Department
for Environment
Food & Rural Affairs

defra
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Animal Health and Greenhouse Gas Emissions Intensity Network

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

ADAS

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

CGIAR

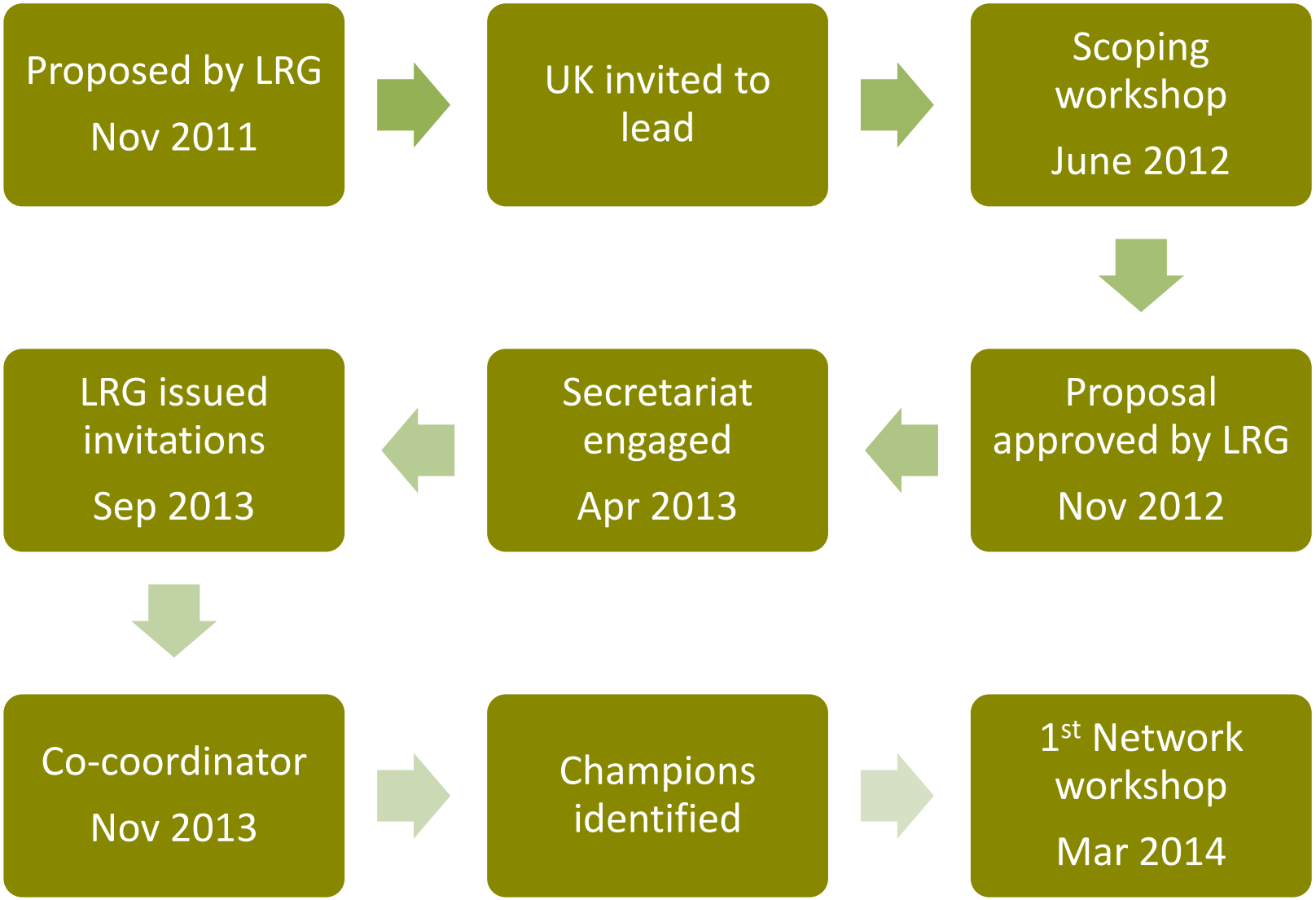
Timothy Robinson
Network Coordinator, ILRI
5TH Multi-stakeholder Platform Meeting
7-10 October 2014, Cali, Colombia

GLOBAL AGENDA FOR SUSTAINABLE LIVESTOCK

Overview

- Network history
- Who are we?
- Network secretariat function
- Aims and objectives
- Challenges
- Existing and on-going studies
- Issues and next steps
- Sources of network information

History


Proposed by LRG
Nov 2011
UK invited to lead
Scoping workshop
June 2012
Proposal approved by LRG
Nov 2012
Secretariat engaged
Apr 2013
LRG issued invitations
Sep 2013
Co-coordinator
Nov 2013
Champions identified
1st Network workshop
Mar 2014

Who are we?

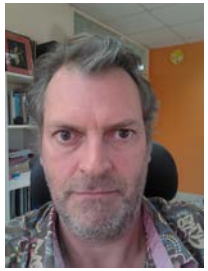
Secretariat

Adele Hulin
ADAS

Alice Willett
ADAS

Coordinators

Ilias Kyriazakis
Newcastle University



Tim Robinson
ILRI

Network Champions

Abdul Chaudhry
Newcastle University

Dr Jos Houdijk
SRUC

Michael Macleod
SRUC

Wim van der Poel
Wageningen University

Network Secretariat

- 3 year project lifespan (defra & ADAS)
- Central contact point and primary channel for information
- Promote the network nationally and internationally
- Maintain network web pages
- Organise network meetings and workshops
- Support for UK scientists to attend network events
- Regular updates on network developments (UK and LRG newsletters)
- Funding of some ‘seed’ projects

animalhealthnetwork@adas.co.uk

Seed Projects

1. Impact of endemic diseases of UK dairy cattle on GHG emissions intensity
2. Review of GHG abatement from health interventions in the livestock sector

Network objectives

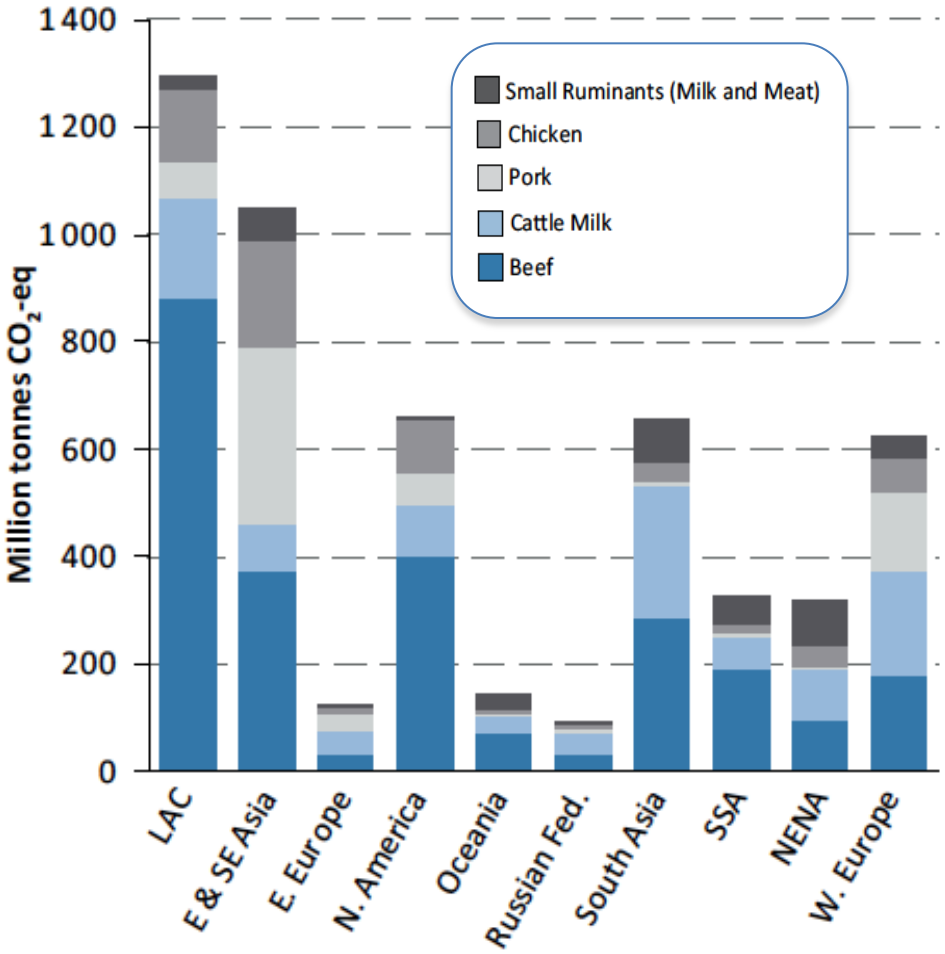
- Share information on current and planned activities
- Maintain and enhance capacity in this field of cross-disciplinary research
- Encourage and facilitate a coordinated approach to research
- Agree on priority issues
- Explore funding opportunities to address them
- Pursue synergies with stakeholders to further strengthen global cooperation and networks

Some immediate aims

- Integrate with other networks
  - FACCE-JPI
  - Global Agenda for Sustainable Livestock
  - STAR-IDAZ (Global network for animal disease research)
- Complement other GRA-LRG networks
- Explore potential for regional subgroups
- Standardise modelling assumptions
- Improve accuracy of data and incorporate measurements from developing countries
- Source funding for research
- Conduct a global scoping study to help prioritise research

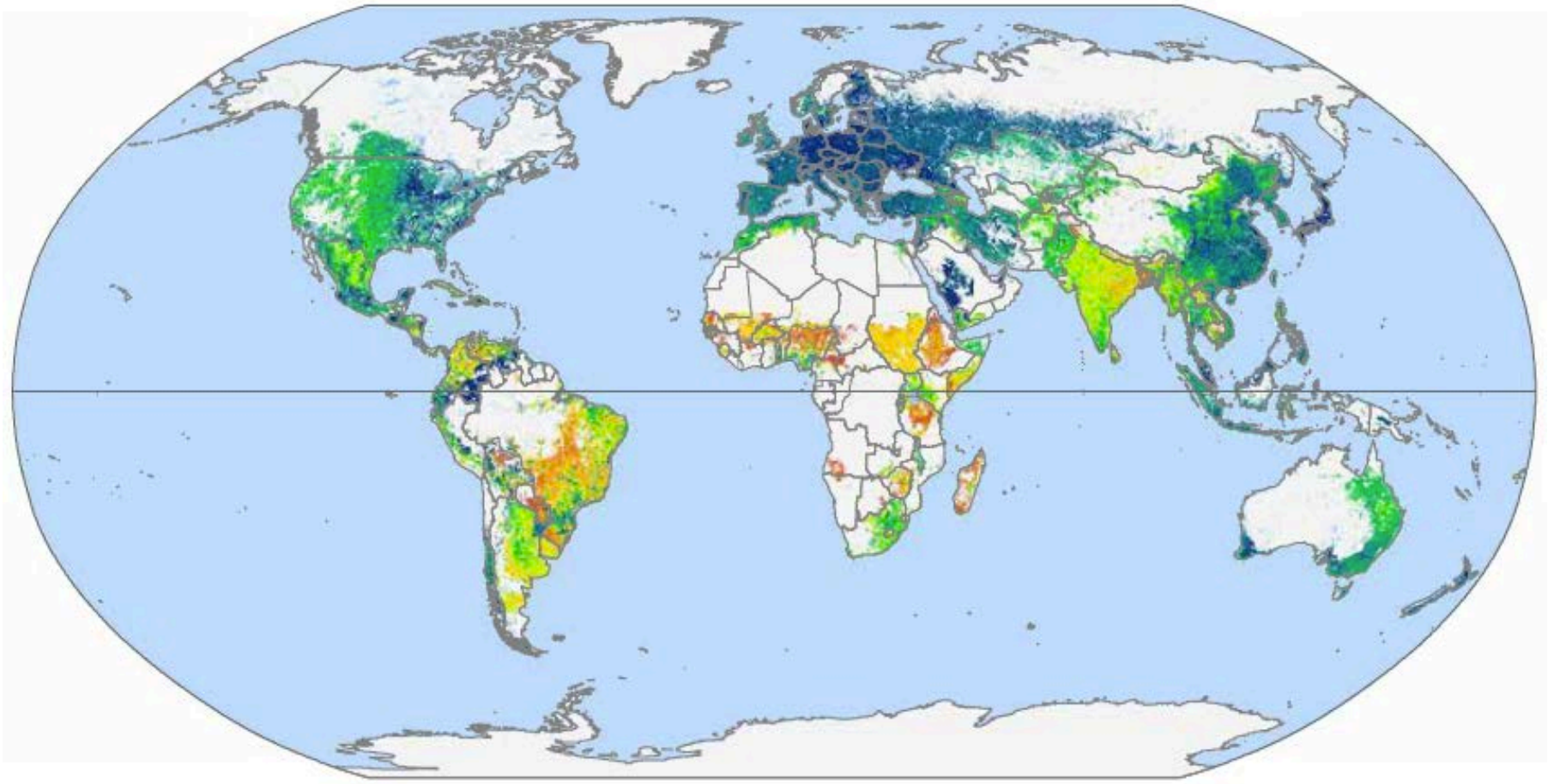
Some challenges

- Understanding where the problems and opportunities lie
- Understanding people's motives for keeping livestock in different regions and systems
- Participation from developing and emerging economies
- Funding for research, participation and integration



Source: Gerber et al. 2013

Emission intensity per unit of edible protein

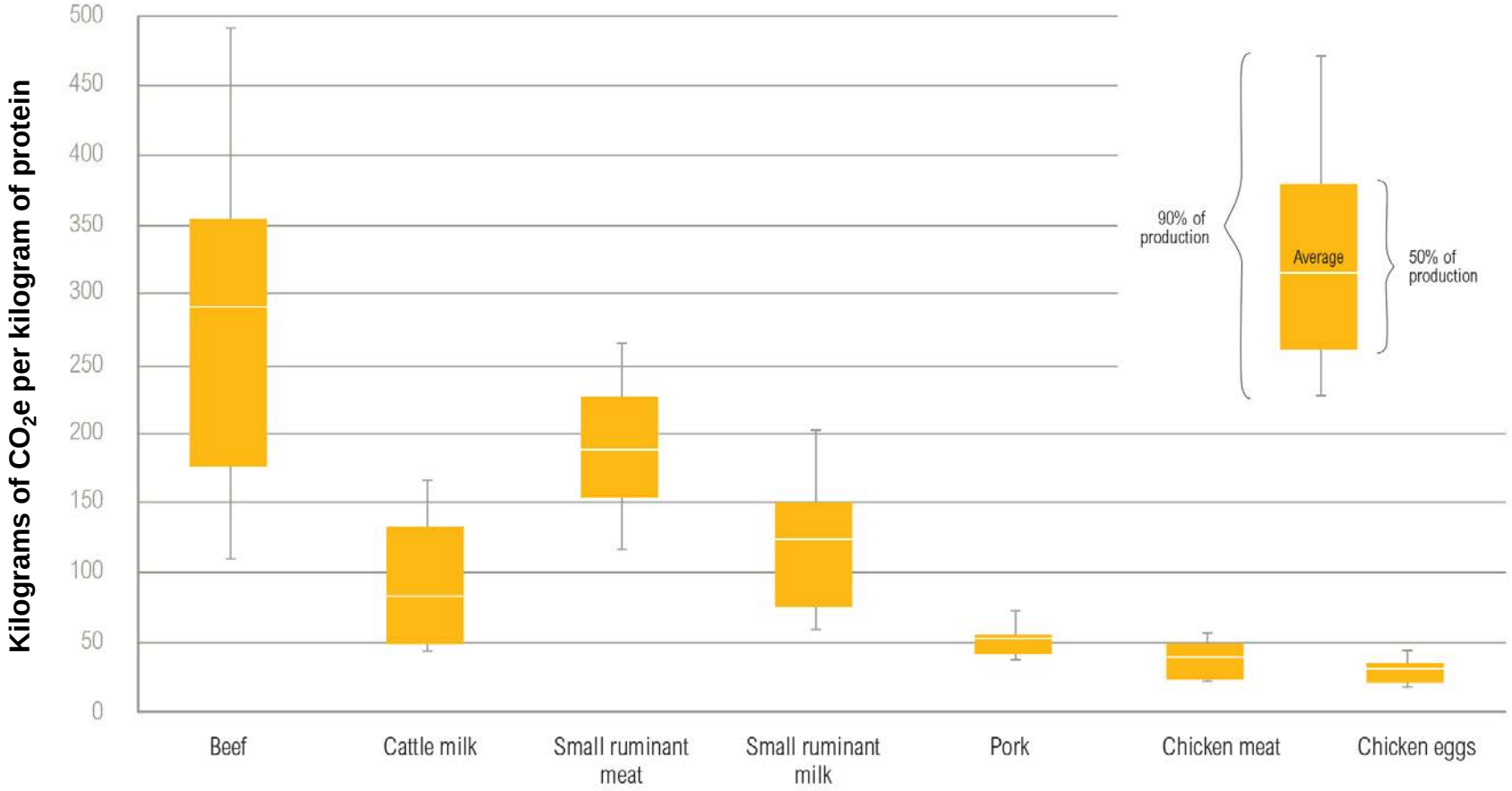


Department for Environment, Food & Rural Affairs

Source: Gerber et al. 2013

Emission intensity per unit of edible protein

Beef production generates 6 times more GHG emissions per unit of protein than pork, chicken and eggs



Source: Gerber et al. 2013

But there is high regional variation

	North America	Western Europe	Eastern Europe	Sub Saharan Africa	Latin America & Carib.	South Asia	East & S-East Asia
$kgCO_2e$ per kg beef	29	18	14	60	72	77	47
% from enteric CH4	38%	33%	36%	68%	33%	65%	60%

- Other sources include manure, feed production related, land use change, energy, and post-farm
- Major differences come from differences in production systems, feed quality, herd management, and manure management

Source: Gerber et al. 2013

So … what of animal health

- Lost opportunity or a drop in a bucket?
- Tripple win?
  - Environment
  - Productivity
  - Animal Welfare
- A few examples exist
  - Mostly from developed economies
- Analytical framework
  - Economic analysis
  - Lifecycle Assessment (LCA)
  - MACC analyses

Some existing studies

- Mastitis in UK dairy herd (Stott et al. 2010)
  - Milk yield losses of 3.5%
  - 40% of loss could be recovered by improved health care
  - Control → **8%** reduction in UK dairy emissions (CO_2e)
- Mastitis in Spanish dairy herd (Hospido & Sonesson 2005)
  - Milk yield losses of 7%
  - Control → **2.5%** reduction in "Global Warming Potential"
- Bovine Viral Diarrhoea Virus (BVDV) in Scottish beef suckler herds (Stott et al. 2010)
  - Strong link between cow fertility and GHG emissions
  - Losses to BVDV estimated at 10 calves/100 cows
  - Control → **8%** decrease in methane emissions per calf sold

Project AC0120

Lifecycle analysis of endemic diseases of UK dairy cattle on GHG emissions intensity

- Modelling the impact and cost-effectiveness of controlling endemic cattle diseases and conditions on GHG emissions
- Interdisciplinary research project
- Lead by John Elliott, ADAS

- £168,000 UK government investment providing evidence in a novel area of interest
- Feeds in to UK contribution to Global Research Alliance activity

Project AC0120

Diseases and treatments considered

10 endemic cattle diseases

- BVD
- Calf pneumonia
- Calf scour
- IBR
- Infertility
- Lameness
- Liver fluke
- Mastitis
- Paratuberculosis
- Salmonella

30 treatments, based around

- Veterinary visits
- Medicines
- Limestone cow track
- Building maintenance
- Milking machine maintenance
- Bedding (straw, sand etc.)
- Grazing management

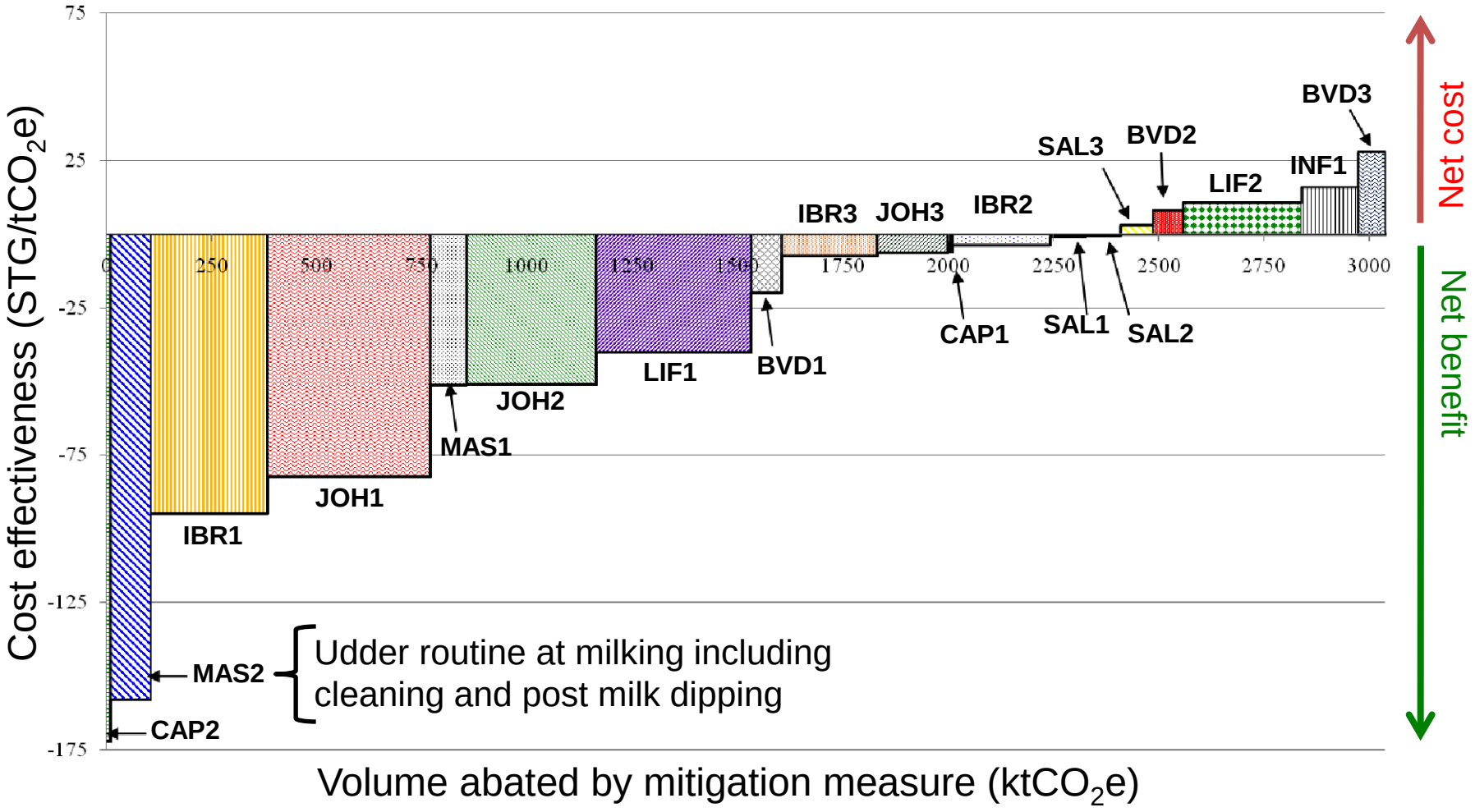
Project AC0120

Code	Mitigation Measure
BVD1 (MMCF04)	Vaccination for BVD
BVD2 (MMCF05)	Identifying persistently infected animals through laboratory testing programme
BVD3 (MMCF06)	Double fencing and buying policy
CAP1 (MMCF08)	Colostrum intake under nutrient management
CAP2 (MMCF09)	Vaccination for calf pneumonia
LIF1 (MMCF13)	Strategic treatment using medicines
LIF2 (MMCF14)	Grazing management - ducks, drainage and fencing
IBR1 (MMCF15)	Vaccination for IBR
IBR2 (MMCF16)	Identifying latently infected carrier animals
IBR3 (MMCF17)	Double fencing and buying policy
INF1 (MMCF19)	Fixed time artificial insemination
JOH1 (MMCF21)	Colostrum management and calving/farm hygiene
JOH2 (MMCF22)	Buying policy, test and cull
JOH3 (MMCF23)	Vaccination for Johne's disease
MAS1 (MMCF24)	DCT/teat sealant with potential for vaccination
MAS2 (MMCF27)	Udder routine at milking including cleaning and post milk dipping
SAL1 (MMCF28)	Hygiene
SAL2 (MMCF29)	Vaccination for Salmonella
SAL3 (MMCF30)	Vector control

Source: Elliott et al. 2014

Project AC0120

Marginal Abatement Cost Curve (MACC)



Source: Elliott et al. 2014

Trypanosomosis in East Africa

- Funded by the International Livestock Research Institute under CCAFS, the CGIAR Research Program “Climate Change, Agriculture and Food Security”.
- Acknowledge the use of the FAO GLEAM model
- Additional model development has been undertaken with funding from the Scottish Government Rural and Environmental Science and Analytical Services division (RESAS).

- Michael MacLeod
- Tim Robinson
- William Wint
- Alex Shaw
- Vera Eory

ILRI
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UNIVERSITY OF OXFORD
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AP Consultants
ECONOMICS FOR ADVOCACY

ERGO
Environmental Research Group Oxford

CGIAR

RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

CCAFS

Department for Environment, Food & Rural Affairs

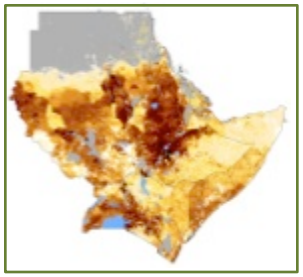
Two complementary approaches

- Mapping the Benefits (MTB) of disease interventions
  - Shaw et al. (2006) *Mapping the benefits: a new decision tool for tsetse and trypanosomiasis interventions*. DFID/FAO-PAAT
  - Shaw et al. (2014) *Mapping the economic benefits to livestock keepers from intervening against bovine trypanosomosis in Eastern Africa*. Preventive Veterinary Medicine 113, 197-210.

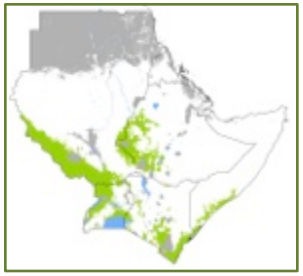
- GLEAM - Life Cycle Assessment (LCA) of GHG emissions from livestock
  - Gerber et al. (2010) *Greenhouse Gas Emissions from the Dairy Sector: A life cycle assessment.* Rome: FAO
  - Opio et al. (2013) *Greenhouse Gas Emissions from the Beef and Small Ruminant Sectors: A life cycle assessment*. Rome: FAO
  - MacLeod et al. (2013) *Greenhouse Gas Emissions from the Pig and Poultry Sectors: A life cycle assessment*. Rome: FAO
  - Gerber et al. (2013) *Tackling climate change through livestock.* Rome: FAO

Mapping The Benefits (MTB)

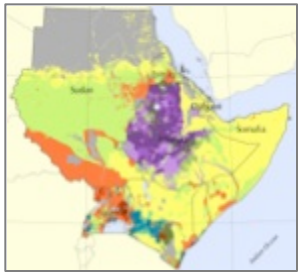
Cattle density



Tsetse distribution



Production systems



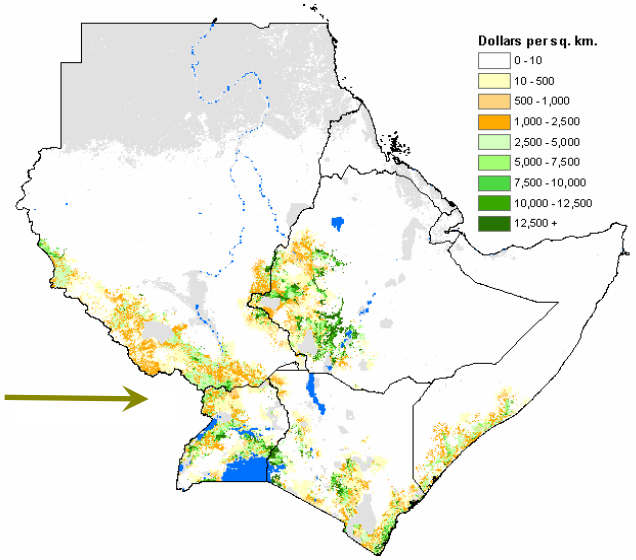
Herd model

- Burden of disease
- Herd growth and spread
- Value of production

Economic benefits per animal (US$)

Cattle production system	Pastoral	Agro-pastoral	Mixed farming (general)	Mixed farming (Ethiopia)
Low oxen	63	82	90	102
Medium oxen	–	98	122	135
High oxen	–	118	152	161
High dairy	–	142	148	–

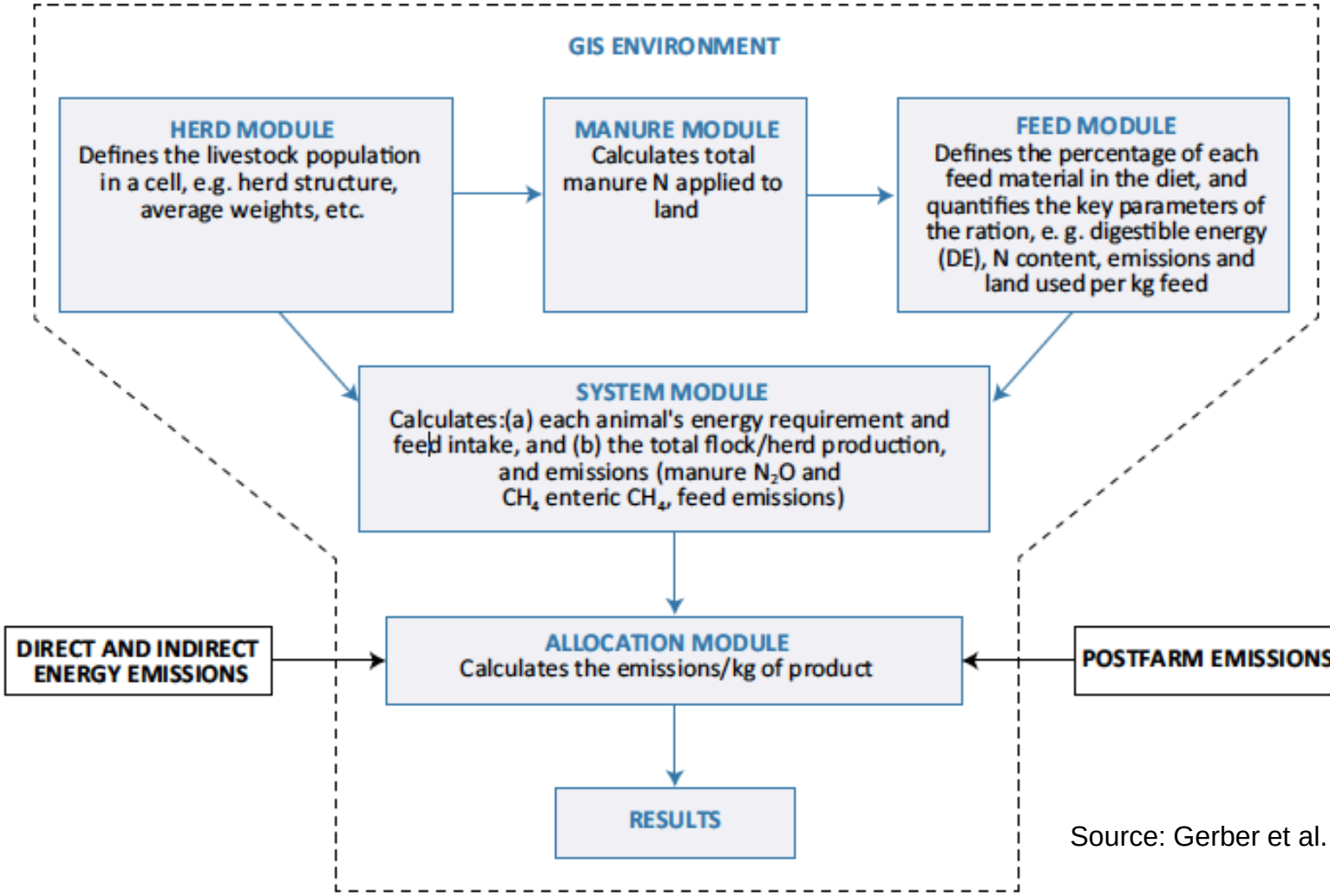
Economic benefits over 20 years of trypanosomosis removal



Source : Shaw et al. (2014)

GLEAM Lifecycle Assessment

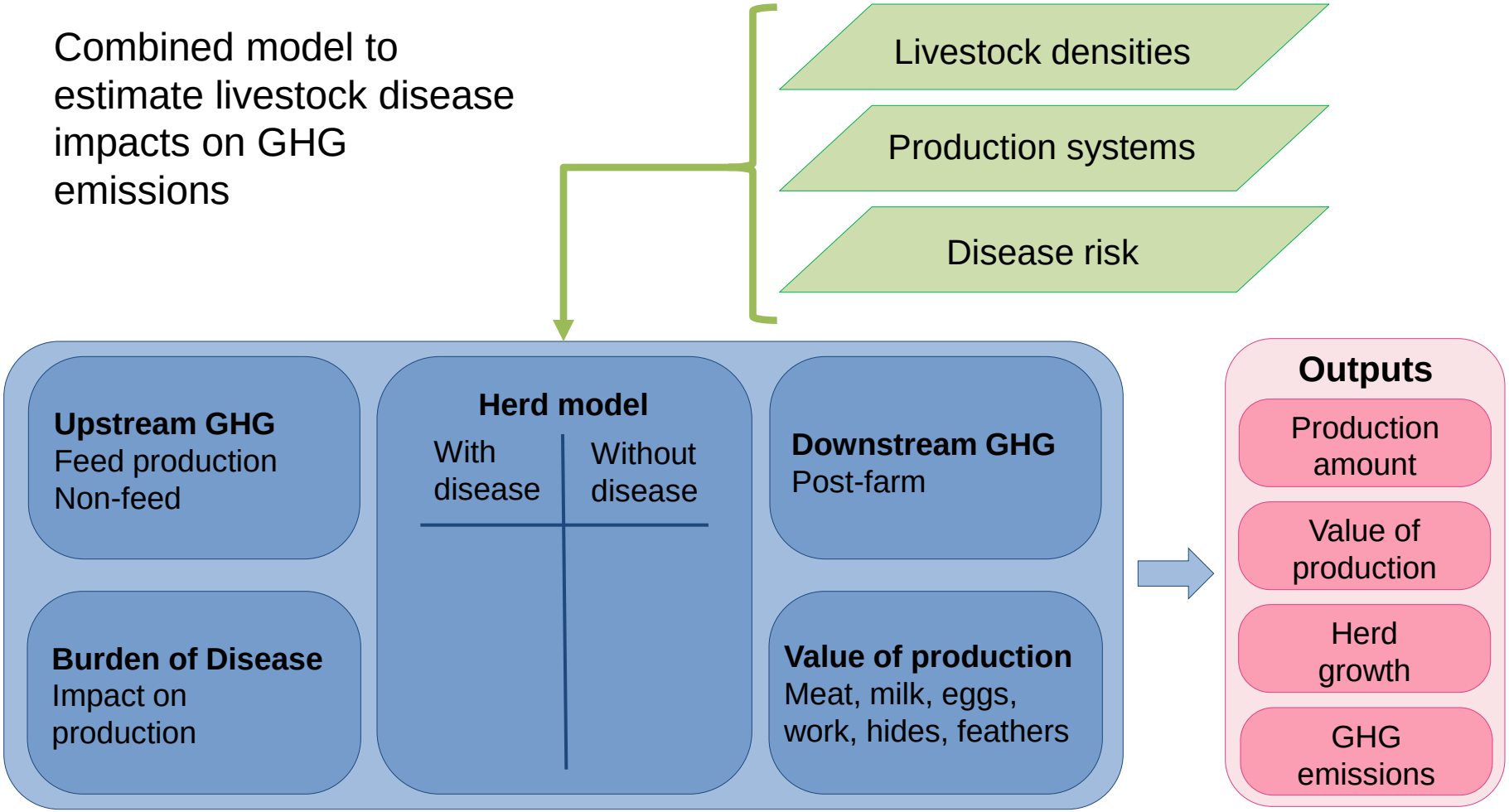
Global Livestock Environmental Assessment Model



Source: Gerber et al. 2013

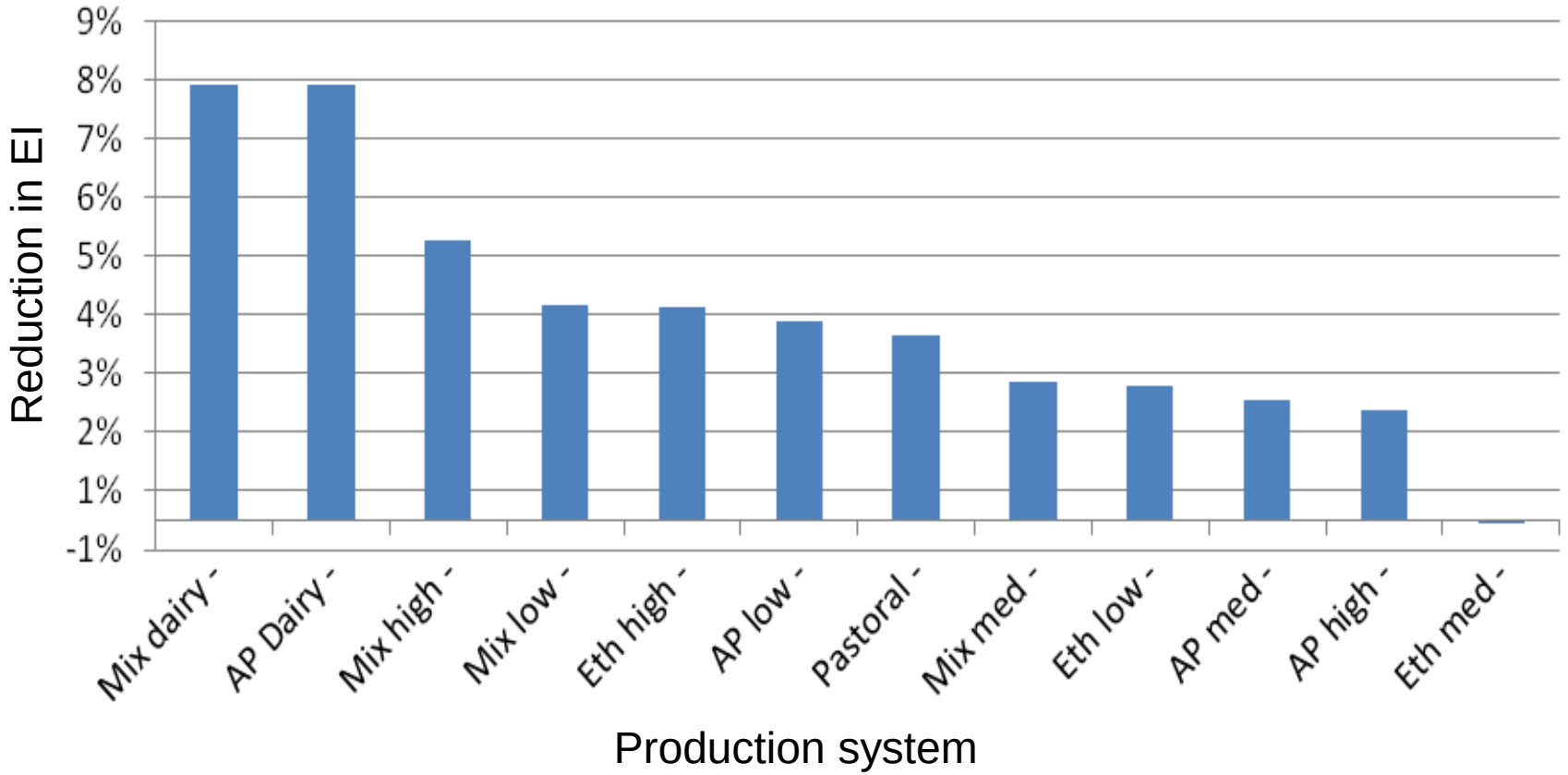
Analytical framework

Combined model to estimate livestock disease impacts on GHG emissions



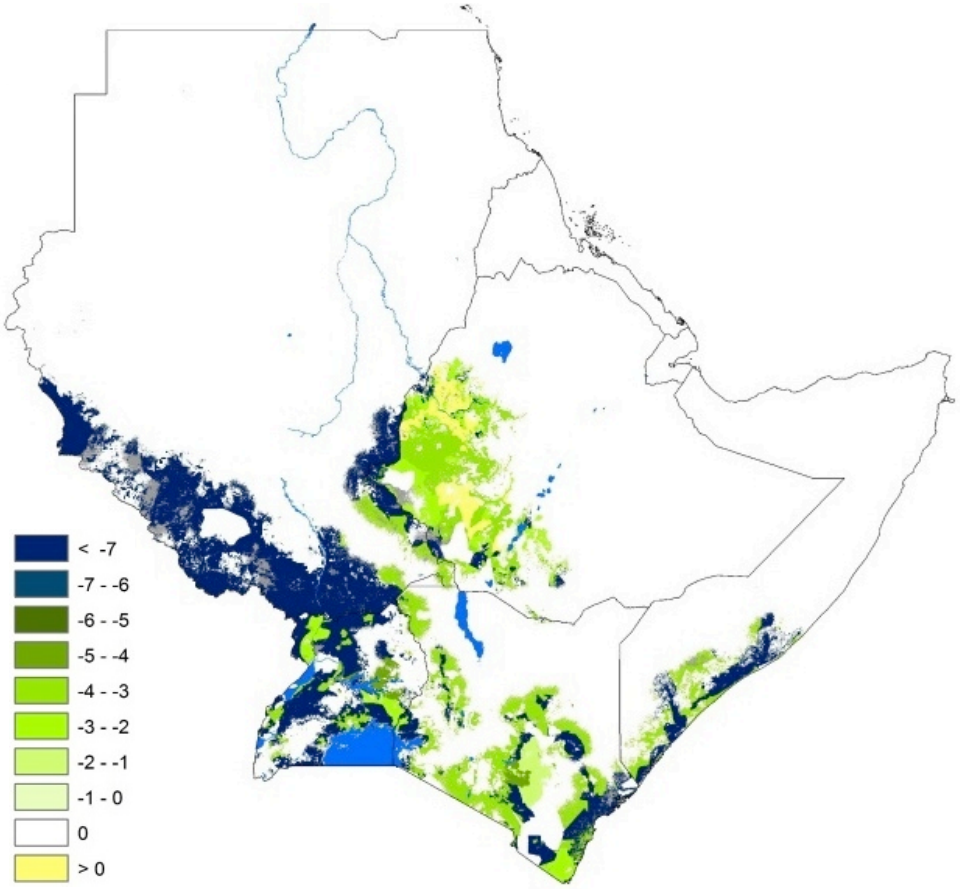
Results

Decrease in emissions intensity arising from trypanosomosis removal



Results

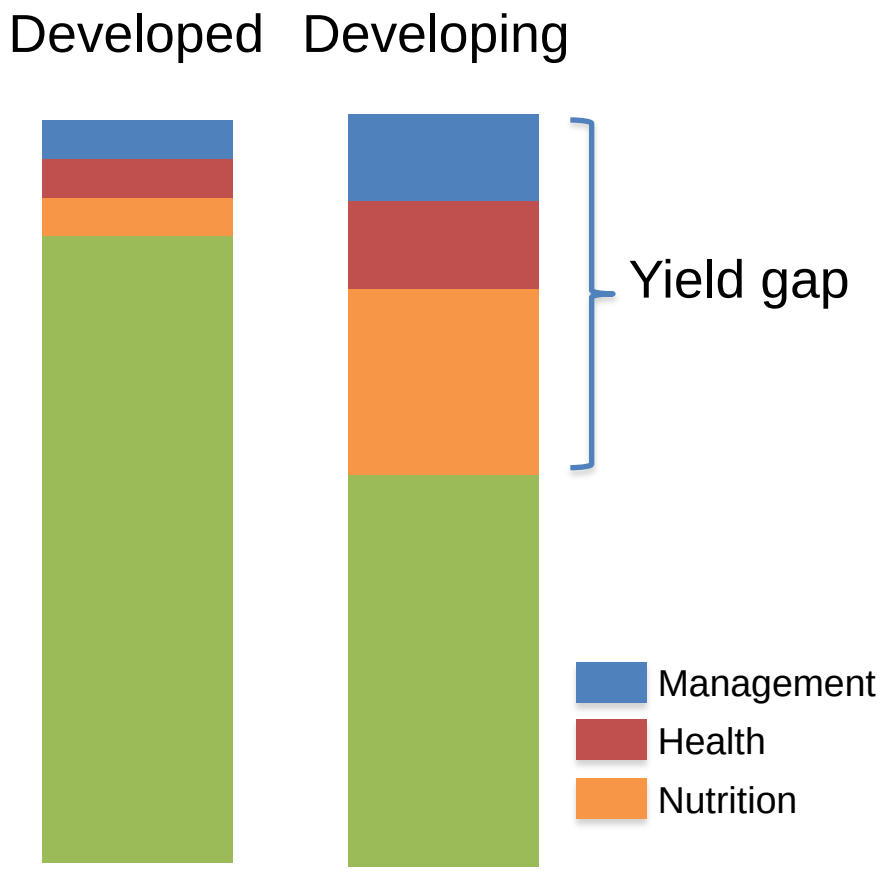
% change in emissions intensity



- Removal of trypanosomosis leads to significant increases in production and emissions across all the systems
- Production increases by more than emissions so EI decreases
- The biggest decrease in EI is in the high yield dairy systems
- Demonstrates a clear link between improving productivity and decreasing EI

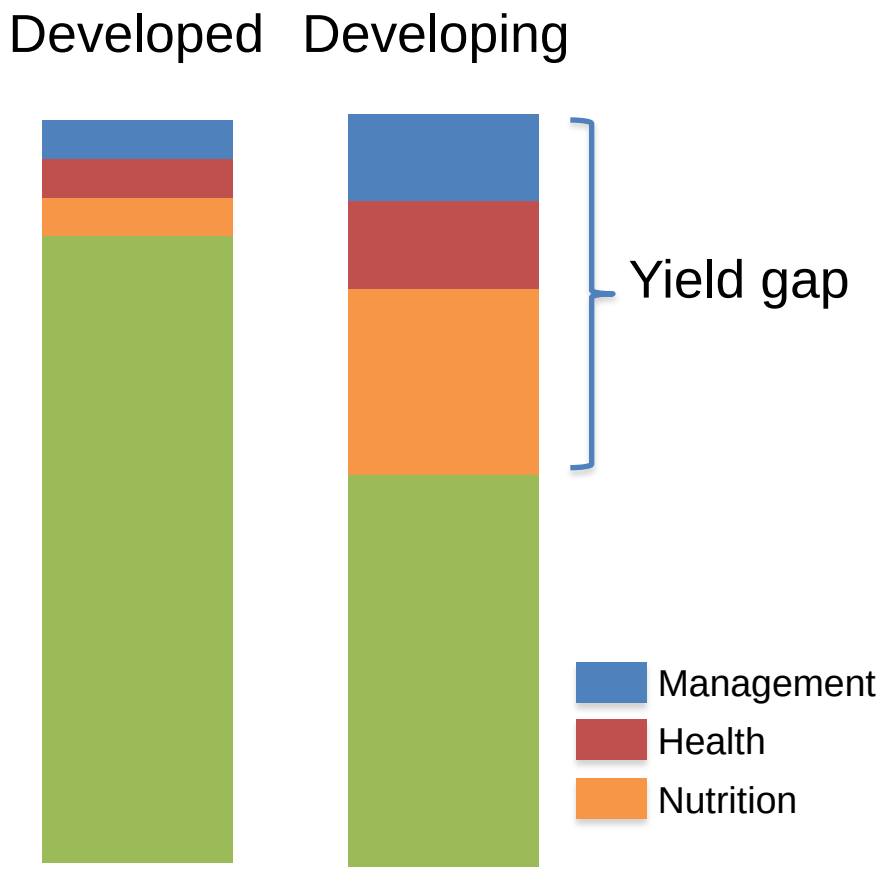
Some issues

- Compare the direct against the indirect effects of disease
- Dealing with uncertainty in models (error propagation)
- Cost and feasibility of AH-related interventions against costs of other types of interventions
- Barriers to uptake of interventions
- What might be the tradeoffs of changing the mode of production (social, resilience)



Some issues

- What are the objectives of the 800 million small livestock keepers in poor countries?
- Are the market incentives available to make productivity their primary objective?
- What proportion of the yield gap is attributable to animal health issues?
- How inter-related are all of the factors contributing to the yield gap?



Next steps for the Network

- Engage more with epidemiology community with the aim to hold the next Annual Workshop in the margins of an epidemiological conference (conference not yet confirmed but ideally it would be spring time next year)
- Regular communication with FACCE-JPI to avoid duplication of effort and pursue funding opportunities
- The Network will be represented at LiveM event this month to improve engagement with MACSUR
- Network participants will soon have access to an online login to share information and discuss topics relevant to the Network (linked with STAR-IDAZ)
- Regional network meeting in Addis Ababa on 5 November 2014 (Hilton)
  - Linked to STAR-IDAZ regional meeting (4 November)
  - Linked to ILRI@40 celebrations (6-7 November)

More information

- Network Secretariat: animalhealthnetwork@adas.co.uk
- GRA-LRG Newsletter: http://www.globalresearchalliance.org/research/livestock/
- UK Agri-Science & Innovation Newsletterhttp://www.globalresearchalliance.org/updates/2013/uk-agri-science-innovation-newsletter/