



Happy Holidays!

Update from the Co-Chairs

This newsletter marks the end of another busy year for the Livestock Research Group (LRG) with several flagship projects ending and new ones beginning, a number of meetings taking place, new member countries and partners being welcomed, a step up in LRG communications and outreach, and delivery of a wide range of capability building initiatives. Updates on many of these activities are included in the following pages.

A new feature in this newsletter is a guest article from CCAFS (CGIAR's Climate Change, Agriculture and Food Security programme), sharing their thoughts on what the historic Paris Agreement from COP21 might mean for agriculture.

It is timely at this point to pause and reflect on the level of action taking place across the LRG. Each year we say that it has been "another busy year", yet the GRA effort just keeps growing. We know that for many of you, GRA work has to be squeezed in around your day jobs – we are tremendously grateful for your ongoing support and involvement across our increasingly broad work programme.

2016 is looking no less busy with some exciting opportunities coming up for the LRG, particularly in terms of advancing priorities within the research networks and building capability amongst LRG members. In addition, work is underway at the GRA Council level to develop a five-year strategic plan, as well as better connecting the GRA with its formal partners and more broadly raising its public profile. All of this will undoubtedly help us to deliver the LRG's work programme.

We look forward to exploring these opportunities and more with you at our upcoming LRG meeting in February. We are delighted to announce the Australian Government will be hosting us for this event, which also includes a joint meeting with the co-chairs of the GRA's new 'Integrative Research Group'. By now you should have received a copy of the draft agenda for your review and comment, along with details on the registration process. If you have any questions about the meeting, please contact the [Secretariat](#).

Note that the LRG meeting follows the sixth [Greenhouse Gas and Animal Agriculture](#)

[Conference](#) (14-18 February) – we encourage all LRG representatives to attend this important international event on livestock emissions research. Page 5 of this newsletter highlights some GGAA programme elements of particular interest to the LRG.

In closing, please accept our very best wishes for 2016 – we look forward to seeing you in Melbourne.

Harry and Martin

8th Livestock Research Group meeting, February 2016

The next meeting of the LRG will be held in Melbourne, Australia, 19-20 February 2016, immediately following the sixth international Greenhouse Gas & Animal Agriculture (GGAA) conference (14-18 February). Registration forms for the LRG meeting have been sent to representatives and should be returned to the [GRA Secretariat](#) by 29 January 2016.

Advancing greenhouse gas inventories in South-East Asia

Countries are increasingly interested in understanding how their national greenhouse gas (GHG) inventories can more accurately capture the impact of improved agricultural productivity in terms of reducing GHG emissions intensity.

The GRA has the dual purpose of reducing emissions intensity of food production while also supporting and enhancing food security. In livestock systems, it is commonly accepted that this is most effectively achieved by

increasing the productivity of animals and the efficiency of farm systems. Many of the practical steps to achieve this have been summarised by the LRG in conjunction with the Sustainable Agriculture Initiative (SAI) Platform in a [recent document](#) on current best practices and emerging options to reduce greenhouse gas emissions from livestock.

As animals increase their productivity, their emissions intensity decreases because less of the energy they consume is used for body maintenance and more is used to produce milk and meat. But such reductions in

emissions intensity remain invisible in many countries, because they use so-called 'Tier 1' inventories to report their greenhouse gas emissions from livestock. Tier 1 inventories calculate emissions based on the number of animals and an emission factor (e.g. kg methane per animal per year). Since these emission factors are not assumed to change over time, such inventories are not suitable for reporting changes in emissions intensity.

By contrast, Tier 2 inventories calculate emission factors based on the amount of energy or dry matter consumed by animals, and a methane yield that gives the



Participants at the LRG inventory workshop in Thailand, September 2015.



Laotian woman tends to a water buffalo.

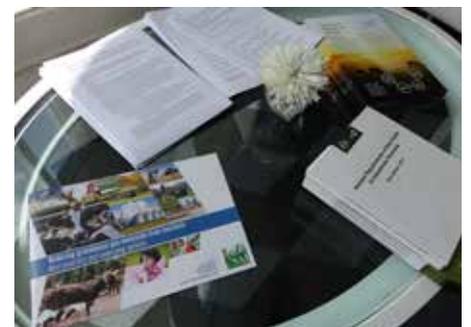
amount of enteric methane produced per kg of dry matter or per kilojoule of gross energy consumed. Farmers and national statistics have a much better chance of reporting how much their animals eat on average, and thus to capture changes in emissions and emissions intensity over time. More importantly, the only chance to reduce emissions in Tier 1 inventories is to reduce the number of animals, whereas Tier 2 inventories allow countries to report reductions in emissions intensity arising from increased productivity. Advanced inventories thus demonstrate a win-win for agricultural and economic development goals and reducing the amount of emissions per unit of food produced.

A workshop held in September 2015 in Bangkok explored the potential benefits, challenges and next steps for countries interested in developing Tier 2 inventories for livestock systems in South-East Asia. The workshop was hosted by the Government of Thailand and funded by the Government of New Zealand in support of the LRG. Representatives from science and policy organisations from Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam participated, supported by experts from Canada, Colombia, Japan and New Zealand.

The workshop explored the principles underlying Tier 2 inventories and the ways



in which national climate and development goals could benefit from advanced inventories to monitor and report their emissions. Countries then determined priority emission sources and developed initial structures for Tier 2 inventories for those sectors, and scoped the minimum data required to turn such inventories into reality. While scientists and policymakers are often concerned about the complexity and data needs of advanced inventories, a key message from the workshop was that Tier 2 inventories do not have to be much more complex and do not necessarily require many more measurements than Tier 1 inventories. Rather, they can help countries identify priorities for measurements and start a process of gradual and continuous improvement.



The workshop closed with countries setting out their next steps to develop their inventories further. A follow-up workshop is planned for July 2016, which will be hosted by the Government of Indonesia. A report of the workshop with next steps for each country can be found [here](#).

Making the UNFCCC work for agriculture

Nicely complementing the September workshop on advanced inventories, the Food and Agriculture Organisation (FAO) hosted a workshop from 19-20 November also in Bangkok entitled “Making the UNFCCC work for Agriculture in Asia and the Pacific”.

The two-day workshop explored how mechanisms set up under the UNFCCC can be used to support countries’ agricultural development goals by better leveraging the UNFCCC framework to deliver climate-resilient, low emissions development in the agriculture sector (comprising crops, livestock, forestry, fisheries and aquaculture). Representatives from Ministries of Agriculture, Environment and other relevant sectors in 15 countries across Asia and the Pacific participated in the meeting, supported by experts from FAO, UNFCCC, CGIAR technical centres, other UN partner organisations, and national and regional research institutions.

The workshop heard presentations, hosted discussions and encouraged countries to develop specific project ideas relating to Intended Nationally Determined Contributions (INDCs) to a future climate agreement, climate finance mechanisms to support agricultural development, technical challenges and ways of addressing them, and key ways for countries to increase their involvement.

Key messages from the workshop included:

- While the agriculture sector in Asia and the Pacific is at risk from climate change, finding ways to reduce emissions from the agriculture sector will be an important way to achieve the global 2°C target
- Current workshops and discussions in the UNFCCC Subsidiary Body on Scientific and Technological Advice (SBSTA) are an important way for countries to draw attention to key issues for the agriculture sector in the region
- INDCs have provided an important opportunity to highlight priority actions that countries can take to promote resilient and low emissions development in the agriculture sector

- Coordination among Environment and Agriculture Ministries will be essential to ensure that the specific opportunities for agriculture are properly reflected in future contributions
- There is a role for international organisations to support Agriculture Ministries to engage with UNFCCC processes and international climate financing schemes

One issue discussed in the workshop was that low emissions agriculture development can run alongside economic development through increasing agricultural productivity. Indeed, many of the specific project ideas put up by participating countries relating to mitigation outcomes focused on increasing productivity and yields per animal or per hectare. But a common theme was that quantifying the resulting emissions reductions (and attracting climate finance to help achieve such reductions) was difficult within current inventory and reporting systems, which in most countries rely on Tier 1 inventories and thus leave a much smaller set of policy options.

The LRG’s capability building programme (in conjunction with GRA partners such as FAO and CCAFS), is an important bridge between policy and science. It is helping identify country-specific opportunities to improve productivity, and ensuring that resulting changes in emissions intensity can be documented through advanced inventories.

The workshop agenda, participants, presentations and country posters/projects can be found [here](#).

Reducing the emissions intensity of agriculture: Uruguay’s INDC

The INDC submitted by Uruguay provides a great example of a country linking its development goals with climate targets. The INDC sets a minimum goal for the emissions intensity of beef production to be reduced by 31-33% below 1990 levels by 2030 with domestic resources only, and by 41-46% with additional means of implementation (reductions for methane and nitrous oxide, respectively). These goals build on a strong and growing research investment and capability building, and international partnerships developed by Uruguay’s leading policy, research and agricultural extension organisations.

Much of the data underpinning Uruguay’s INDC for the beef sector was generated by another international project supported by the LRG. The flagship project ‘[Reducing enteric methane for improving food security and livelihoods](#)’, funded by the Climate and Clean Air Coalition and the New Zealand Government and delivered by the FAO with the New Zealand Agricultural Greenhouse Gas Research Centre (see newsletters from [August](#) and [October](#) 2015), seeks to identify nationally appropriate intervention packages that increase productivity and support livelihoods while reducing emissions intensity of livestock production.

A first step of the project is to gather existing data for production systems and estimate their associated emissions, and then to identify opportunities to increase productivity and increase efficiency, and estimate the resulting climate benefits. Phase 2 of the project will seek to implement priority intervention packages on demonstration farms in selected countries, and to identify mechanisms to up-scale those interventions.



(Left) Activities at the two-day FAO workshop in Bangkok, November 2015.

Bringing together the global research community: the GGAA and the LRG

Sixth Greenhouse Gas & Animal Agriculture conference, 14-18 February 2016.



The [GGAA](#) is the world's premier event on livestock emissions research and it will meet consecutively with the LRG in Australia in February 2016, bringing together the global research community of livestock emissions experts. This is the sixth GGAA and the third one to incorporate an LRG meeting. The last GGAA was held in Ireland in 2013 and previous events have been held in Canada, New Zealand, Switzerland and Japan.

The conference programme is jam-packed with talks, workshops and poster presentations of core interest to the LRG (and in many instances featuring familiar faces). A few such examples include:

Saturday/Sunday 13-14 February

- A workshop on 'Metabolic gases and the GreenFeed system', sponsored by C-Lock

Monday 15 February

- Pierre Gerber (World Bank, formerly FAO) discussing the policy challenges of balancing food security and GHG mitigation
- The LRG's own Martin Scholten (Wageningen, Netherlands) presenting on international initiatives in support of agricultural GHG mitigation
- Greg Cook (New Zealand) explaining a pharmaceutical approach to methane inhibitors (relating to a GRA project supported by the New Zealand Government via its Global Partnership on Livestock Emissions Research fund)
- Mark Powell, the US LRG representative, discussing GHG emissions from different dairy barnyard surfaces

Tuesday 16 February

- Jean-Francois Soussana, co-chair of the GRA's new Integrative Research Group, sharing an update on the AgMIP/ GRA model inter-comparison

Thursday 18 February

- Bill Kelly from New Zealand presenting on a flagship LRG project, the 'Hungate 1000'
- Ben Henderson (CSIRO, Australia) presenting on the GHG mitigation potential of grazing lands via modeling soil carbon and nitrogen fluxes of mitigation practices
- Last but very definitely not least, Harry Clark, LRG co-chair (NZAGRC, New Zealand), discussing how much livestock actually contributes to global warming

We are also anticipating presentations from some of the LRG's networks, including Alex Hristov and Jan Dijkstra from the Feed & Nutrition Network, Jamie Newbold of the Rumen Microbial Genomics Network and Dave Chadwick of the Manure Management Network.

Eighth Livestock Research Group meeting, 19-20 February 2016



The GGAA and the LRG have been closely associated over the years, with the LRG making the most of the GGAA's global gathering of scientists to meet in its margins. The 2016 GGAA is no exception, with an LRG meeting hosted by the Australian Government on February 19-20 and various meetings of the LRG's research networks taking place in the margins (see text box).

The LRG meeting will focus on advancing several opportunities during 2016 including:

- Celebrating the success of the LRG: identifying new ways and strengthening existing ways to promote the LRG and its activities
- Resourcing: facilitating the LRG's involvement (via its research networks) in the upcoming ERA-GAS funding round
- Capability: capturing the benefits of productivity on emissions intensity including identifying training needs and options for advanced inventories
- Partnerships: identifying practical ways to continue strengthening the LRG's relationships with key partners

The LRG meeting will also incorporate a joint session with the co-chairs of the GRA's new 'Integrative Research Group'. This group is a merger of the GRA's previous two cross-cutting groups (Soil Carbon & Nitrogen Cycling, and Inventories & Monitoring), which was agreed at the Council meeting in September 2015.

LRG representatives have been contacted directly about the meeting but please get in touch with the [GRA Secretariat](#) for more details.

LRG Research Network meetings, February 2016

Sunday 14 February:

- Animal Selection, Genetics and Genomics Network meeting (see the [ASGGN website](#))
- Manure Management Network meeting (email the [network coordinators](#))

Tuesday 16 February:

- Joint meeting of all the research networks, picking up on progress since the last joint meeting in June 2015 (see [here](#))

Thursday 18 February:

- Feed & Nutrition Network meeting (email the [network coordinator](#))



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CCAFS' views on the Paris Agreement and its impact on agriculture

In a guest article, CCAFS (CGIAR's Climate Change, Agriculture and Food Security Programme) has kindly shared its analysis of the UNFCCC Paris Agreement and the potential opportunities for food and farming.



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After two weeks of negotiations, nearly 200 nations have finally agreed on a global climate change agreement to replace the nearly expired Kyoto Protocol. The Paris Agreement – which aims to limit the increase in global average temperatures to “well below two degrees C” and to pursue efforts to limit it to 1.5 degrees C – will come into force in 2020, and has already been hailed as historic and ambitious by many world leaders.

Though agriculture is not mentioned by name, food security, food production, human rights, gender, ecosystems and biodiversity are explicit in the Agreement:

- The preamble of the [Paris Agreement](#) makes specific reference to “safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change” and also refers to

human rights, gender, ecosystems and biodiversity, all issues that are central to agriculture.

- Article 2.1 of the Agreement mentions the importance of protecting food production while reducing emissions.

The ambitious 1.5 degree C target offers some hope for farmers and food security:

- The Paris Agreement aims to limit global temperatures “well below” two degrees C, and pursue a 1.5 degree target. As CCAFS has previously outlined, the debate between a 1.5 or two degree C target [means different future scenarios for agriculture](#).
- A 1.5-degree temperature rise would produce fewer climate extremes than a two degree C temperature rise, which is good news for farmers in the tropics, who are on the frontline of heatwaves, droughts, floods and cyclones.

Nations Unies

Conférence sur les Changements Climatiques 2015

COP21/CMP11

Paris France



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A 1.5 degree C target demands urgent mitigation in agriculture sector:

- As CCAFS has noted elsewhere, [a 1.5 degree C target will require even more mitigation effort from the agriculture sector than a two degree C target](#). But even with a two degree C target, by 2050 we will likely run out of viable options for reducing emissions from the industrial, transport and energy sectors.
- Reducing emissions from agriculture will be imperative as it will be impossible to stay within either a 1.5 or two degree C target if agriculture does not contribute to emissions reductions.
- The Paris Agreement notes that, on the whole, country commitments to reducing emissions will not limit global temperature rise to two degrees and that “*much greater emission reduction efforts will be required*”.

Countries want to take action on adapting agriculture and reducing emissions from farming – but funds are not yet there:

- Considerable finance is needed for agricultural adaptation and mitigation by Least Developed Countries (LDCs). [CCAFS’ analysis of the INDCs calculates at least USD 5 billion annually](#).

- The Paris Agreement commits developed countries to set a new collective financing goal of at least USD 100 billion per year, “*taking into account the needs and priorities of developing countries*” but does not include binding requirements on financial contributions by individual countries.

Issues related to agriculture are being discussed in a slow-moving parallel process under the Subsidiary Body for Scientific and Technological Advice (SBSTA):

- Now is the time for countries and observers to prepare their submissions on agriculture to SBSTA for discussion at workshops scheduled for June 2016. [Submissions are due 9 March 2016](#).

Critical next steps for the global agriculture community

There are some imminent challenges, now that the deal is done. Will countries take action quickly enough to limit global warming below 2-degrees? Will funding will be on hand to support developing countries to implement their plans to combat and adapt to climate change in the agriculture sector? And will there be enough political will to move away from ‘business as usual’?

The Paris Agreement opens the door to further work on agriculture between now and 2020, when the Agreement takes hold. This is the chance for the global agriculture community to step up and drive action.

To read CCAFS’ full analysis of the COP21 outcomes for food and farming, download their latest [info note](#). Visit the [CCAFS website](#) to view the original version of this article, along with suggestions for further reading.

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Paul Boma, recipient of a New Zealand LEARN technical training award.

Supporting livestock emissions measurement in Uganda

Work is underway in Uganda to establish a framework for a national greenhouse gas (GHG) inventory system. However, with very little data on methane emissions from the different livestock production systems across the country and very few people trained in measuring these emissions, it is a challenge to accurately include information on livestock in the national inventory.

Last year, the New Zealand Government sponsored a LEARN fellow from Uganda, Stephen Olinga, to receive technical training in New Zealand on livestock emissions measurement (see the [October 2014 LRG Newsletter](#)). To continue building Uganda's scientific capability in livestock emissions measurement, a second LEARN technical training fellowship has been awarded to a Ugandan scientist – Paul Boma, who works with Stephen at the Ugandan National Agricultural Research Organisation (NARO).

Paul is a qualified veterinarian, currently acting Program Leader Livestock and Fisheries Research and Development based at the Nabuin Zonal Agricultural Research and Development Institute in the Karamoja region. He works on dry season feeding projects, including evaluating different grasses and legumes for adaptability in the dry lands, their nutritive value and identifying grass-legume combinations for

ruminant feeding to improve productivity and reduce the time to market from the current 4-5 years to 1.5-2 years. He is also working to encourage Ugandan pastoralists to adopt pasture preservation techniques (especially hay and silage making) during times of growth for feeding livestock during the long dry spells, and is spearheading a cattle cross-breeding program between the small east African zebu and the Jersey and sahiwaal breeds for increased milk production.

Paul is visiting AgResearch in New Zealand on a six month LEARN technical training award to gain knowledge and skills in methane measurement techniques in ruminant livestock, in particular around the SF₆ tracer technique. He will be involved in a dairy cattle trial using SF₆ including subsampling and preparation and maintenance of SF₆ gear, and will participate in other studies using different measurement techniques

including respiration chambers and in vitro gas production. For the in vitro technique, he will learn to use the automated system developed in New Zealand, but will also work with a manual system, which is more readily applicable to research programmes in Uganda.

Paul hopes to use this knowledge to contribute to a Ugandan working group that was set up in July 2014 to generate data for the livestock sub-sector in order to understand its contribution to the national GHG inventory. He also wants to work with farmers and local government to improve their understanding on why it is relevant to mitigate greenhouse gases from livestock. Thanks to this LEARN award, Paul will boost the technical capacity available in Uganda to inform policy development on the research agenda of livestock GHG emissions and their mitigation.



Dr Sven Sommer, GRASS award recipient from the University of Southern Denmark.



Technician from Lincoln University taking samples from stored liquid manure.

Reducing CH₄ and N₂O emissions from liquid manure: outcomes of an exchange between New Zealand and Denmark

New Zealand dairy farmers collect around 70 million m³ liquid manure annually from milking parlours and feed pads – a large source of both methane (CH₄) and nitrous oxide (N₂O) emissions.

Scientific understanding of emissions from dairy farm effluent management in New Zealand's predominantly pastoral dairy systems is limited and it is not clear to what extent mitigation options developed overseas can be applied to those systems. A Global Research Alliance Senior Scientist (GRASS) Award recently enabled New Zealand and Danish scientists to collaborate on a joint project to expand knowledge in this area.

Dr Sven Sommer, a Professor at the University of Southern Denmark and a European expert in livestock manure management to reduce greenhouse gas emissions, spent five months at Lincoln University this year working with Dr Tim Clough, Professor of Environmental Biogeochemistry. Together they explored the hypothesis that CH₄ and N₂O from liquid manure could be reduced by either acidification of the manure or by liquid manure separation immediately after transfer from feed pads and milking parlours.

Acidification of livestock slurry is already considered an efficient technology to reduce ammonia (NH₃) emissions from stored livestock manure because release of NH₃ stops at a low pH. The joint research investigated whether acidification of stored slurry could also inhibit the microbial transformation of organic matter in anaerobic ponds and therefore reduce methane production. The team found that reducing the pH to 5.5 significantly reduced CH₄ emissions initially but with time the microorganism adjusted, pH rose and emissions increased again.

Separation of slurry reduces its organic matter content, which can also reduce N₂O emissions from field-applied manure. However, it was found that liquid manures in New Zealand are already very low in organic matter, compared to European systems, due to separation as a result of manure storage (weeping walls, screw press, filtering etc).

Consequently, emissions are also lower and further reductions from additional manure separation were found to be insignificant when liquid manure, with either high or low dry matter content, was applied to a well-drained silt loam soil.

The findings underscore the need to test and develop locally appropriate solutions, even where mitigation options exist in principle in other countries' farm systems. While the study did not result in immediately applicable mitigation options, it created an important link between researchers and their institutions on which to build further efforts. As dairy systems in New Zealand further intensify and increase their productivity, effective management of manure to minimise greenhouse gas emissions as well as odour and water quality implications will become all the more important.

International fellowship opportunities

LEARN Awards (sponsored by the New Zealand Government)

Building capability in livestock emissions research

[LEARN](#) is an international awards scheme sponsored by the New Zealand Government. It aims to improve the quantification of non-CO₂ greenhouse gas emissions from animal agriculture, and facilitate the collaborative development of cost effective and practical greenhouse gas mitigation solutions for livestock production. The scheme is part of New Zealand's support for the [Global Research Alliance on Agricultural Greenhouse Gases](#).

AWARD TYPES

Technical Training Award:

Provides funds for up to six months for technical staff from developing countries to receive training in New Zealand on equipment, tools or methods that when applied in their home organisation/country will improve the measurement and understanding 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 five years work experience.

Postdoctoral Fellowship:

Provides funds for an emerging researcher from a developing country to work alongside New Zealand researchers. To be eligible, you must have gained a PhD in the last five years and be employed in an area of research aligned with mitigation of livestock greenhouse gas emissions in your home country. The fellowship is for up to two years with an expected minimum duration of 12 months.

Co-funded PhD:

Provides a stipend for a PhD student from a developing country to benefit from having supervision from a researcher in a New Zealand institution. The scholarship is for a maximum of three years duration. To be eligible, the student must be enrolled in a PhD programme in their home country or a New Zealand institution and must have secured or be likely to secure co-funding.

GRASS (Global Research Alliance Senior Scientist) Award:

Provides funds for exchanges of between six weeks and six months duration between New Zealand scientists and scientists from other Alliance member countries. To be eligible, you must have a PhD and/or be a scientist with at least five years research experience, with demonstrated potential to lead major collaborative projects that align to the priorities of the GRA or other relevant strategies.

For more details see: www.livestockemissions.net or email the New Zealand Agricultural Greenhouse Gas Research Centre awards@nzagrc.org.nz

Upcoming events



6th Greenhouse Gas & Animal Agriculture conference

Preeminent international conference for scientists and policymakers working on the measurement, modelling and mitigation of greenhouse gases from animal agriculture. The event reviews the current state of knowledge and presents significant new scientific developments.

Date: 14-18 February 2016
Location: Melbourne, Australia
Website: www.ggaa2016.org

Livestock Research Group meeting

Eighth meeting of the Livestock Research Group, immediately following the GGAA conference. Note that various LRG research networks are also meeting during the week of the GGAA.

Date: 19-20 February 2016
Location: Melbourne, Australia
Website: secretariat@globalresearchalliance.org

Submissions on agricultural productivity to SBSTA

Not an event but an important deadline for policy makers and researchers engaged in agriculture and climate change issues – the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) has called for submissions from UNFCCC Parties and admitted observer organisations by 9 March 2016 on the identification and assessment of agricultural practices and technologies to enhance productivity in a sustainable manner. Submissions are also called for on identification of adaptation measures.

Date: 9 March 2016
Info: <https://unfccc.int/resource/docs/2014/sbsta/eng/l14.pdf>



Global Methane Forum

The Global Methane Initiative and the Climate and Clean Air Coalition (CCAC) are convening an international gathering of methane experts and policy-makers to discuss options for methane reduction and mitigation activities, including from the agricultural sector.

Date: 28-30 March 2016
Location: Washington DC, USA
Website: www.globalmethane.org/forum/



International Rangeland Congress

The 10th International Rangeland Congress is exploring the interchange of scientific and technical information on all aspects of rangelands and grass farming and management of wildlands. Aimed at ranchers, grass farmers, extension agrologists, range managers, land reclamation specialists, parks or wild land supervisors, researchers, modellers, remote sensing specialists and other people interested in the management of the world's grazing and wild lands.

Date: 17-22 July 2016
Location: Saskatoon, Canada
Website: www.irc2016canada.ca

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