



Season's greetings to you all

As the year draws to an end, it is natural to reflect on the work that has been undertaken, facilitated or influenced by the LRG during 2012. It has been a busy and productive year with many new research projects started, a number of research networks formed, technical outputs published and relationships built with influential organisations across the world. At the LRG meeting (November 1-2) in Uruguay we marvelled at the amount of work on-going in the member countries; the round table discussion of country activities revealed a variety of new projects and increasing co-ordination across LRG countries. Pages 2-3 of the newsletter provide a brief overview of the meeting and the outcomes achieved. The full meeting report will be available in the New Year on the LRG website (www.globalresearchalliance.org).

Also in this issue of the newsletter is a report of the recent technical capability building workshop held in collaboration with the Inventories and Measurement Cross Cutting Research Group in Ghana (pages 6-7). This is the third workshop held this year and there were representatives at the workshop from many African countries and nationally focused research organisations. The participants, many meeting each other for the first time, agreed to form a regional science network to consolidate research efforts across the region to avoid duplication of work.

Articles from researchers in Canada (pages 4 -5) and Japan (back page) are presented, with details about innovative research projects that provide in-country solutions to mitigate GHG emissions.

The country focus in this issue is on Ireland, (pages 10-11). An insight into the agri-food economy of Ireland is offered, alongside some good examples of the research currently underway to mitigate GHG emissions. Ireland is the host country of the next LRG meeting (June 28th – 29th, 2013) which follows the Greenhouse Gases and Animal Agriculture (GGAA) Conference (June 23rd – 26th, 2013).

Finally, there is an article about the forthcoming Nitrous Oxide Chamber Methodology Guidelines (page 9) and the usual features highlighting new PhD (page 8) and postdoctoral fellowship (page 1) projects.

With best wishes for a Happy New Year 2013; enjoy reading.

Martin and Harry



Dr. Bambang Kusumo (pictured above), Senior Lecturer at the Faculty of Agriculture of the University of Mataram, and Director of the Research Centre for Rural Development, at the same University, has been awarded a LEARN postdoctoral fellowship to work at the New Zealand Biochar Research Centre, at Massey University, for the next two years.

The objective of his post-doctoral research is the development of Vis-NIR technology to allow the on-site monitoring of stable carbon in soil (including biochar) and the three major environmental factors controlling denitrification fluxes in soil (labile organic carbon, nitrate and absence of oxygen).

The collaborating research group, which includes A/Professor Marta Camps, Professor Mike Hedley and Dr. Caroline Hedley, expects that the spectral reflectance from soil horizons will also hold information on the soil's redox potential and the likelihood that nitrous oxide and methane may be generated.

This will help predict the potential emissions of greenhouse gases (GHG) to the atmosphere from grazed pastures. Measurements will be carried out in on-going field experiments and will be integrated with measurements carried out with other techniques (e.g., chemical and physical fractionation of soil carbon, C13 NMR spectroscopy, Pyrolysis-GC/MS).

Dr Kusumo previous experience in developing the Vis-NIR technique for measuring soil carbon, soil nitrogen and root density developed during his PhD studies at Massey University will help Dr Kusumo refine the technique.

Update from the Livestock Research Group meeting

Punta del Este, Uruguay
1-2 November 2012

The meeting was attended by nearly 30 representatives from 15 countries (Argentina, Canada, Colombia, Germany, Indonesia, Ireland, Japan, Mexico, The Netherlands, New Zealand, Switzerland, United Kingdom, United States of America, Uruguay, and Vietnam) and four organisations (FAO, African Development Bank, FONTAGRO, and World Bank). The fourth meeting of the LRG was an opportunity to review progress of its work plan and agree on a range of new activities and collaborative research projects to accelerate the discovery of mitigation options.

Key points from the review of current activities

One key LRG work area is to identify opportunities for increasing research capability and capacity around the world. To this end, technical workshops have been held in different world regions to scope projects and activities that would help improve understanding of livestock emissions and help scientists to develop locally appropriate mitigation options. Recent activities have focused on projects in south-east Asia and east and west Africa (the latter workshop in collaboration with the Inventories and Measurement Cross Cutting Research Group).

The development of the good practice guide to N₂O chambers is now complete; it is expected to be published on the LRG website early in the New Year 2013. The SF₆ good practice guide has now formally started,

and should be completed in time for presentation at GGAA (June 2013). It is currently co-authored by nine countries. The technical manual on respiration chambers has been published on the LRG website. This is a 'living document' and countries with respiration chambers that are not currently listed in the manual were invited to contact New Zealand if they were interested in contributing their designs.

The trial of the Greenfeed system for rapid measurement of CH₄ emissions from individual cows under New Zealand grazing conditions has been completed. Other countries (Australia, UK) have also purchased units and further trials in all of these countries are continuing. The New Zealand evaluation has also highlighted areas for potential improvement that would be addressed in a collaborative follow-up project.

The four active research networks (rumen microbial genomics, animal selection via genetics and genomics, manure management, and feed and nutrition) are making sound progress and are the main source of scientific work for the LRG. The networks all encourage global membership and all have held an initial meeting and developed work plans with clear agreed science objectives.



LRG meeting Uruguay Minister of Agriculture Mr Aguerre.



The LRG Co-chairs, Harry Clark and Martin Scholten.



GCARD and LRG members on a field trip to Uruguayan farms around Punta del Este.



New areas for future action

The LRG meeting agreed to establish a new research network on the links between animal health status and greenhouse gas emissions intensity. This network draws on the fact that healthy animals are generally more productive and thus have lower emissions intensity per unit of product. This new network is seen as an important link between mitigating agricultural greenhouse gas emissions and delivering on broader

objectives of food security and sustainable agricultural development. The LRG also agreed to explore the potential need for a dedicated research network on the role and management of grasslands with regard to livestock emissions. Uruguay, Ireland, New Zealand and the United States will collaborate to develop the scope of this potential network.

Future technical capability building workshops and follow-up activities are planned for central America and the Caribbean, and central/eastern Europe.

Finally, a range of new collaborative research projects were agreed, either for immediate implementation or to further develop their scope. These include several new projects to further develop novel measurement methods, provide decision-support to farmers, and better understand the factors that influence the adoption of low-cost mitigation options on farms. In a promising

interaction with global industry, a workshop will be held in the first half of 2013 to explore areas in which members of the Sustainable Agriculture Initiative (SAI) Platform could collaborate with scientific experts from LRG member countries.

A full updated work plan of the LRG will be available on the LRG website (www.globalresearchalliance.org).



Finding a balance between Animal Agriculture and Greenhouse Gas Emissions

The Canadian Approach

Worldwide there is an increasing need to find innovative solutions to reduce greenhouse gas (GHG) emissions.

This also holds true in Canada where agriculture accounts for 8% of its total GHG emissions and agricultural emissions have increased by 19% since 1990, due to expanding beef cattle and swine populations and increased use of synthetic nitrogen fertilizer (Environment Canada 2010).

As part of its commitment to the Global Research Alliance, Agriculture and Agri-Food Canada (AAFC) launched the Agricultural Greenhouse Gases Program (AGGP) to advance research, transfer new technologies, and encourage the adoption of beneficial management practices to mitigate agricultural GHG emissions. More than \$20 million has now been allocated to 19 projects managed by industry and university researchers for research and technology transfer initiatives to reduce enteric and manure emissions from Canadian beef and dairy operations.

Example livestock projects

- University of Alberta: \$828,850 to study GHG emissions for the cow-calf sector. The project focuses on: 1. swath-grazing, the practice of leaving cereal crops in the field for cattle to graze during winter, and 2. residual feed intake, the efficiency with which beef cattle retain energy that they convert from feed.



CO₂ exchange above pasture and enteric CH₄ emissions measured on grazing cattle using micro-meteorological techniques at the Lethbridge Research Centre.

- University of Manitoba: \$2,996,451 to study GHG emissions related to livestock and cropping systems with a focus on beef cow-calf operations in non-confinement production systems, where cattle are allowed to graze during the winter rather than keeping them in a confined area.

Enteric Methane Research at AAFC

AAFC also conducts research at its 19 centres across the country and is developing mitigation practices to reduce GHG emissions from agricultural sources. With 34% of agricultural GHG emissions originating from enteric methane, research at several facilities focuses on livestock production. The research centres in Lethbridge (Alberta) and Sherbrooke (Québec) are equipped with specialized large animal chambers used to measure enteric methane emissions from beef, sheep, and dairy animals. Researchers also use tracer and micrometeorological techniques to measure emissions from cattle grazing in pastures.



Use of the SF₆ tracer gas technique to measure enteric methane emissions from grazing cattle at the Semiarid Prairie Agricultural Research Centre, Swift Current, Saskatchewan.



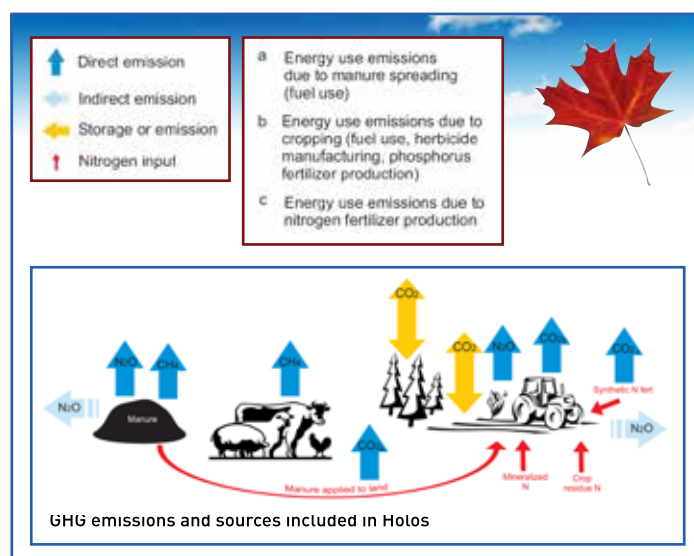
Environmental chambers used to measure enteric methane emissions at (left) the Dairy and Swine Research and Development Centre, Sherbrooke, Québec and (right) the Lethbridge Research Centre, Alberta.



Farm Systems Modeling



Scientists at AAFC have also developed Holos, a whole-farm systems model that uses Canada-specific factors to estimate GHGs from crop and livestock production and test possible ways of reducing emissions on farm. Holos is used by farmers to look into the future, to ask 'What-if?', and test a number of hypothetical scenarios to contemplate possible options that reduce GHG emissions. Holos uses a whole farm systems approach to estimate how mitigation options implemented on one site of the farm could affect total livestock production and productivity of the farm. Holos is helping farmers find new ways of reducing GHGs so that Canadian livestock production can continue to grow in an environmentally sustainable manner.



For further info:

AGGP and AAFC: www.agr.gc.ca

HOLOS: Holos@agr.gc.ca

Livestock Research Contacts at AAFC	Email: first name. last name@agr.gc.ca
Karen Beauchemin (beef and dairy nutrition, Holos development)	Chaouki Benchaar (dairy nutrition)
Bob Forster (rumen microbiology)	Alan Iwaasa (grazing cattle)
Henry Janzen (Holos development)	Roland Kroebe (Holos development)
Shanan Little (Holos co-ordinator)	Daniel Massé (manure management, biogas)
Tim McAllister (beef cattle nutrition, rumen microbiology)	Sean McGinn (measurement)

Karen Beauchemin: Agriculture and Agri-Food Canada, Lethbridge Research Centre, Lethbridge, Alberta, Canada T1J 4B1



Workshop on building capability in measurement, inventory and mitigation of greenhouse gases for African farming systems

Accra, Ghana 19-21 November 2012

New Zealand Government

The Governments of Ghana, Canada, France, the Netherlands, and New Zealand were the joint hosts of a three day workshop on measurement and inventory of agricultural greenhouse gases in African farming systems, 19-21 November 2012 in Accra, Ghana. Forty participants representing Government, national research institutes, universities and invited experts attended the workshop. African country participants came from: Benin, Gabon, Ghana, Kenya, Malawi, Mali, Niger, South Africa, Togo, Zambia, and Zimbabwe.

The aims of the workshop was to improve understanding of African farming systems and to document critical data, knowledge, and capability gaps that need to be addressed to enhance the countries' ability to measure, monitor, and quantify greenhouse gas emissions in order to inform efforts to improve productivity and resiliency of agriculture under climate change in a sustainable manner.

To achieve these aims, the workshop had two targeted objectives:

- a) Develop a common understanding of production systems that represent regional practices and existing activity data and Identify crucial areas within those production systems where region/country-specific emission factors should be developed via measurements. The longer-term goal is to identify critical needs for measurement guidance and methodologies and to undertake



Delegates at the workshop came from across Africa, Canada, Germany, the USA, New Zealand and the Netherlands.



The hosting committee: Jerome Boutang (France), Brian McConkey (Canada), Nicholas Iddi (Ghana), Jan Verhagen (the Netherlands)



priority measurements across the region to improve national inventories.

- b) Improve opportunities for countries to identify similar systems so as to better share knowledge on improved production practices, environmental sustainability, and resilient and resource efficient farming systems

Key outcomes

Over the three days of the workshop, participants identified a series of outcomes and next steps for continuing discussions on agricultural measurement and mitigation opportunities for Africa. Activities were considered in three key categories:

1. Developing a scientific network to improve emission factors and activity data bringing existing networks together to improve communications across the region;
2. Improving links between science and policy to transfer knowledge and develop feedback loops between science and governments, industry and the private sector;
3. Training and capacity building on measurement techniques to improve emission factors.

All participants will report back to their Governments and encourage countries to join the Global Research Alliance to advance research and collaboration in this area.



A fieldtrip at the end of the workshop to the Institute of Livestock enabled participants to look around the laboratory facilities, visit the farms and view an experimental biogas production site.

How do different types of farm dairy effluent affect ammonia volatilization and nitrous oxide emissions from pasture soils?

Jie Li, who has recently received a scholarship from the LEARN co-funded PhD programme, will hopefully have the answer to this question at the end of her PhD programme. Jie is enrolled in her PhD at the Chinese Academy of Sciences (CAS) and works under the primary supervision of Ecology and Fertilizer Professor Yuanliang Shi, an expert in plant nutrition, nitrogen cycling and soil science. However, Jie will be based at AgResearch, in Ruakura, New Zealand for the majority of her PhD, studying under the supervision of co-supervisors Drs Jiafa Luo and David Houlbrooke; two study periods in China will enable Jie to undertake field work and facilitate the transfer of knowledge between institutions.

Jie's research project will investigate potential technologies for reducing greenhouse gas emissions and denitrification nitrogen losses from land application of Dairy Farm Effluent (DFE). The aim of the project is to quantify gaseous NH_3 and N_2O losses from DFE applications over several contrasting seasons, and to assess the associated N movement in the soil profile. The potential for urease and/or nitrification inhibitors applied with to reduce gaseous N losses, increase pasture production and increase N use efficiency will be evaluated in the laboratory and in the field.

Through this research programme, Jie will become familiar with current standard research techniques for measuring both nitrous oxide and ammonia emissions and other nitrogen cycling processes. Jie Li has a strong desire to contribute to science advancement in agricultural greenhouse gas research and apply her knowledge to mitigate nitrous oxide and ammonia emissions from agriculture in China.



Jie Li taking samples from the experimental site in Hamilton, New Zealand.

LEARN Co-Funded PhD Scholarship research in Agricultural Greenhouse Gases



Learn

Livestock Emissions & Abatement Research Network

The New Zealand Government in support of the goals of the Global Research Alliance is co-funding PhD students from developing countries to benefit from having a supervisor from New Zealand for the duration of the PhD project. The Scholarship is for a maximum of three years duration and the student can be enrolled in a PhD programme in their home country or at a New Zealand Institution to receive the Scholarship.

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 identified a suitable PhD supervisor in a New Zealand research organisation who will be an integral part of the PhD supervisory team for the duration of the PhD.
- Be a high achieving student (supported by academic transcripts, letters of recommendation and publishing record (if appropriate)).
- Be enrolled or in the process of enrolling in a PhD programme in an area of research aligned with livestock GHG emissions mitigation in your home country and/or a New Zealand Institution.
- Have secured or are likely to receive co-funding (this could be a Scholarship or a stipend) from an organisation in your home country or elsewhere.

Funding

The Scholarship is awarded for three years.

- NZ\$15,000 per year for a stipend for a maximum of three years.
- Up to \$5,000 will be provided for economy airfares and travel/medical insurance.

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

A common protocol for measuring N₂O fluxes using chamber methods

For the last 30 years static chamber methodologies have been commonly used to measure N₂O fluxes from agricultural soils. The main advantages of static chamber techniques are that they are relatively inexpensive, versatile, and very easy to adopt. Consequently, the majority of our knowledge and understanding of N₂O emissions that underpins both the estimation of national emission inventories from agricultural soils and the efficacies of potential mitigation practices is based on N₂O static chamber measurements.

A recent review of N₂O emissions studies using chamber methodologies from around the world highlighted that there is large variation in chamber design, deployment and data analysis resulting in variable data quality. This has implications for the reliability of N₂O emission factors derived from these data and limits comparisons of data across studies.

In 2011 and 2012, the New Zealand Ministry for Primary Industries in support of the objectives of the Global Research Alliance sponsored a project to develop standard guidelines for the use of chambers to measure N₂O fluxes. In May 2011 an initial workshop was held in Lincoln, New Zealand. Leading international researchers with expertise on different aspects of N₂O chamber methodologies discussed a range of topics and agreed the broad content and structure of a booklet Nitrous Oxide Chamber Methodology Guidelines. The experts also assigned editors and (lead) authors for the different chapters:

Nitrous Oxide Chamber Methodology Guidelines

Cecile de Klein & Mike Harvey (Eds)

1. **Introduction** – Cecile de Klein & Mike Harvey (New Zealand).
2. **Chamber design** – Tim Clough (New Zealand) et al.
3. **Deployment protocol** – Philippe Rochette (Canada) et al.
4. **Air sample collection, storage and analysis** – Frank Kelliher (New Zealand) et al.
5. **Automated GHG measurement in the field** – Peter Grace (Australia) et al.
6. **Data analysis considerations** – Rod Venterea (US) et al.
7. **How to report your experimental data** – Marta Alfaro (Chile) et al.
8. **Health and safety considerations** – David Chadwick (UK) et al.

Since this first meeting, researchers from around the world have been working together to write chapters for the different steps in producing N₂O flux data from the use of chambers. These chapters each include i) agreed minimum standards, ii) site or system specific requirements and iii) evolving standards.



Style editor Dave Hansford and technical editors Cecile de Klein (AgResearch) and Mike Harvey (NIWA). Photo: Dave Allen (NIWA).



Delegates from Australia, Canada, Chile, Denmark, NZ, UK and US.

In June 2012, a delegation of the lead-authors and editors met again in Wexford, Ireland, to discuss some key issues that had emerged during the writing process. These largely focussed on

- i) minimum requirements for the number of headspace samples per flux measurement
- ii) flux calculation methods
- iii) cost-effective deployment under high spatially and temporally variable fluxes

This face-to-face meeting was invaluable for reaching consensus and by August 2012, the draft booklet was completed and submitted for international peer-review. The peer review comments have now been received and addressed and it is expected that a first version will be published on the Alliance website by the end of December 2012 www.globalresearchalliance.org.

These guidelines are a 'living document' and it is anticipated that there will be future updates to document evolving issues and new understanding.

*corresponding authors:

Cecile de Klein: cecile.deklein@agresearch.co.nz

Mike Harvey: Mike.Harvey@niwa.co.nz



Delegates meeting in Johnstown Castle Wexford Ireland, June 2012.



Chamber deployment. Insulated cover with water trough base (left); Headspace sampling (right).

Photos: Selai Letica (AgResearch)



A country focus: Ireland

Ireland's mild and moist climate reflects its position at 51° to 55° north latitude off the west coast of Europe, with the moderating influence of the Atlantic's gulf stream being particularly important. This climate results in grassland dominating the Irish landscape, accounting for 55% of the total area and over 90% of the area used in agriculture.

The agri-food sector is important to the Irish economy, and contributes 7.7% of employment, 6.3% of gross value added and 25% of net foreign earnings. Beef and dairy production are particularly important, with approximately 90% of output being exported. The Irish

government's roadmap for the agricultural industry, Food Harvest 2020, envisions a range of ambitious targets including a 50% increase in milk production and a 20% growth in both beef and sheep output value by 2020 (relative to 2007-2009). Fundamental to this strategy will be an emphasis on promoting sustainable pasture-based farming and soil management while simultaneously reducing the carbon intensity of agricultural activities and enhancing carbon sinks.

Agriculture is calculated to currently account for 30% of Ireland's greenhouse gas emissions, with enteric fermentation,

manure management, nitrogen application to agricultural soils and the associated use of fossil fuels accounting for 46%, 28%, 22% and 4%, respectively, of total emissions from agriculture. Under the European Union's Climate and Energy Package, Ireland is required to deliver a 20% reduction in non-ETS (Emissions Trading Scheme) greenhouse gas emissions by 2020 (relative to 2005 levels).

There has been an active research programme in Ireland for the past decade seeking to identify and exploit opportunities to reduce greenhouse gas emission intensities from all agricultural systems, and to increase



carbon sequestration where feasible. The emphasis has been both to increase overall system productivity and reduce greenhouse gas emissions. In addition to providing the information to allow progression from Tier 1 to Tiers 2 and 3 emissions calculation, there have been in vivo and in vitro studies on enteric methanogenesis, and on gaseous losses from both manure and soils. Selected mitigation measures being evaluated include:

- Improvement of genetic merit of cows
- Extension of the grazing season
- Reducing beef finishing times
- Restructuring the national bovine herd
- Improvement of nitrogen efficiency

- Increased use of clover
- Use of nitrification inhibitors
- Minimum tillage techniques.

Each of these, together with other options is being evaluated within whole-farm systems models that calculate both the economic and the greenhouse gas mitigation effects. In addition, studies are being undertaken on the displacement of fossil fuels through the domestic production of biofuel. A 'Marginal Abatement Cost Curve for Irish Agriculture' was produced in 2012, and it set out both the potential mitigation options available for Irish agriculture and the cost associated with

them. This showed that the most cost effective mitigation strategies were those that improved the technical efficiency of farm enterprises. Against this background, a decision-support system ('The Carbon Navigator') has been developed to assist farmers assess their current performance in relation to greenhouse gas mitigation and to chart a path to help lower their emissions.

For further details regarding any information presented here contact: padraig.okiely@teagasc.ie



Learn
Livestock Emissions &
Abatement Research Network

LEARN Postdoctoral Fellowship

The New Zealand Government in support of the goals of the Global Research Alliance is funding postdoctoral fellowships for emerging scientists from developing countries to benefit from working on a research project mentored by a New Zealand researcher while being based at a New Zealand institution. The Fellow must be employed in a research post in their home country to receive the award.

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 gained a PhD in the last 5 years
- Be a high achieving researcher (supported by academic transcripts, letters of recommendation and publishing record)
- At the time of application be employed in an area of research aligned with livestock GHG emissions mitigation in your home country
- Have the support of your employer to apply for the Fellowship

Funding

The Scholarship is awarded for up to two years with an expected minimum duration of 12 months.

- NZ\$50,000 per year for a maximum of two years
- Up to \$5,000 will be provided for economy airfares and travel/medical insurance

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

Development of Mitigation Technologies of GHGs Emissions from Animal Waste Treatment in Japan

A project financially supported by the Ministry of Agriculture, Forestry and Fisheries, Japan.

Livestock wastes are a major source of nitrous oxide (N_2O) and methane (CH_4). The national GHGs inventory in Japan estimates total emissions of 1,184,802 Gg CO_2 -eq with 7,680 Gg CO_2 -eq of that coming from livestock wastes (2010). The Government has pledged to reduce GHG emissions and to help achieve this, it invested in the development of mitigation technologies to inhibit GHGs emitted from solid manure composting systems, livestock wastewater purification systems and slurry storage. The aim is to reduce GHG emissions in these areas by 25% using these new technologies.

To reduce GHGs emissions from the composting of animal waste we have investigated the nature of the microbial communities responsible for the high levels of N_2O emissions using molecular analysis of bacteria and an N_2O isotopomer analysis. Using this information, we developed a mitigation technique that controls microbial communities through the addition of nitrite-oxidizing bacteria during the composting process. Nitrite (NO_2^-) accumulation is responsible for significant N_2O generation and the addition of nitrite-oxidizing bacteria reduces NO_2^- accumulation, which leads to the reduction of N_2O emission [see Figure 1].

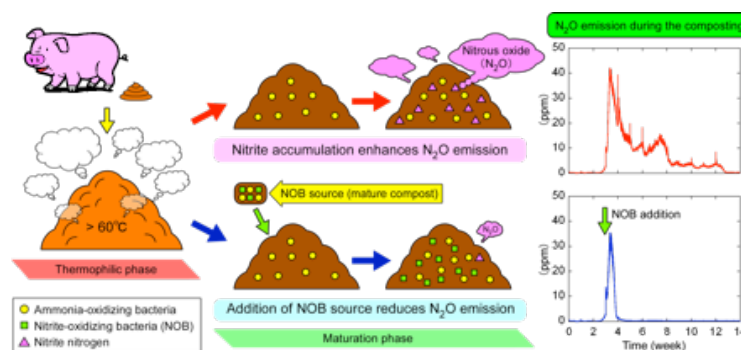


Figure 1. Nitration promotion process for reducing N_2O emission

During the activated sludge treatment of wastewater, the accumulation of nitrite/nitrate nitrogen enhances N_2O emissions. A study that is just beginning will seek to develop a wastewater treatment system with low nitrite/nitrate nitrogen accumulation, which will lead to low N_2O emissions. The project will consider the use of a Bioreactor packed with a carbon fiber biofilm which will reduce the accumulation of nitrite/nitrate nitrogen [see Figure 2].

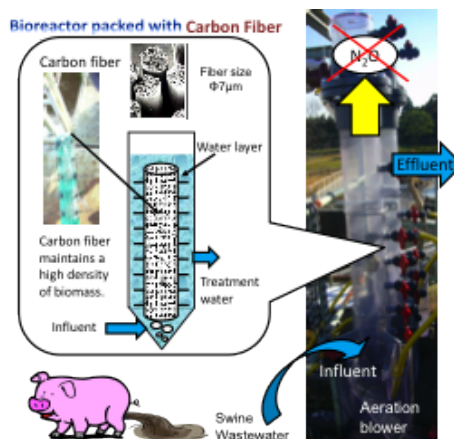


Figure 2. Development of new wastewater treatment system with low GHGs emission

STOP PRESS

Offered paper submissions for the GGAA conference 2013 are due on the 18th January 2013. www.ggaa2013.ie