GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

Animal Health and Greenhouse Gas Emissions Intensity Network

African Regional Meeting

Hilton Hotel, Addis Ababa, Ethiopia

5th November 2014

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EXECUTIVE SUMMARY

The Animal Health and Greenhouse Gas Emissions Intensity Network (referred to as "the Network" hereafter) is a United Kingdom (UK) led initiative of the Global Research Alliance (GRA) on Agricultural Greenhouse Gases. The Network brings together researchers (e.g. in veterinary science, epidemiology, animal science, modelling, GHG research, economics and food security) to explore links and synergies between animal diseases and GHG emissions intensities, and possible mitigation through disease control. The first regional Network workshop focussed on Africa and was held on 5th November 2014 in Addis Ababa in the margins of the ILRI@40 celebrations and alongside the regional meeting of the Global Strategic Alliance for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonosis (STAR-IDAZ).

The workshop was attended by 19 people bringing together researchers in relevant fields to exchange information on current studies via presentations and to discuss how to increase the uptake of greenhouse gas (GHG) emission mitigation strategies within the animal health community.

A background to the development of the Network was given along with technical presentations from Scotland's Rural College (SRUC), the International Livestock Research Institute (ILRI), University of Bristol and the Norwegian University of Life Sciences.

The discussion sessions identified two methods for increasing the uptake of GHG mitigation measures. One being through shifting the focus to the benefits to human health resulting from an increased level of production. The second driver to be identified was that of the influence of market integration (especially in peri-urban areas).

This report is a summary of key discussions, action points and outcomes from the meeting.

LIST OF ABBREVIATIONS

BMGF	Bill and Melinda Gates Foundation
CCAFS	The CGIAR research programme on Climate Change, Agriculture and Food Security
CDM	Clean Development Mechanism
CGIAR	Consultative Group on International Agricultural Research
Defra	UK Government Department for Environment, Food and Rural Affairs
DFID	Department for International Development
ENPV	Expected Net Present Value
FACCE-JPI	Joint Programming Initiative on Agriculture, Food Security and Climate Change
FAO	Food and Agriculture Organisation of the United Nations
GHG	Greenhouse Gas
GLEAM	Global Livestock Environmental Assessment Model
GRA	Global Research Alliance on Agricultural Greenhouse gases
ICAR	International Committee on Animal Recording
ILRI	International Livestock Research Institute
LCA	Life Cycle Analysis
LRG	Livestock Research Group
NAMA's	Nationally Appropriate Mitigation Actions
NOK	Norwegian Krone
SRUC	Scotland's Rural College
STAR-IDAZ	Global Strategic Alliances for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonoses
UK	United Kingdom

1 NETWORK BACKGROUND

The Animal Health and Greenhouse Gas (GHG) Emissions Intensity Network (referred to as "the Network" hereafter) is a United Kingdom (UK) led initiative of the Livestock Research Group (LRG) of the Global Research Alliance (GRA) on Agricultural Greenhouse Gases.

The Network was proposed as there is a broad consensus amongst experts and stakeholders that the GHG emissions intensity from livestock farming can be reduced through efficiency and production gains resulting from improved livestock health. The aim of the Network is to bring together scientists and researchers from relevant research disciplines across the world to investigate links and synergies between animal diseases and GHG emissions intensities, and possible mitigation through disease control. This offers multiple win-win opportunities across a diversity of countries and the GRA provides an excellent platform for researchers to engage with one another. There are significant bodies of current research in work areas relevant to the Network and therefore a real opportunity for interested researchers to collaborate and for research funders to co-ordinate their efforts. The Network will maintain and enhance capacity in the cross-cutting field of animal health and GHG research, facilitate interaction of practitioners, and encourage sharing of information on current and planned activities, so as to avoid duplication of effort, identify evidence gaps and help focus and prioritise research efforts. The work of the Network has the potential to provide real benefits to farmer livelihoods and food security.

Further information on the background to the Network and its objectives is provided in the Network proposal and the report of the inaugural Network workshop. Both reports are available at http://www.globalresearchalliance.org/community/alliance-member-countries/member-country-page-united-kingdom/uk-activities-livestock-research-group/.

2 SUMMARY AND OUTCOMES OF WORKSHOP

2.1 General overview

The regional meeting of the Network was held on the 5th November 2014 at Hilton Hotel, Addis Ababa, Ethiopia in the margins of the ILRI@40 celebrations (http://www.ilri.org/node/39048). This international workshop brought together researchers in animal health, GHG research and other relevant fields. The workshop was attended by 19 participants (see Appendix 1 for the list of participants). The workshop agenda is provided in Appendix 2.

The workshop was chaired by the Joint Network Co-ordinator, Tim Robinson of the International Livestock Research Institute (ILRI).

The workshop achieved the following outcomes:

- Introduction to the Network.
- Subject relevant presentations by representatives from ILRI, Scotland's Rural College (SRUC), University of Bristol and the Norwegian University of Life Sciences.
- Discussion on how to increase the focus of animal health researchers onto GHG mitigation measures.
- Exploration of potential funding sources.

The Network workshop provided an excellent opportunity for delegates to get to know one another and to learn about the variety of research taking place in this field.

2.2 Overview of Presentations

2.2.1 Introduction to the Animal Health and GHG Emissions Intensity Network and overview of animal health and GHG emissions – Tim Robinson (ILRI)

Animal health improvements are expected to reduce GHG emissions intensity (emissions per unit of product) and there is significant synergy between improving food security and reducing GHG emissions intensities, particularly in developing countries. Multiple win-wins then derive in terms of poverty alleviation.

Tim Robinson provided a background to the development of the Network. The activity on animal health status and GHG emissions intensity was first proposed by the GRA in November 2011, with the UK invited to lead. A scoping workshop was held in June 2012 and the proposal for the formal creation of a Network was approved by the LRG in November 2012. The Network Secretariat was then commissioned in June 2013. Initial invitations for participants to join the Network were sent in September 2013 and participation has been increasing since then.

Tim then presented details of work relevant to the Network. The UK Government Department for Environment, Food and Rural Affairs (Defra) funded a study to model the impact of controlling endemic diseases of cattle productivity in the UK, estimating their impact on performance and therefore on GHG emissions intensity. This involved a life cycle analysis (LCA) that focused on 10 endemic cattle diseases in the UK to provide estimates of GHG abatement. Building upon the results from this study, Defra also commissioned a review of literature on global GHG abatement potential from health interventions in the livestock sector. The review of academic and grey literature aimed to identify the regions where there is the greatest scope to reduce GHG emissions. The ILRI funded CGIAR Research program "Climate Change, Agriculture and Food Security" has used the Food and Agriculture Organisation of the United Nations (FAO) GLEAM model to map the benefits of removing trypanosomosis in East Africa.

The next steps for the Network were highlighted as:

- Engaging more with the epidemiological community;
- Keep regular contact with FACCE-JPI to avoid duplication of effort and pursue funding opportunities;
- Share information and discuss relevant topics with Network members through an online portal; and
- Source funds for project work and conduct a global scoping study to identify major risks and opportunities for mitigation.

2.2.2 Burden of animal disease in Africa – Delia Grace (ILRI)

The impacts of livestock disease in Africa result in multiple burdens that reach from people to the ecosystem. It is possible to conduct a sampling study into disease burden but this would require targeted sampling across multiple countries and pathogens. An estimated figure for conducting a burden study in Africa, similar to those carried out in the UK and Australia, would cost around $700,000 per year.

The aim is to move beyond making like for like comparisons between Africa and Europe. Comparing yields with developed countries is not reasonable as productivity in Africa is not a priority and is low for a reason. A better comparison would be against what is realistic for the land area.

A major issue in mapping the burden of disease is due to a massive under-reporting of disease and the disconnect between human, livestock and wildlife. Further to this, the diagnosis of disease is also a challenge. It is thought that three quarters of the disease burden is caused by five or six diseases. However the priority diseases, as ranked by stakeholders, do not reflect importance or the ability to control the disease, therefore we need to be careful of how policy is influenced through the interpretation of the results of animal production and GHG emission studies.

2.2.3 GHG abatement potential of removing trypanosomosis – Michael MacLeod (SRUC)

This project aims to quantify the GHG mitigation effect of intervening against tsetse and trypanosomosis in Eastern Africa and is a collaboration between SRUC, ILRI, University of Oxford and AP Consultants.

Livestock are estimated to contribute 14.5% of the total anthropogenic GHG emissions and there is expected to be an increase in demand for livestock derived products. Consequently it is important to meet that demand without facing a proportionate increase in emissions. Improving animal health may be one way of achieving that aim.

The removal of trypanosomosis was shown to result in significant increases in production and emissions across all of the studied systems (driven primarily by increases in milk yields and fertility rates). However the production increases were greater than the emissions increases and so the emissions intensity (i.e. the kg of CO_2e per kg of edible protein output) decreased by between 2 and 8%, depending on the production system. Trypanosomosis control can be effected through vector control – and there is a number of ways to control or remove tsetse – but tsetse control activities tend to be declining on the continent.

The project also looked at the change in cattle population density and emissions intensity and found that in areas where trypanosomosis was removed (in the model) there were large increases in animal numbers. Emissions intensities resulting from additional draft power associated with healthier animals were also accounted for in the study.

The follow up from the project is to quantify the effects of trypanosomosis removal in West African cattle systems as well as quantifying the extent to which feed availability might act to constrain herd growth. Further areas to explore would be to analyse other constraints and investigate how the benefits of disease removal could be realised in practice.

2.2.4 Steps to sustainable livestock and the Global Farm Platform – Mark Eisler (University of Bristol)

The presentation covered the background to the 'Perfect Storm' of global events, the process to achieving sustainable intensification and sustainable livestock, the impact on the environment of dairy and beef production and the University of Western Australia's Future Farm 2050. The key remarks from the presentation were:

- Farmers are in it for profit…but do care about other things;
- Sustainability is about more than carbon and GHG's;
- We face huge challenges…but we can make only small changes; and,
- We can empower society to make informed choices.

2.2.5 The relationship between subclinical mastitis and emissions intensity in dairy cows – Şeyda Özkan (Norwegian University of Life Sciences)

Emissions in Norway increased by 6% between the year 1990 and 2011, with 90% of the total agricultural emissions (4.5 $MtCO_2e$) being attributed to feed and livestock production. The Norwegian Ministry of Agriculture and Food suggests a 20% reduction in agricultural emissions from 1990 levels by year 2020.

The aim of the project was to look at the impact of a high somatic cell count (and replacement decisions) in dairy cattle on Greenhouse Gas (GHG) emissions. A dynamic programming (DP) model of dairy cow replacement decision problem was used to estimate the optimised culling rate that consists of involuntary and voluntary culling, as well as the structure of the herd in terms of proportions of animals in each parity. The objective of the DP was to maximise the expected gross margins over feed (i.e. expected net present value (ENPV) of margin over feed expressed as an annuity) from a current lactating cow and future cows over an infinite time horizon by making appropriate replacement decisions Once the replacement rates were obtained from the DM model, HolosNor, a farm-scale model that estimates net farm GHG emissions from combined dairy and beef systems in Norway, accounting for all significant GHGs including soil C changes, was used to calculate the GHG emissions associated with different health status (health *versus* diseased). The scenarios that were compared were: healthy herd and two levels of disease.

The results showed that the ENPV's were 34,800 NOK/year for the healthy herd and 34,600 and 27,700 NOK/year for the diseased herds. Results also indicated that the increased GHG emissions per kg milk were related to an increased culling rate associated with a younger herd.

2.3 Overview of Discussions

2.3.1 Current research, research gaps and implications

This session was facilitated by Tim Robinson and focused on whether animal health researchers took GHG emissions into consideration and whether animal health impacts on emissions were considered to be significant.

There is a concern that even though there is evidence of a high benefit to cost ratio for disease interventions (before GHG benefits are counted) there has not been great uptake. The main interest has been into multiple burdens research, but it is thought that the sectorial nature of animal health research has resulted in the research area not gaining much traction. The additional benefit associated with GHG reductions could be seen as a useful part of a wider package aimed to improve productivity, profitability and resource efficiency in order to encourage greater uptake. An example of work of this type is that which focused on the voluntary eradication of Bovine Viral Diarrhoea (BVD) in Northern Ireland (for more information: http://www.animalhealthni.com/BVD.aspx).

A lack of capacity amongst farmers (in the form of not understanding the benefits of the health measures of how to put them into practice) has been associated with the undermining of the sustainability of health programmes. Uptake post programme is generally low, even where significant private benefits exist. For example, Newcastle disease kills up to 70% of infected poultry but there is underinvestment in control measures. Either because of lack of access to vaccines or the private sector not getting involved in projects once they have finished. Where the private sector fail to get involved, medicines are distributed and applied by (underqualified) community agents, which makes them less effective and results in people losing faith in putting preventative measures in place.

To increase the uptake of animal health intervention measures, two suggestions were made:

1. To focus on the human nutritional benefits; or
2. Make better use of market integration.

Benefits to human nutrition can be accrued, for example where smallholder dairy systems increase their production. Examples in Kenya and Tanzania (traditional liquid milk consuming countries) have shown evidence of an increase in milk consumption following an increase in production. Providing milk for schools has been used as a way of increasing school attendance. Where there is less of a culture of drinking liquid milk, the consumption of other dairy products, such as yoghurt, can be encouraged.

The above suggestion is largely limited to certain system types and there is little scope to elicit an increase in dairy production from subsistence farming systems, especially where there is little incentive, as dairy farming is seen as a side-business. It was concluded that there was a greater need to focus on market orientated producers.

Market integration could be used to encourage improved health, especially if the focus is started where market integration is already happening (i.e. peri-urban areas).

2.3.2 Funding opportunities and identification of co-benefits

The second discussion was facilitated by Tim Robinson and concluded that making links with other projects was the best way to make use of existing data and funding streams.

A list of organisations which have already been approached is as follows:

- CCAFS (funded the trypanosomosis and GHG emissions intensity work)
- STAR-IDAZ (Star-IDAZ will circulate information on a call for research, if the text is provided)
- Wellcome Trust (were approached for funding for the scoping study – although unsuccessful)
- Livestock Research Group (Research Group of the GRA) has been approached regarding funding for the scoping study
- The Bill and Melinda Gates Foundation (BMGF) has been approached regarding funding for the scoping study.

Potential sources of funding are:

- ERA-NET will be holding a sustainable animal production call in the next few years, however they are EU focused.
- FACCE-JPI
- Horizon 2020 (EU initiative)
- International Fund for Agricultural Development (IFAD)
- Clean Development Mechanism (CDM)
- Nationally Appropriate Mitigation Actions (NAMA's)
- Department for International Development (DFID)

APPENDIX 1: PARTICIPANTS LIST

Name	Organisation Name	Role/Job Title
Baba Soumare	African Union Inter African Bureau for Animal Resources (AU-IBAR)	Chief Animal Health Officer
Delia Grace	International Livestock Research Institute (ILRI)	Programme Manager
Alex Morrow	Department for Environment Food & Rural Affairs (Defra)	Deputy Science Coordinator
Luke Dalton	Department for Environment Food & Rural Affairs (Defra)	STAR-IDAZ Project Manager
Alaa Marzok	General Organization for Veterinary services Ministry of agriculture and Land Reclamation	Senior Veterinarian
Victor Mbao	Centre for Ticks and Tick Borne Diseases (CTTBD)	Programme Manager - Large Ruminant
Adugna Tolera	Hawassa University	Professor, Animal Feeds and Nutrition
Kurt J. Peters	Humboldt-Universität, Berlin	International Livestock Research Consultant
Tim Robinson	International Livestock Research Institute (ILRI)	Principal Scientist
John Mutua Mugambi	Kenya Agricultural and Livestock Research Organization	Veterinary Research Centre Director
Michel Bellaiche	Kimron Veterinary Institute (KVI)	Director of KVI
Noelina Nantima	Ministry Of Agriculture, Animal Industry And Fisheries	Principal Veterinary Officer
David Shamaki	National Veterinary Research Institute	Director Research
Seyda Özkan	Norwegian University of Life Sciences	Researcher
Michael MacLeod	Scotland's Rural College (SRUC)	Climate Change Researcher
Halifa Mussa Msami	DELTAVET - Tanzania	Veterinary Research Officer
Mark Eisler	University of Bristol	Chair in Global Farm Animal Health
Samuel Thevasagayam	Bill & Melinda Gates Foundation	Deputy director, Livestock Initiative
Giuliano Cecchi	Food and Agriculture Organisation of the United Nations (FAO)	Project Officer

APPENDIX 2: AGENDA

Animal Health & Greenhouse Gas Emissions Intensity Network

Regional Meeting - Africa

5th November 2014
12:30 – 18:30
Hilton Hotel
Addis Ababa
Ethiopia

What will we achieve at the meeting?

- Introduce the Network and its aims
- Encourage awareness and active participation/promotion of the Network (focus on Africa)
- Discuss current research and areas in which research is required
- Understand the key drivers for funding research in Africa and explore how research can be funded
- Understand the importance of GHG/climate change mitigation in Africa and how the Network can help meet this challenge.

Held in the margins of the ILRI@40 celebrations (http://www.ilri.org/node/39048) and alongside the STAR-IDAZ (http://www.star-idaz.net/) regional meeting.

Time	Agenda Item
12:30 – 14:00	*Lunch*
14:00 – 14:30	Introduction to the Network and GRA and overview of animal health and GHG emissions intensities ○ *Tim Robinson (ILRI, Kenya)*
14:30 – 15:30	Scientific presentations • Burden of animal disease in Africa ○ *Delia Grace (ILRI, Kenya)* • GHG abatement potential of removing trypanosomosis ○ *Michael MacLeod (SRUC, UK)*
15:30 – 16:00	*Coffee break*
16:00 – 17:00	Scientific presentations (Cont.) • Steps to sustainable livestock and the Global Farm Platform ○ *Mark Eisler (University of Bristol, UK)* • The relationship between subclinical mastitis and emissions in dairy cows ○ *Şeyda Özkan (Norwegian University of Life Sciences, Norway)*
17:00 – 18:00	Discussion chaired by: Tim Robinson 1. Current research, research gaps and implications 2. Funding opportunities and identification of co-benefits
18:00 – 18:30	Summary and Close ○ *Tim Robinson (ILRI, Kenya)*