

Livestock Research Group Meeting

Red Room, Student Centre, University College Dublin, Ireland

28-29 June 2013

Meeting Report

OVERVIEW

The fifth meeting of the Livestock Research Group (LRG) of the Global Research Alliance on Agricultural Greenhouse Gases (“the Alliance”) was held at University College Dublin, Ireland on Friday 28 and Saturday 29 June 2013 immediately following the Greenhouse Gas and Animal Agriculture (GGAA 2013) conference. The meeting was co-chaired by New Zealand (Dr Harry Clark, New Zealand Agricultural Greenhouse Gas Research Centre) and the Netherlands (Dr Martin Scholten, Wageningen UR) as the country Co-Chairs of the LRG.

This report is a summary of key discussions, action points and outcomes from the meeting. Presentations are provided separately as PDFs on the Alliance Website.

PARTICIPANTS

The meeting was attended by Alliance representatives from 25 member countries, two observer countries and other invited guests:

- **Alliance Members attending:** Argentina, Brazil, Chile, Canada, Colombia, Denmark, Finland, France, Germany, Indonesia, Ireland, Italy, Japan, Malaysia, Mexico, The Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States of America, Uruguay, Vietnam.
- **Alliance Members unable to attend:** Australia, China, Costa Rica, Ghana, Korea, Peru, Philippines, Thailand.
- **Observer countries attending:** Kenya, Poland
- **Invited Guests attending:** AnimalChange, The European Commission (EC), UN Food and Agriculture Organisation (FAO), Global Agenda for Action on Sustainable Livestock Development, FONTAGRO/Inter-American Development Bank, International Livestock Research Institute (ILRI), European Union Joint Programming Initiative on Food Security, Agriculture and Climate Change (FACCE-JPI), Sustainable Agriculture Initiative platform (SAI)

Refer to Appendix 1 for the full participants’ list.

MEETING OUTCOMES

The meeting achieved the following outcomes:

- Update on new research activities or funding for Alliance related activities in Member countries.
- Agreement to develop activities with the SAI platform.
- Identification of activities in the LRG that meet the council's requirement of synergies between adaptation and mitigation research.
- Establishment of a Grasslands Network and identification of key points of engagement of this network with other organisations and work programmes.
- Update on the launch of the Animal Health Network with a call for Network Co-Coordinator nominations of and opportunities for the first Network meeting.
- Development of technical manuals from within the Manure Management and Feed and Nutrition Networks.
- Agreement to increase interaction between LRG networks
- Agreement to contribute to the extension of the US-led Livestock GRACEnet.
- Support from Spain's REMEDIA blog for Spanish speaking participants.
- Confirmation to continue with technical capability building workshops and coordination of regional activities.
- Development of a partnership with the Global Agenda for Action.
- Agreement to collaborate with FAO to model packages of mitigation options.
- Agreement to collaborate with CCAC on a joint project around manure management

SUMMARY OF DISCUSSIONS

OPENING REMARKS

1. The fifth meeting of the LRG was opened by Dr Richard Howell, Department of Agriculture, Fisheries and Food, Ireland as the meeting host. Dr Howell welcomed participants to Ireland and hoped they all had been able to attend activities of the GGAA 2013 conference earlier that week.
2. The main research organisation in Ireland is the Agriculture and Food Development Authority (Teagasc) which has a number of centres around the country, and a focus on agri-environment research and livestock. Ireland has recently confirmed a comprehensive priority funding programme directing research investment toward 14 areas of work, including sustainable production and processing to support agriculture and climate change research.
3. There are increasing links between the Alliance and Ireland in global initiatives and collaborations, which is a welcome sign of interest in research investment and cooperative funding initiatives. Ireland has an Agricultural Greenhouse Gas Research Initiative which brings together scientists from across Ireland to establish a coherent team able to engage with international organisations such as the Alliance.

UPDATE FROM THE SECRETARIAT

4. The Secretariat updated participants on developments in the Alliance since the last LRG meeting in November 2012. This concentrated on outcomes of the Council meeting in Montevideo, 18 and 19 June 2013, and an overview of the activities underway in other Research and Cross-Cutting Groups of the Alliance.

Key outcomes of the Council meeting included:

- Canada handed the role of Council Chair onto Uruguay.
- The Netherlands confirmed as Vice-Chair of Alliance Council.
- The Communication plan was reviewed one year on from its adoption and confirmed.
- Participation from 19 member countries and three invited organisations.
- A discussion on mobilisation of resources – all Members to:
 - Highlight / promote the Alliance in related activities and events.
 - Integrate the Alliance into national agricultural research programs.
 - Identify opportunities and activities to include in the Research Group workplans.
- Research Groups to provide the Council with a list of their partnerships/collaborations.
- Members are requested to identify/develop mitigation projects or activities that have synergies with adaptation; and Research Group Co-Chairs to report back to the Council on synergies between mitigation and adaptation within their work plans.

RESEARCH NETWORKS AND DATABASES

5. The meeting was provided with an update of activities in the various research networks. In introducing the session, the LRG Co-Chairs noted that the network coordinators had met for dinner after the GGAA conference, and that this had been a very constructive exchange of ideas and lessons learnt, and that they would seek to further support interactions between the networks, given their overlapping and synergistic roles in reducing emissions intensity of livestock systems. The LRG Co-Chairs team will organise regular teleconferences between the network coordinators as a first step.

Feed and Nutrition Network

6. *Michael Kreuzer of ETH Zurich, Switzerland* presented to the Group on behalf of the Feed and Nutrition Network (FNN). The Network held its second meeting 27 June 2013 in Dublin with representatives from 23 countries attending. At this meeting Switzerland announced that the role of Network Coordinator would be handed over to the US, with the Netherlands remaining as the Co-Coordinator. Having established the Network among Alliance members the Network will now be opened to wider membership.

7. The Scope of the Group covers enteric methane and nitrogen excreted from ruminants with a focus on feed and nutrition, and has links to many of the other LRG Networks especially the Manure Management Network (MMN). All the Networks contribute to livestock systems as a whole and there should be opportunities for them to meet and discuss the work of each of the Networks.

8. The short and medium term action plans for the Network are:

- to produce good practice guidelines for *in vitro* and *in vivo* experiments
- to obtain funding for a Network project to develop and maintain global nutrition related strategies – currently the proposal is before the FACCE-JPI multi country funding call for approval.

9. The long term goals of the Network are:

- to improve feed characteristics and support work underway in the FAO
- Encourage industry and private sector involvement in the Network, but balance the representation of members and include multi-country organisations.

Manure Management Network

10. The report from the *Manure Management Network (MMN)* was presented by *Theun Vellinga*. The Network held its second meeting in Dublin, 27 June 2013 and is coordinated by the Netherlands and Viet Nam. Outcomes from the meeting include:

- Best practice guide on greenhouse gas emissions from manure; material for developing this guide has now been collected from members.
- Practical mitigation options guide; all members will identify the top ten options for each of their countries so the most common practices can be addressed in this guide.
- Development of a position paper that looks at manure management options which account for the whole value chain. This paper is to be shared externally through the manure management kiosk once complete.

11. The Group is developing project proposals in collaboration with international organisations:

- The Manure Management Improvement Programme (MMIP) and the FAO are both collaborating on the development of a knowledge kiosk. The pilot programme is underway in Vietnam, based on the results of a survey from the South East Asia regional LRG project. Kenya is the other location chosen for the pilot project.
- The Climate and Clean Air Coalition (CCAC) are extending their work on reducing methane emissions to include the agriculture sector and the MMN is now developing a proposal bringing together the aims of the network and the FAO livestock dialogue that will be supported by this group.

12. These collaborations were seen as examples of the Alliance adding value to other networks and organisations, showing how we can meet our aim of making things happen that would not happen in the absence of the Alliance.

Rumen Microbial Genomics Network

13. *Harry Clark* presented the *Rumen Microbial Genomics Network (RMGN)* update on behalf of the Network coordinators. The Network held its third meeting in Dublin, June 2013 alongside the RuminOmics workshop and had 80 participants from 29 countries in attendance. The RMGN focuses on methane mitigation and rumen adaptation technologies using microbial genomics approaches and sharing of resources.

14. RMG network members are currently collaborating in a range of projects that draw on the sharing of data and expertise across Alliance member countries, and are funded through various mechanisms. Three examples of projects initiated by network members include:

- Hungate1000, a project to sequence 1000 rumen micro-organisms
- Global rumen census, identifying differences in rumen microbial populations
- Deep sequencing, a project to explore how strongly microbes in the rumen affect the levels of methane produced.

15. The Network will build on these and other projects to develop future activities.

Animal Selection, Genetics and Genomics Network

16. *Harry Clark* presented the *Animal Selection Genetics and Genomics Network (ASGGN)* update on behalf of the Network coordinators. The second Network meeting was held 27 June 2013 in Dublin. The Network has over 250 contacts on the mailing list from 43 countries and connects more than 75 organisations including research institutes, universities, government agencies, equipment manufacturers, consultancies and livestock agencies.

17. Research aims for the Network:

- That animal breeding is a recognised technology for changing animal productivity.
- To reduce the time required and costs involved in measuring methane emissions from many animals.
- That new measurement protocols are developed as required.
- To implement genomic selection where basic genetics are known.
- That international expertise is made available to assist rate of learning and uptake.

18. Network activities include a project to rapidly identify low-emitting phenotypes. It is also active in developing additional research proposals across Alliance member countries. Coordination of the network will now pass from New Zealand/Australia to the Netherlands/Australia.

Animal Health and Greenhouse Gas Emissions Intensity Network

19. The Animal Health and Greenhouse Gas Emissions Intensity Network (Animal Health) update was provided by *John Tayleur of DEFRA UK* as the Network coordinator. The Network aims to improve interactions between greenhouse gas and animal health researchers and identify common priority issues. This includes links with more traditional animal health and agricultural rural development programmes. The Network is developing relationships with other organisations such as the Global Network for animal disease research (STAR-IDAZ).

20. The Network is completing a literature review to identify regions with greatest scope for reducing emissions by improving animal health, an important step to show participants the value of the Network. This Network has strong links to adaptation work, which meets the request from the Alliance Council to identify adaptation and mitigation synergies in the Research Groups.

21. A Network secretariat has been established which will act as a common contact point and circulate information and updates. The secretariat contacts are Adele Hulin (adele.hulin@adas.co.uk) and Alice Willett (alice.willett@adas.co.uk). The Network is now at the stage of identifying a co-coordinator and participants with the aim of holding the first meeting later this year. All LRG members should identify representatives to take part in this Network and are requested to consider taking on the co-coordinator role if interested.

22. The UK is also currently funding a domestic project on the effect of endemic diseases on total greenhouse gas emissions, and the mitigation impact of controlling diseases on livestock production. This work was presented by John Elliot (ADAS, UK).

23. The study looked at ten animal diseases considering each for prevalence, impact and the mitigation options which could be applied. The economic analysis report for each of the ten diseases looked at a range of 30 possible interventions including healthcare and infrastructure improvements which contribute to overall economic productivity per animal.

24. The outcome of the study identified cost abatements that are possible for each disease treatment and the overall effects on greenhouse gas emissions. The costs can then be scaled up to understand the impact of a disease and treatment options at a country level. The final costs are spread across an entire herd, healthy and diseased, which means that a number of assumptions are made and must be accounted for in the final outcomes.

25. The treatments considered need to be cost effective for farmers, and judgements made against livestock production and environmental benefits. Any gains in efficiency through the treatment or prevention of diseases can lead to increased competitiveness and trade at a country level. The full presentation is available on the Alliance Members Website.

COUNTRY ACTIVITIES: ROUNDTABLE DISCUSSION

26. Members provided an update on Alliance activities that are taking place in their country and new research funding that has been made available to support the work of the Alliance.

27. Argentina

- Participating in the FONTAGRO project.
- Measuring enteric methane from beef cattle in a university study project.
- INTA has launched several new projects; measurement of greenhouse gas emissions from crops and rice, and estimating emissions in integrated systems with livestock which includes PhD students.
- Planning for international collaborative projects with France and the European Commission on a sustainable livestock project including enteric methane, carbon and water footprints.

28. Brazil

- Coordination of national research through EMBRAPA including: forestry, livestock, crops and AnimalChange – will look to include Alliance collaboration as well.
- Established a new centre for meeting Nationally Appropriate Mitigation Actions (NAMA) which includes universities, monitoring soil carbon in restored pasture and integrated agriculture systems.

29. Canada

- Currently supporting three Alliance projects, all through universities:
 - Assessing greenhouse gas mitigation options in cow-calf production, including residual feed intake, summer pasture and winter grazing.
 - Faecal microbial communities, and the effects of temperature on methane production
 - Integrated dairy and cropping practices, covering emissions from the whole system.
- Also developing emission factors from beef and dairy cattle across mitigation practices
- Project on grazing cattle on extensive rangeland using the HOLOS model which tests mitigation options using a whole of farm approach.
- Collaborations underway with Norway, Australia, New Zealand, Chile, Brazil and the EU.

30. **Chile**

- Planning new national 5 year programme for mitigation and adaption research, with the aim to include funding exchanges and research collaboration.
- Participants in the FONTAGRO project and host the last meeting of this group.
- Would like to host an Alliance event in the near future and would like Latin American countries to indicate their support and interest of this proposal.

31. **Colombia**

- Sustainable livestock programme through the FONTAGRO project.
- Collaborating with the International Centre for Tropical Agriculture (CIAT) to undertake a survey of emissions, and research in models, microbiology and training.
- Strong support from the government to continue research in collaboration with the FAO measuring agriculture emissions and soil carbon sequestration.

32. **Denmark**

- Undertaking methane measurements in livestock nutrition research.
- Considering the nutrition, microbiology and genetics impacts in all new livestock projects
- Are participating in a collaborative project 'Feed Utilisation in Nordic Cattle' (FUINC), which follows a multi-country funding model with all countries supporting their own research.
- Identifying high and low emitters to undertake genetic programmes and feed experiments.
- Have many young scientists working in and attracting funding to this area.

33. **Finland**

- Updated national climate strategy includes adaptation and mitigation for each activity.
- Participate in all working groups of the Alliance (except rice).
- Have four respiration chambers for livestock and are testing other methods.
- Manure management programmes underway in the Baltic sea region.
- Collaboration with Canadian researchers on a grasslands project.
- Collaborations to measure emissions from cattle and soils.
- The FACCE- JPI multi funding call has increased interest from funders.
- Increased collaboration with farmers on feed efficiency and incentives to reduce agricultural emissions.

34. **Germany**

- Scientists and funding agencies in Germany are becoming more interested in supporting collaborative projects through the Alliance.
- National Federation of Agricultural Nutrition and Feed Science have funding for projects and these will likely relate to the work of the Alliance.
- Projects are underway measuring emissions from agriculture at the farm level.

35. **Indonesia**

- National action plan on greenhouse gas emissions which includes adaptation and mitigation.
- Have held national and international workshops on measurement and monitoring of greenhouse gas emissions.
- Participating in the collaborative livestock emissions projects in South East Asia, funded by New Zealand.
- Dynamic model to mitigate emissions from beef cattle, with variables including feed, breed and manure management, using measurements from respiration chambers.

36. Ireland

- Two main areas of research of interest to the Group:
 - carbon and nitrogen cycles in grazed grasslands soils.
 - modelling of livestock systems to understand the economic component of greenhouse gases.
- Studies are underway to better understand animal microbiomes in pigs and cows
- Work carried out on marginal abatement cost curves.
- Moving abatement measures onto farms.
- Partnering with FAO benchmarking and JPI on rumen microbiome research.
- Ireland has a greenhouse gas emissions network of researchers which is a valuable resource.

37. Italy

- Implementation of anaerobic digesters in the field currently supports 800-900 plants of large capacity.
- Undertaking LCA analysis of traditional Italian food.
- Continual improvement of Livestock through genetic selection to reduce emissions.
- Adaptation focus on research but an increasing interest from the food industry on mitigation.

38. Japan

- Researching a low protein diet in pigs with amino acid to reduce nitrous oxide emissions
- Development of wastewater treatment technologies from livestock runoff.
- Feeding trials exploring cashew nut extract to reduce methane emissions from livestock.
- Sharing results of measurements from paddy rice and livestock mixed production systems.
- National training with scientists in Vietnam on monitoring of emissions from ruminants.
- Supporting research on biogas digesters in Vietnam.
- Research into nutrient requirements of beef cattle in Indochinese peninsula (<http://www.jircas.affrc.go.jp/english/manual/NutrientBeefCattle2010/>).

39. Kenya

- Research in Kenya has an adaptation focus.
- Collaboration underway with ILRI and FAO to increase productivity in dairy systems, improvements in feed and housing to reduce emissions and access carbon markets.
- Exploring biogas digesters as a manure management technology.
- Interested in developing a low carbon emission and resilience pathway.
- Future research will focus on improving grazing systems to restore pastures.

40. Malaysia

- Undertaking a survey and inventory project on methods for methane measurement from livestock.
- Researching feed to reduce emissions from livestock.
- Capacity building of scientists; Malaysia has recently had one researcher in the US to learn waste measurement techniques and a researcher in New Zealand to learn methods for measuring methane from livestock.
- Collaborative project with New Zealand to use the SF₆ measurement technique.
- There is now a small amount of government funding to support research related to the LRG.

41. **Mexico**

- Three main national projects: manure management for dairy cattle systems, pig farm slurry on wetlands, feed analysis in vitro with the MMN.
- A programme to improve ruminant nutrition project.
- A project to select low methane emitting animals.

42. **Netherlands**

- Increased funding for Alliance projects in LRG, Croplands Research Group and Inventories and Measurement Cross-cutting Group.
- Collaborating with public and private sectors on animal nutrition work and low emission feeds for ruminants.
- Have developed a carbon footprinting tool for the feed production chain in cattle.
- Livestock breeding programmes to improve nitrogen use efficiency in livestock, and also feed efficiency.
- The dairy industry is aiming to increase production and achieve carbon neutral goals.
- International collaborations with AnimalChange and the Modelling European Agriculture with Climate Change for food Security (MACSUR) study.

43. **New Zealand**

- New Zealand's international Research Fund (GPLER) will be opening a third round later this year.
- An increasing number of research projects are underway with funding from the New Zealand government in direct support of the Alliance. Examples include :
 - A microbial genomics project to identify denitrification processes.
 - Novel in vitro assays on rumen methanogens.
 - Disrupting the hydrogen transfer in microbial rumen species.
- Involved in other international funding collaborations, such as the Australian FtRG and JPI-FACCE with projects that support the Alliance.
- LEARN scholarships will continue to be supported; we welcome comments on how these could be more beneficial.
- Organised and supported various capacity building initiatives and workshops (east and west Africa in conjunction with other countries and the I&M Group, and project in south-east Asia).
- The Governments of New Zealand and the Netherlands support the Co-Chairs to undertake work for the LRG.

44. **Norway**

- Developed emission factors for non-lactating and lactating dairy cows.
- Undertaking In vitro experiments on rumen bacteria.
- Developing optimal grazing strategies to reduce methane and nitrous oxide emissions.
- Collaborating with Sweden on a LCA modelling programme.
- Measuring greenhouse gas emissions from livestock to understand feed efficiency.

45. **Poland**

- Projects underway in livestock research to measure greenhouse gas emissions.
- Most research is focused on livestock breeding, defining new traits with a change in breeding objectives.
- Hosting the Central and Eastern European workshop of the LRG later this year, which will provide an opportunity to better connect all interested researchers in the region.

46. **Spain**

- Established a network for agriculture and forestry researchers (REMEDIA).
- Have held several workshops to share national research outcomes on livestock, manure and feeding.
- Using the REMEDIA website to translate information on agriculture and climate change into Spanish (<http://redremedia.wordpress.com/>).
- Projects currently underway in manure management from ruminants.

47. **Sweden**

- Focus on methane from housed animals to reduce emissions from the dairy sector, as dairy cows are by far the most important ruminants and they are housed for 8-10 months of the year.
- Routine monitoring of methane emissions using sensors placed in milk robot and concentrate feeders.
- In vitro systems developed to measure methane and used to identify possible feeding measures to mitigate methane from cows.
- Feed advisors on farm have the ability to calculate methane production from optimised feed rations by use of new PC programmes ("NORFOR").
- Research projects where LCA projects are also accounting for benefits of ruminant systems.

48. **Switzerland**

- National climate strategy for agriculture, coordinated across the agriculture and environment ministries.
- National programmes on animal health, nutrition and food, and soil.
- Participating in the FACCE-JPI joint call, through the National Foundation for Research and Development.
- Host of a World Food Systems Centre that includes work on environmental issues.

49. **US**

- Inviting international scientists to join and contribute to Livestock GRACEnet. The group has produced a two page fact sheets for non-scientists (www.ars.usda.gov/livestockGRACEnet).
- Developing a methane measurement manual, in collaboration with the MMN.
- University and USDA projects underway including climate change adaptation and mitigation strategies in the great lakes region, and emissions from beef cattle in rangelands.

50. **UK**

- Animal health is a key priority that the UK Government wants to support.
- Participating in the FACCE- JPI multi country call.
- Supporting many Alliance activities, and communicating with national and international researchers through a regular newsletter which is available as the UK country page on the Alliance website.
- National programme on agriculture emissions worth £30million.
- Moving away from direct focus on reduction of emissions to improving productivity, including a sustainable intensification programme at the farm scale which accounts for environmental impacts.

51. **Uruguay**

- Participation in the FONTAGRO project continues, developing emission factors.

- Developing greenhouse gas emissions intensity studies of management practices to reduce emissions across sectors.
- Exploring a FAO funded project on degraded lands.
- About to begin a collaborative Uruguay/New Zealand project on family farms, including research on reducing emissions intensity in beef cattle.

52. **Vietnam**

- National project on manure management. Funding provided by Denmark and Finland.
- Research underway to replace nitrogen sources in ruminants using feed additives.
- Improving the design of animal housing to reduce environmental pollution.

TECHNICAL INFORMATION AND KNOWLEDGE

53. This session discussed progress of the guidelines and manuals that are being produced by the Group, or in collaboration with other Groups.

54. **Manual on technical designs for respiration chambers**

- Has been published on the Alliance website and available for over a year.
- Members have been in contact with researchers who are interested in chamber design and use since the manual was published.
- Scientists who are interested in contributing to and updating this manual should contact the editor cesar.pinares@agresearch.co.nz

55. **Guidelines for measurement of soil N₂O**

- These guidelines were promoted at the N₂O measurement workshop associated with the GGAA 2013 conference and are available on the Alliance website.
- A proposed next stage is to explore optimal sampling strategies; several members of the Group expressed willingness to support this work.

56. **Manual on measurement of emissions from manure**

- Manual is still in development by the MMN.

57. **Manual explaining the SF₆ tracer technique**

- Will be made available on the Alliance website when complete, which is expected to be late 2013.
- An overview presentation of the process for the manual had been given during the GGAA 2013 pre-conference workshop on CH₄ measurement workshop at AFBI, Hillsborough, Northern Ireland.

58. **Guidelines on Soil Carbon measurements**

- Being developed by the Inventories and Measurement Cross-Cutting Group.
- The LRG will support this activity to ensure the interests of the Group are considered.
- Development of the guidelines will be of importance to the Grasslands Network, and it was suggested that the network coordinator should be involved in their further development.

59. **Good practice guide to micromet measurement**

- Currently not a priority for the Inventories and Measurement Cross-Cutting Group.
- The manure management guidelines will include separate measurement options for micro met experiments, and also link to the GRACenet website which includes similar information.

- The LRG can create a hub linking to information on micromet to begin with.

CAPABILITY BUILDING AND ENGAGEMENT

Global Agenda for Action in Support of Sustainable Livestock Sector Development

60. *Neil Fraser, Chair of the Global Agenda for Action in Support of Sustainable Livestock Sector Development* (Global Agenda) spoke to the Group on how the Global Agenda involves organisations from across the public and private sector as well as academia and others. They discuss the continual improvement and sustainability of the livestock sector while considering human development, use of resources and food security.

61. The Global Agenda's objectives are developed by consensus from its members, and support three focus areas:

1. **Closing the efficiency gap** - Application of existing technologies and transfer through **public-private** and other forms of partnership,
2. **Restoring value to grassland** - Better management of grazing land for C sequestration, protection of water and biodiversity, enhanced productivity and livelihoods (financial and institutional innovation), and
3. **Waste to worth** - Recovering and recycling nutrients and energy from manure (planning tools, regulatory and incentive frameworks).

62. There are some obvious complementarities between the LRG and the Global Agenda in terms of objectives and challenges and coordination of activities is already in place between the LRG and the Global Agenda in relation to manure management:

- LRG - MMN, meeting in September 2012 to develop a knowledge sharing agreement and develop a joint manure management improvement program improvement programme.
- Development of a proposal for the Climate and Clean Air Coalition concerning dissemination of knowledge of manure management.

63. It was suggested that a further concrete interaction could arise through the newly Grasslands Research Network and the 'restoring value to grassland' work stream of the Global Agenda.

64. Participants also discussed and agreed that representatives of the LRG and Global Agenda should be routinely invited to attend each other's meetings as observers to further facilitate collaborations. The LRG Co-Chairs team will invite the Global Agenda to the next meeting of the Group.

FONTAGRO: support of research projects on livestock and climate change

65. The FONTAGRO Fund is a funding mechanism to support regional collaboration in Latin America. *Hugo Li Pun of the Inter-American Development Bank (IDB)* explained to the Group how IDB and the Inter-American Institute for Cooperation in Agriculture (IICA) support agricultural innovation projects in collaboration with the FONTAGRO member countries.

66. Member countries contribute a set amount to the competitive fund and eligible proposals must be a consortium of two or more participating institutes. The proposals should focus on small family farms and include components of capacity building and development of new technologies.

67. There are currently ten projects related to agriculture and climate change with two of these focusing specifically on livestock. The Government of New Zealand has partnered with FONTAGRO to support a project measuring emissions from livestock systems in Latin America, the first project involving Uruguay, Chile, Colombia, and the Dominican Republic. A second set of projects is about to start involving countries from Central America and the Andes, where livestock are critical for farmers and contribute significantly to greenhouse gas emissions. The projects also build science capability in the participating countries through workshops and training fellowships.

68. The FONTAGRO fund is calling for proposals with a climate change focus in 2013, and is continuing to develop specific projects in collaboration with the private sector and governments from outside Latin America. It was proposed that the Grasslands Research Network could coordinate a collaborative proposal to FONTAGRO focusing on understanding and managing soil carbon in pasture and rangelands in Latin America.

International Livestock Research Institute

69. *Steve Kemp from the Consultative Group on International Agriculture Research (CGIAR) Consortium* spoke to the Group on the International Livestock Research Institute (ILRI) and their research in livestock and climate change.

70. ILRI focus on increasing livestock production and mitigation of greenhouse gas emissions from livestock, and are a hub for scientific training in bioinformatics and genetics. However, work programmes of the CGIAR are spread across the 15 centres forming an integrated approach.

71. The genetics and breeding programme is improving productivity across ruminant and non-ruminant livestock which is achieved through a number of pathways:

- Phenotyping of livestock – regional, and farm specific.
- Animal health.
- Mapping areas of impact for specific diseases.
- Improving feed, and feed/fodder gene banks.
- Understanding the relationships between feed and livestock breeds.
- Collaborative activities with ILRI's many partners.

72. The challenge is to change the way livestock are perceived. Livestock are often seen as a source of environmental problems. However animal production systems are integral to all aspects of livelihood for many in the world. By improving the efficiency of livestock systems in the developing world we can increase production and mitigate greenhouse gases.

73. In considering the links between ILRI and the LRG, participants agreed that ILRI had an important role to play in future capacity building activities particularly in Africa, the activities of the Animal Health Research Network, and also the FAO project to develop and apply the GLEAM model (see below).

Livestock greenhouse gas emissions from four countries in South East Asia; a collaborative approach to a regional problem.

74. Following the LRG capacity building workshop in Thailand, March 2012, four countries from the region (Indonesia, Thailand, Malaysia and Vietnam) have been developing a collaborative project to reduce greenhouse gas emissions from livestock. La Van Kinh from Vietnam presented the outcomes of this workshop and two subsequent meeting on behalf of the project coordinators.

75. The pilot project has been supported by the government of New Zealand and aimed to:
- Describe the key livestock systems in each country.
 - Collect and analyse emissions data from cattle and manure to identify common and country specific priority areas.
 - Identify realistic steps to improve or modify livestock emission data to develop regional emissions estimates and explore regionally appropriate mitigation options.

76. Although there is a difference in the livestock systems and animal numbers in each of the participating countries the results showed that countries with the highest levels of greenhouse gas emissions also have the most livestock. Therefore reducing emissions from livestock systems is an important issue in this region. The pilot project identified that the next steps are to:

- Complete a literature review of the greenhouse gas emissions work underway in each country.
- Undertake a stocktake of methods and technologies available for enteric fermentation and waste management systems in the region.
- Identify activities across the regions that are improving inventories for better measurement of greenhouse gas emissions.

77. The Co-Chairs mentioned that this project or the project partners could be put forward to the Manure Kiosk team (MMN, Global Agenda, CCAC) as a regional hub based in South East Asia.

Central European Engagement Workshop

78. With support from New Zealand and the Netherlands the LRG will hold the next regional workshop in Poland in late 2013. Participants from Eastern and Central Europe will be invited. The workshop is planned to be held at the Institute of Genetics and Animal Breeding, Polish Academy of Sciences. This workshop will have two purposes:

- To engage with senior decision makers to demonstrate the opportunities for enhanced collaboration to better understand and reduce emissions intensities.
- To showcase the LRGs science activities and points of contact within the science community.

79. To meet these purposes the workshop will provide a higher level overview of the Alliance on the first day, with the aim of encouraging membership. The second day will then focus on the science activities underway, build a regional network of livestock researchers, and identify priority activities.

80. The LRG needs the support of Members for this engagement workshop to be successful, this includes:

- Technical experts to give presentations.
- Identifying the key scientists in this region to invite.
- Identifying key decision/policy makers in this region.

81. Members that are able to support this workshop or have contacts in Central or Eastern Europe should contact Victoria Hatton of the Co-Chairs team (Victoria.Hatton@nzagrc.org.nz).

COLLABORATIVE RESEARCH PROJECTS

Sustainable Agriculture Initiative

81. On Friday 21 June 2013, members of the LRG Co-Chairs team and science experts met with the Sustainable Agriculture Initiative (SAI) Platform, Beef and Dairy group to discuss potential synergies and collaboration. To continue this discussion and develop an initial proposal *Delanie Kellon (International Dairy Federation, and SAI member)* was invited to give a presentation to the LRG.

82. The SAI Platform is a global initiative helping food and drink companies achieve sustainable production and source agricultural products. The platform was established by large global food companies who collaborate on implementation actions, there are now 40 companies who work together to develop sustainable production at the pre-competitive level. There are currently six working groups within the SAI, taking a holistic approach to the global agriculture supply chain and together generate information that can be used by policy makers.

83. The workshop on 21 June included SAI members from the beef and sheep and dairy groups. The workshop established an understanding of the key challenges for these Groups in the areas of communication, approach and mapping as well as an outline of the LRG workplan. Presentations on direct mitigation, indirect mitigation and manure management were provided.

84. SAI members mentioned the importance of communication and to involve the industry as soon as possible, to ensure that research outcomes can have a practical application. Companies work at a whole of system level taking a sustainability approach rather than focusing only on greenhouse gases. The trade-offs and farm-level implications need to be looked at as well as barriers to adoption of new technologies. Industry needs to be aware of and understand the research currently underway.

85. The workshop identified that there are many areas of overlap between the SAI and LRG Activities. A more detailed summary of the workshop prepared by the SAI will be made available.

86. Based on discussion at the workshop, LRG Co-Chairs proposed that the LRG will map out the research prospects for different approaches to livestock emissions mitigation and their current stages of discovery, development, implementation and commercialisation. Having a clear understanding of the maturity of research and time lines would be an important entry point for industry to engage more directly with research and ensure its ready take-up in business practices. The Co-Chairs offered to coordinate the development of the paper. This was agreed to be the first activity in developing this relationship. The Group noted the need to continue to communicate with the SAI with the Co-Chairs to maintain this communication.

Global Livestock Environmental Assessment Model

87. *Pierre Gerber of the UN Food and Agriculture Organization (FAO)* outlined the proposal for a joint activity between the LRG and the FAO working with the Global Livestock Environmental Assessment Model (GLEAM).

88. GLEAM aims to identify low emission pathways for the livestock sector. It combines modules that calculate emissions for Herd, Feed, Manure, System and Allocation (product) components finally calculating the emission per kilogram of product. All of the main emissions are calculated and as the model works at a local level it is able to scale up the results for scenario analysis e.g. a change in management practice or feed composition.

89. The specific objectives of GLEAM are to:
- Produce disaggregated assessments of global greenhouse gas emissions and related mitigation potential, using ‘packages’ of mitigation options to avoid double counting and ensuring regionally appropriate approaches.
 - Carry out economic analyses of mitigation costs and benefits.
 - Engage in multi-stakeholder initiatives on methods and change practices.

90. GLEAM has been used to complete a review “Mitigation of greenhouse gas emissions in livestock production: a review of technical options for non-CO2 emissions” published by the FAO (<http://www.fao.org/docrep/018/i3288e/i3288e.pdf>). Packages of mitigation options have been designed and tested based on this model – the options all consider income, co-benefits, environmental impact etc.

91. The next stage of developing this model is to better understand the interactions between mitigation options and mitigation packages, particularly in the livestock sector where the confidence in the model is the highest. The model is developed at the national/regional level so that it may be used to support national and global policy development. The Group is asked to collaborate with the FAO in this project; the LRG is a global grouping of livestock experts who could improve the mitigation technique packages that are appropriate for given conditions (farming system, climatic zone).

92. The project proposal is to begin with 2-3 regions only at this time and expand to include other regions depending on progress and resources. It is expected that the project will take at least 18 months. The project will need a coordinator, modelers, livestock experts from the Alliance, and operation and facilitating expenses. The five proposed activities of the project are:

1. Identification/refinement of packages in expert groups.
2. Model adjustment / development.
3. Modeling of mitigation potentials and iteration with expert groups.
4. Capability building, through the involvement of regional universities or institutes.
5. Facilitation, communication and reporting.

93. The Group agreed to collaborate with FAO in the GLEAM model project. Countries who are interested in participating should contact Pierre Gerber and the LRG Co-Chairs. The Co-Chairs will coordinate activities and engagement from the Group.

Horizons 20/20 Programme

94. *John-Charles Cavitte from the European Commission* outlined the Horizons 20/20 framework programme for research funding that has been established by the European Commission. This programme is a 70 billion euro programme which will run from 2014-2020.

95. Horizons 20/20 brings together research and innovation with an emphasis on improving societal challenges such as Societal Challenge 2: food security and sustainable agriculture which has the most relevance to the Alliance. Sub-priorities under this challenge will consider production efficiency and climate change, ecosystem services and public good, rural areas, and forestry.

96. The programme hopes to encourage increased participation in projects from small/medium enterprises. Therefore the process has been simplified for non-EU involvement.

97. International cooperation is seen as crucial to address the large challenges and the programme is an open funding programme. While there are specific criteria for non-EU members to meet before becoming involved with the programme, partners in Horizon 20/20 may be private/public, public/public (including Joint programming initiatives), and European innovative partnerships.

The Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI)

98. *Jean-François Sousanna, Head of the JPI Scientific Advisory Board* presented the Joint Programming Initiative (JPI) model that EU members are using to improve research for Food Security, Agriculture and Climate Change (FACCE). The initiative aligns the national research programmes and strategies of the participating countries and identifies a shared vision across five core themes:

1. Food security and climate change,
2. Intensification of agriculture systems,
3. Assessing and reducing trade-offs,
4. Adaptation to climate change, and
5. Mitigation of greenhouse gases.

99. Alliance members are involved in the JPI through an international multi-partner call on greenhouse gas mitigation. The call involves several European JPI partners but also involves Canada, New Zealand and the US. Each project needs a consortium of at least three partner countries to submit a proposal to the fund. Countries support the participation of their own scientists in the collaboration, either with cash or “in-kind” funding. The first stage of the process saw 36 letters of intent received, with 30 deemed eligible to submit full proposals in the next stage.

100. The call was developed in collaboration with the FACCE-JPI Secretariat and countries involved with a view to enabling international research projects. The call also allows for participation from private research organisations. Full proposals are due in early September and funding decisions are expected in mid-November. Many of the applications being developed are being submitted by Alliance members and will strongly support the workplans of the Research Groups. The multi-partner approach has shown to be a good example of what can be done by forming collaborations among countries and with those outside Europe.

LINKS TO POLICY AND INTERNATIONAL INITIATIVES; OTHER COLLABORATIVE OPPORTUNITIES AND NETWORKS

Proposal to Establish a Grasslands Network

101. *Gonzalo Becoña from Uruguay* outlined to the Group the proposal for a Grasslands Network under the LRG. The expert workshop in Dublin on 27 June 2013 to develop this proposal included 24 participants from 13 countries. Researchers who participate in other Networks of the LRG also attended.

102. The proposal is inclusive and will cover all grasslands grazed by livestock, with a focus on improving soil carbon sequestration at the farm level. The Network will be organised by region (each continent) and support from each continent is sought to help coordinate the network.

103. The Network will collaborate with other Alliance Research and Cross-Cutting Groups. This includes the Inventory and Measurement Cross-Cutting Group in developing guidelines to measure soil carbon and the Soil Carbon and Nitrogen Cross-Cutting Group on a modelling project (see below).

104. The Network has also identified collaboration with the Global Agenda for Action on Sustainable Livestock Development to disseminate management practices developed.

105. First activities for the network:

- Undertake a review of potential carbon sinks.
- Undertake a review of management practices to improve carbon sequestration.
- Explore relationships with other networks and partners.

106. It was also noted that the work by the Grasslands Network would have strong synergies with adaptation and would thus respond to the request by the Council on adaptation/mitigation interactions.

Joint activities with the Soil Carbon and Nitrogen Cross-Cutting Group

107. *Jean-François Soussana* attended the meeting as Co-Chair of the Soil Carbon and Nitrogen Cycling Cross-Cutting Group. He was invited to present the aims and activities of the Cross-cutting Group and potential areas where the two Groups could collaborate.

108. The Soil Carbon and Nitrogen Cycling Cross-Cutting Group aims to improve model and methodologies for mitigation options through the development of a common modelling platform. Completed activities of the Cross-Cutting Group include a stocktake defining data needs and protocols of common models, and a comparison of models using two control sites in Europe (France and Switzerland).

109. The next step in the model comparison work is to include more sites and compare models globally. The Cross-Cutting Group is already developing protocols for this next step with the Croplands Research Group, would like to include the LRGs as well.

110. During the discussion the Group agreed that:

- The Grasslands Network is the obvious point of overlap between the LRG and the Soil Carbon and Nitrogen Cycling Cross-Cutting Group. Gonzalo Becoña (gonbec@gmail.com) the Network coordinator will be the LRGs contact person for this relationship.
- The data and outcomes from the initial work will be made available on the Alliance website for those who are interested to access, and Jean-François Soussana undertook to send relevant information to the LRG Co-Chairs. This includes what has already been completed and an outline of future activities and expected outcomes. The Group would also support the idea of workshops which could improve understanding of the models available and their data collection needs.

111. Participants with information on further tests sites that could be used to validate models should contact Jean-François Soussana (dsenv@paris.inra.fr). Tests sites would include long term experiments and a comparison of treatments to measure changes in carbon stocks.

From the trenches to blue skies, 5 years of science and policies on agricultural greenhouse gases

112. *Rogier Schulte, Teasgasc*, was invited to present Ireland's experiences of policy development in the area of agriculture and climate change science to the Group. His presentation included an example of carbon neutral livestock development.

113. Ireland food policies have recently shifted to have more focus on improving productivity and food security while reducing their impact on global greenhouse gas emissions. This is instead of trying to meet an emissions reduction target for the agriculture sector.

114. A Marginal Abatement Costs Curve (MACC) has been used to assess the scope for reducing agricultural greenhouse gas emissions through cost-beneficial and cost-effective measures. The results of this modelling change significantly depending on the criteria used - the whole value chain approach or the current Intergovernmental Panel on Climate Change Criteria (IPCC) criteria.

115. The modelling outcomes suggest that it is possible to increase agricultural production while maintaining the current level of emissions (decoupling). In addition, there is a significant untapped potential for offsetting in the form of forestry and biofuels. However, unlocking of this potential would require changes to the current accountancy methodologies for agricultural greenhouse gases.

116. The outcomes of the MACC led to the development of the “Carbon Navigator”, a decision support tool that is accessible to all farm advisors. Advisors can then work with farmers to identify on-farm options that will provide economic and environmental benefit.

117. Ireland’s most recent draft climate policy proposes that agricultural systems need to be carbon neutral by 2050, where agricultural emissions are offset by carbon sequestration – this marks a departure from the current IPCC metrics. Ireland is currently conducting a scenario analysis on carbon neutrality and preliminary results suggest that carbon neutral agriculture will only be achieved if a range of scenarios and policy incentives are put in place.

UPDATE OF WORKPLAN

This session summarised the outcomes from the meeting and updated the LRG workplan.

118. Council and broader partnerships

- Adaptation and mitigation synergies are already included in the LRG workplan, most obviously through the Grasslands and Animal Health Networks. The synergies of these activities could be emphasised.
- The LRG agreed to support the SAI platform by outlining current research programmes and their likely timelines, to facilitate better awareness and timely engagement by industry. The Co-Chairs will coordinate this initial activity and will maintain and seek to increase dialogue with the SAI on further interactions.
- Wider interactions with the private sector should be managed at the pre-competitive stage - the Alliance should not be seen to favour companies or provide advantages. Interactions should be a flexible sharing of experiences, with industry invited to attend meetings.

119. Research networks

- Increase interaction and communication between the Networks, allowing the Networks to learn from each other and identify opportunities for synergies between research approaches. The Network coordinators will participate in regular teleconferences, to coordinate activities without increasing travel commitments. The first teleconference will be organised by the LRG Co-Chairs team.
- Animal Health Network is looking for a Co-Coordinator. The UK Coordinator will contact possible researchers.

- MMN to finalise the CCAC proposal and distribute to the Group. The Co-Chairs will identify a representative of LRG and help develop this collaboration.
- The Grasslands Network is formally established, with Uruguay as Coordinator. Countries are requested to identify contact points and in particular regional co-coordinators from each continent to help with developing the network.
- The US has opened up Livestock-GraceNet for international participation. A standardised form will be created so that countries can indicate their interest in joining. Links will be created on the Alliance website.
- FONTAGRO and REDMEDIA to coordinate Spanish notifications and announcements.

120. **Technical manuals and information**

- MMN is compiling a best practice guidance manual on measurement of emissions from manure; this will include some micromet methods.
- FNN will develop guidelines for conducting and assessing in vitro and in vivo experiments to enhance their utility and comparability.
- Soil N₂O sampling strategies; scientists from UK, Chile and NZ will develop a research proposal building on the N₂O chambers best practice manual.
- LRG supports the development of soil carbon measurement best practice guidelines by the Inventory and Measurement Cross-Cutting Group.

121. **Capacity building**

- Partnering with the Global Agenda for Action – coordinators of three Networks (MMN, FNN, Grasslands) will explore and develop links with three themes (waste to worth, closing the efficiency gap, restoring value to grassland).
- ILRI and the Animal Health Network will explore opportunities for collaboration.
- FONTAGRO has initiated two new capacity building projects, on dairy production and silvipastoral systems in Central and Latin America.
- The LRG will organise an engagement workshop for central and eastern Europe, to be held in Poland in late 2013. New Zealand and the Netherlands will lead the preparations for this workshop and identification of regional partners.

122. **Collaborative projects**

- A significant number of new research projects in direct support of the LRG are currently being funded through various funding mechanisms. These will be listed on the LRG work plan to maintain an overview of the growing range of activities.
- Project between FAO GLEAM and the LRG - countries who have expressed interest in this project will be contacted with project requirements.
- An upcoming research call from FONTAGRO will be announced soon. All members should consider resourcing and co-funding this multi-country call. The Grasslands Network will be developing a multi-country bid.

123. Links to policy and international initiatives; other collaborative opportunities and networks

- An expert group will be established for the exchange and support of marginal abatement cost curve information and reviews. A new page will be created on the Alliance website as a hub to link and share information.
- Uruguay will be the contact point between the Soil Carbon and Nitrogen Cycling Cross-cutting Group modelling project through the Grasslands Network. Suggestions for new data sites and models that could be included in this project should be sent to Jean Francois Susanna directly. The coordinators of the grassland network will arrange to meet the coordinators of the soil C/N modeling group during Sydney Grasslands Congress 16-20 September 2013.

NEXT MEETING/CLOSING REMARKS

124. The Chairs announced that the sixth meeting of the LRG will be held in Indonesia. The LRG are very pleased to accept Indonesia's offer to host the 2014 meeting, further details about the meeting will be confirmed at a later date.

125. The Co-Chairs would like to extend the opportunity for all members to provide feedback on the leadership of the LRG. The feedback survey is an anonymous process, a reminder and link to the survey questions will be sent out shortly from the Secretariat.

126. The Co-Chairs thank Ireland for their hosting a successful week of meetings, and all participants for their attendance and willingness to participate in the LRG.

APPENDIX 1: Participants List

Country	Attendees
Alliance Member Countries	
Argentina	Laura Finster: INTA (lfinster@cnia.inta.gob.ar)
Australia	<i>Unable to attend</i>
Brazil	Luis Barioni: Embrapa (barioni@cnptia.embrapa.br)
Canada	Tim McAllister: Agriculture and Agri-Food Canada (tim.mcallister@agr.gc.ca) Sean McGinn: Agriculture and Agri-Food Canada (sean.mcginn@agr.gc.ca)
Chile	Marta Alfaro: INIA (malfaro@inia.cl)
China	<i>Unable to attend</i>
Colombia	Olga Lucia Mayorga: CORPOICA (lmayorga@corpoica.org.co) Edgar Alberto: National University of Columbia (eacardenasr@unal.edu.co)
Costa Rica	<i>Unable to attend</i>
Denmark	Peter Lund: Aarhus University (peter.lund@agrisci.dk)
Finland	Markku Jarvenpaa: MTT Agifood Research Engineering (Markku.Jarvenpaa@mtt.fi)
France	Jean-Francois Soussana: INRA-DSENV (dsenv@paris.inra.fr)
Germany	Karl-Heinz Sudekum: University of Bonn (ksue@itw.uni-bonn.de)
Ghana	<i>Unable to attend</i>
Indonesia	Amlius Thalib: Indonesian Institute for Animal Production (balitnak@indo.net.id)
Ireland	Padraig O'Kiely: Teagasc (padraig.okiely@teagasc.ie)
Italy	Giacomo Pirlo: CRA-FLC (giacomo.pirlo@entecra.it)
Japan	Tomoyuki Kawashima: JIRCAS (tkawa@affrc.go.jp)
Malaysia	Azizi Ahmad Azmin: Malaysian Agricultural Research and Development Institute (MARDI) (aziziazmin@mardi.gov.my)
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Norway	Tonge Marie Storlien: PhD Student (tonje.storlien@umb.no)
Peru	<i>Unable to attend</i>
Philippines	<i>Unable to attend</i>
Republic of Korea	<i>Unable to attend</i>
Spain	David R. Yanez-Ruiz: CSIC (david.yanez@eez.csic.es) Augustin del Prado: BC3-Basque Centre for Climate Change (agustin.delprado@bc3research.org)
Sweden	Jan Bertilsson: Swedish University of Agricultural Sciences (jan.bertilsson@slu.se)
Switzerland	Michael Kreuzer: ETH Zurich (michael.kreuzer@inw.agrl.ethz.ch) Angela Schwarm: ETH Zurich (angela.schwarm@usys.ethz.ch)
Thailand	<i>Unable to attend</i>
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USA	Matt Smith: USDA-ARS (matt.smith@ars.usda.gov)
Uruguay	Gonzalo Becona (gonbec@gmail.com)
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Observer Countries	
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Other Participants	
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