Department
for Environment
Food & Rural Affairs

Animal Health and Greenhouse Gas Emissions Intensity Network

Timothy Robinson
Network Co-cordinator, ILRI

Michael MacLeod
Scotland's Rural College

Joint GRA Networks meeting
26 June 2015, Reading

Trypanosomosis in East Africa

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- Funded by CCAFS, the CGIAR Research Program “Climate Change, Agriculture and Food Security”.
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- Michael MacLeod
- Tim Robinson
- Pierre Gerber
- William Wint
- Alex Shaw
- Vera Eory

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

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FIAT PANIS

SRUC

UNIVERSITY OF OXFORD
DOMI NVS ILLV MINA TIO MEA

AP Consultants
ECONOMICS FOR ADVOCACY

ERGO
Environmental Research Group Oxford

CGIAR
RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security
CCAFS

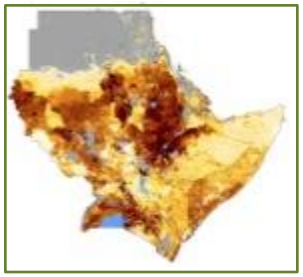
Two complementary approaches

- 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.

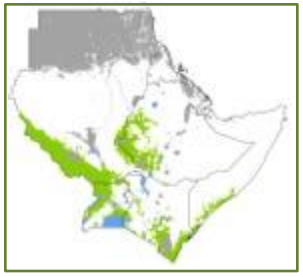
- GLEAM - Life Cycle Assessment (LCA) of GHG emissions from livestock
  - Gerber et al. (2010) *Greenhouse Gas Emissions from the Dairy Sector: A life cycle assessment.* Rome: FAO
  - Opio et al. (2013) *Greenhouse Gas Emissions from the Beef and Small Ruminant Sectors: A life cycle assessment*. Rome: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

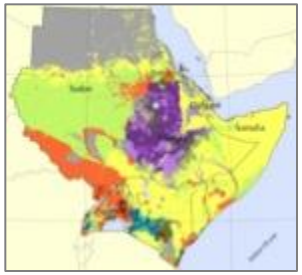
Cattle density



Tsetse distribution



Production systems



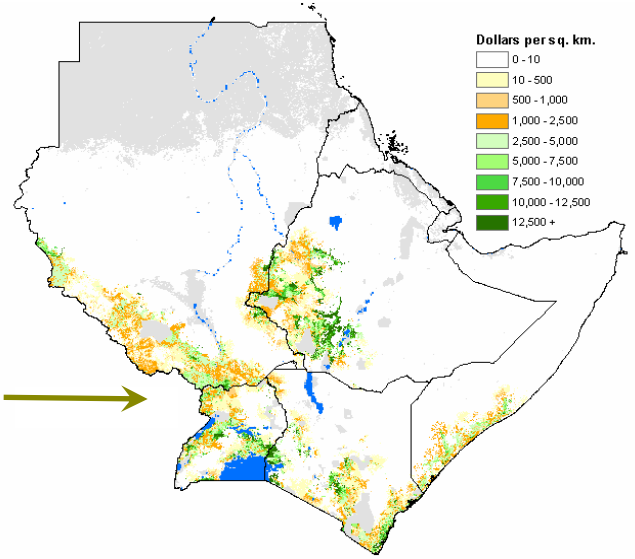
Herd model

- 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	–

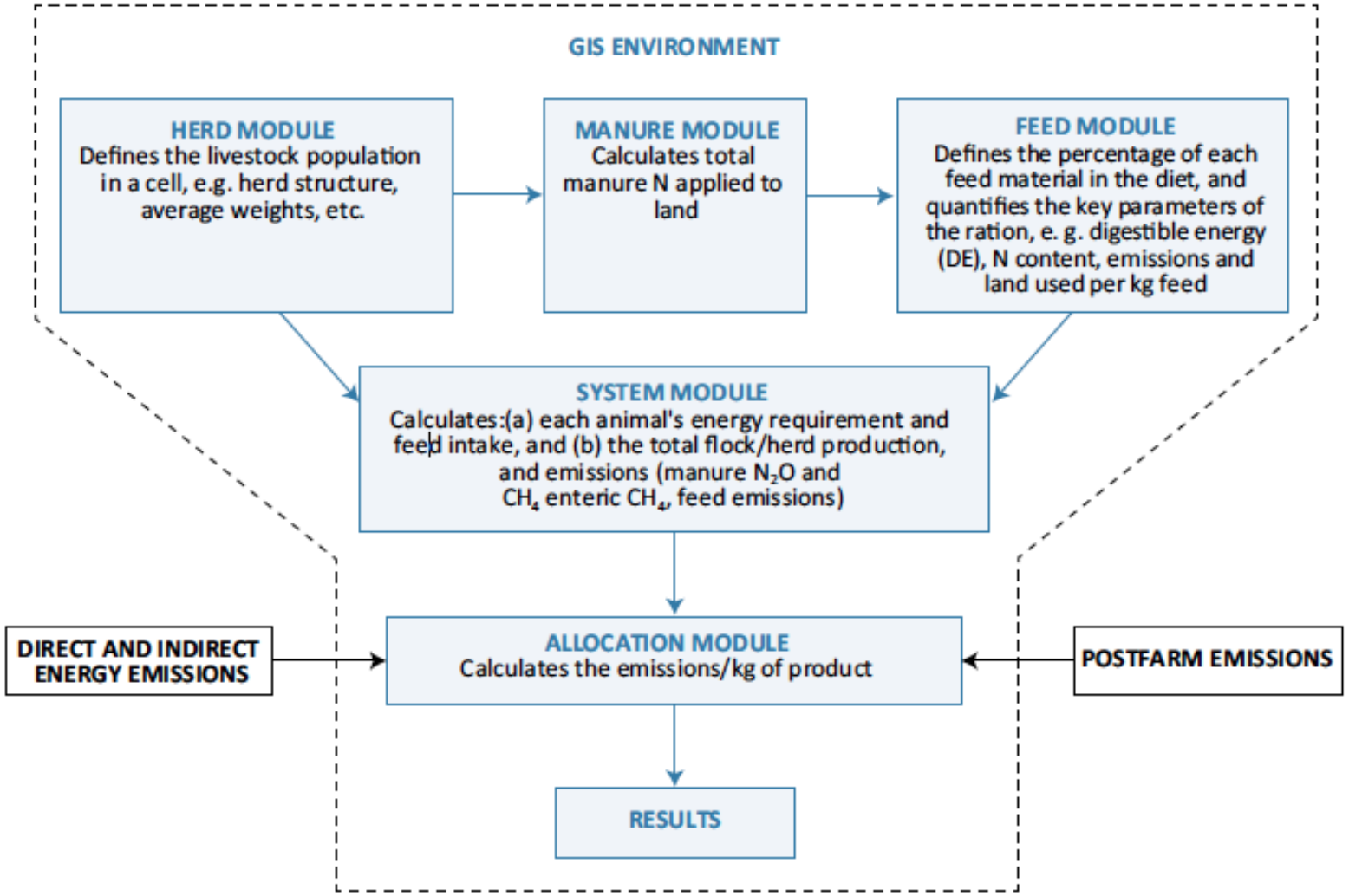
Economic benefits over 20 years of trypanosomosis removal



Source : Shaw et al. (2014)

GLEAM Lifecycle Assessment

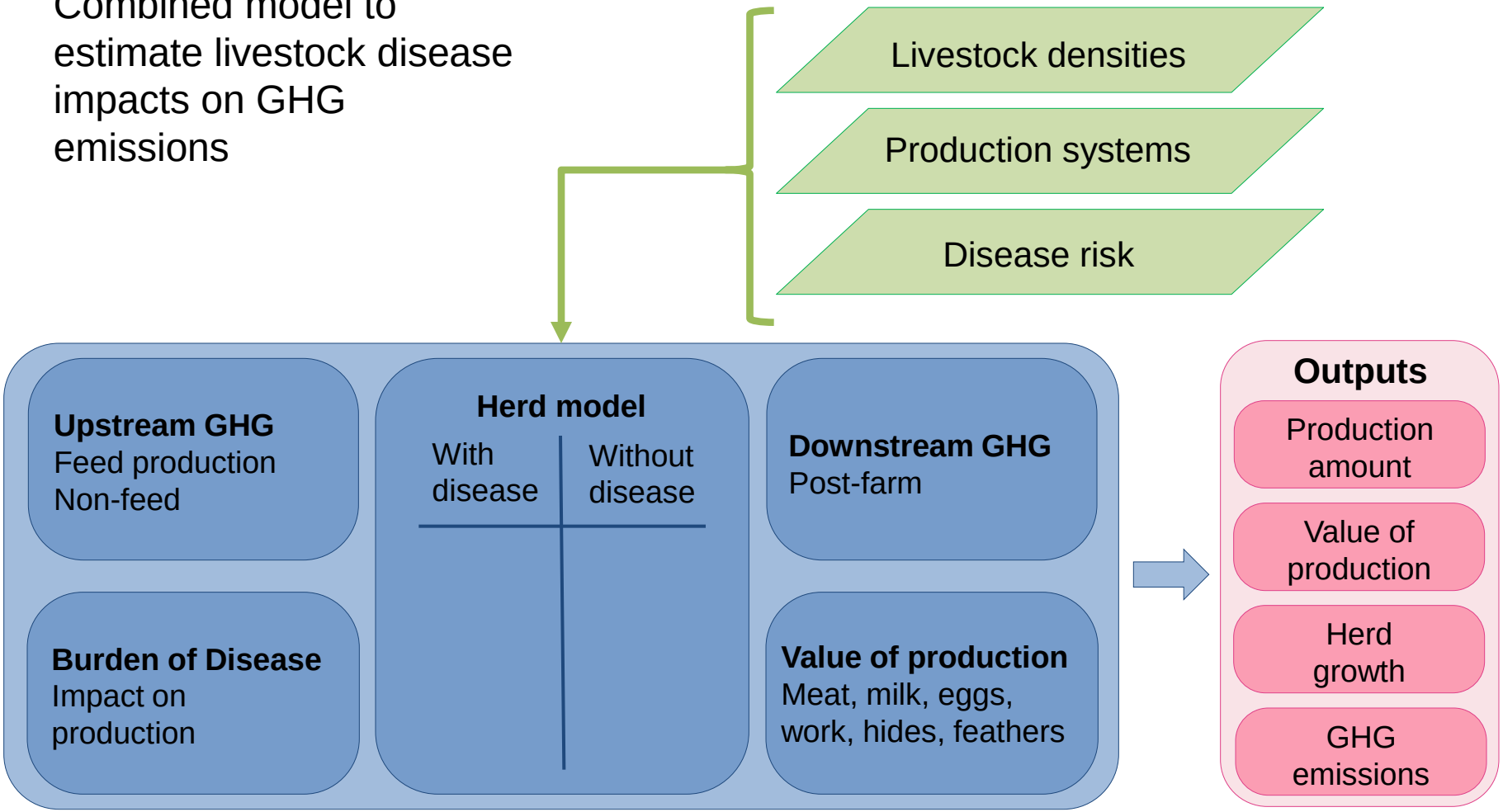
Global Livestock Environmental Assessment Model



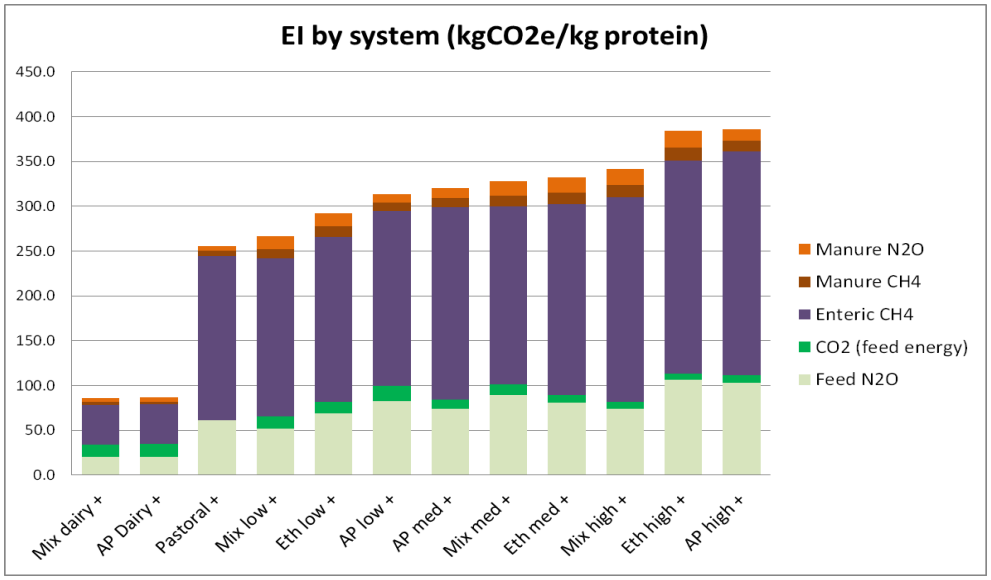
Source: Gerber et al. 2013

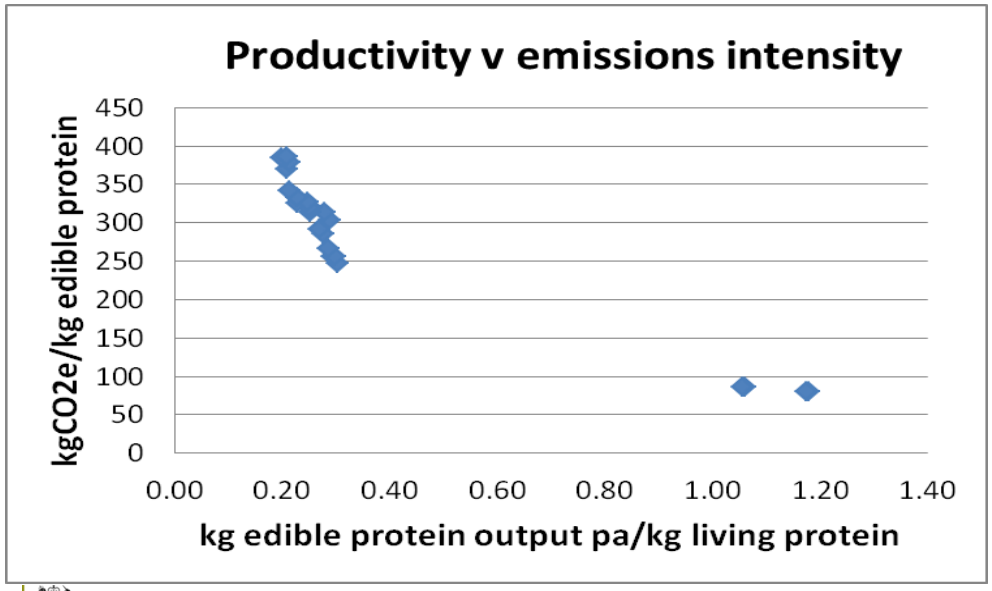
Analytical framework

Combined model to estimate livestock disease impacts on GHG emissions



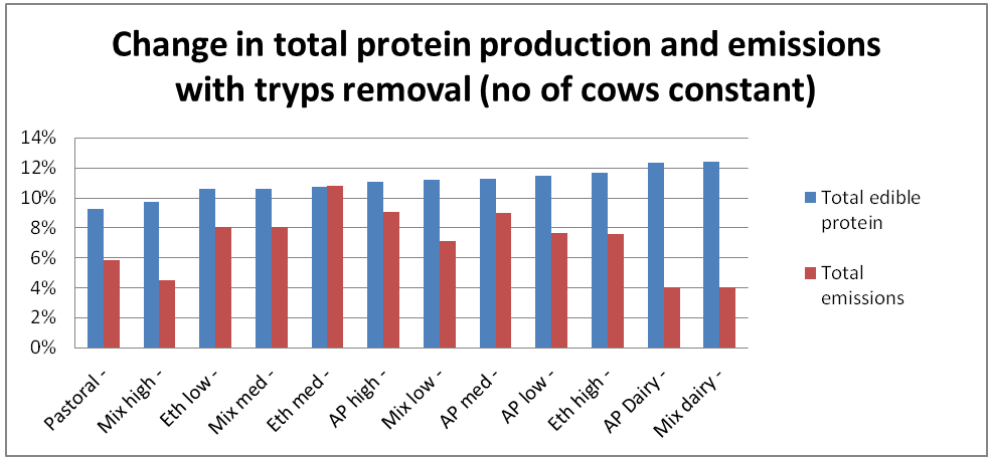
Results

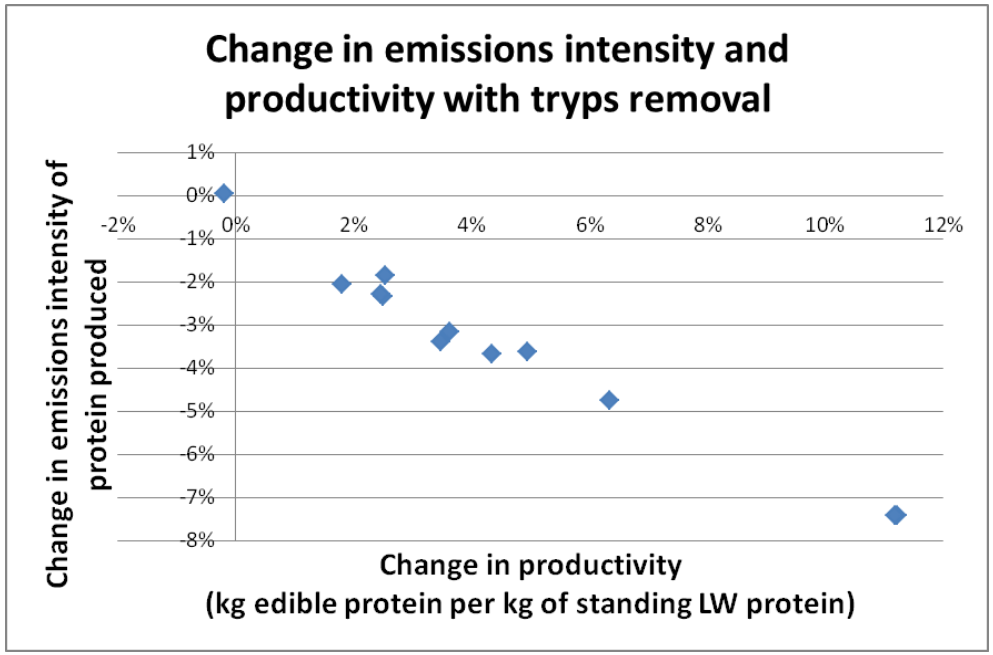




- Main sources of emissions are (a) enteric CH_4 and (b) nitrous oxide arising from the deposition of organic N on pasture (either directly via the urine of grazing animals, or via the spreading of the collected manure of housed cattle)
- The higher yield grade dairy systems have much lower emissions intensity due to their higher productivity. Variation between the other systems is less marked but also largely driven by productivity (and to a lesser extent, the digestibility of the ration).

Results

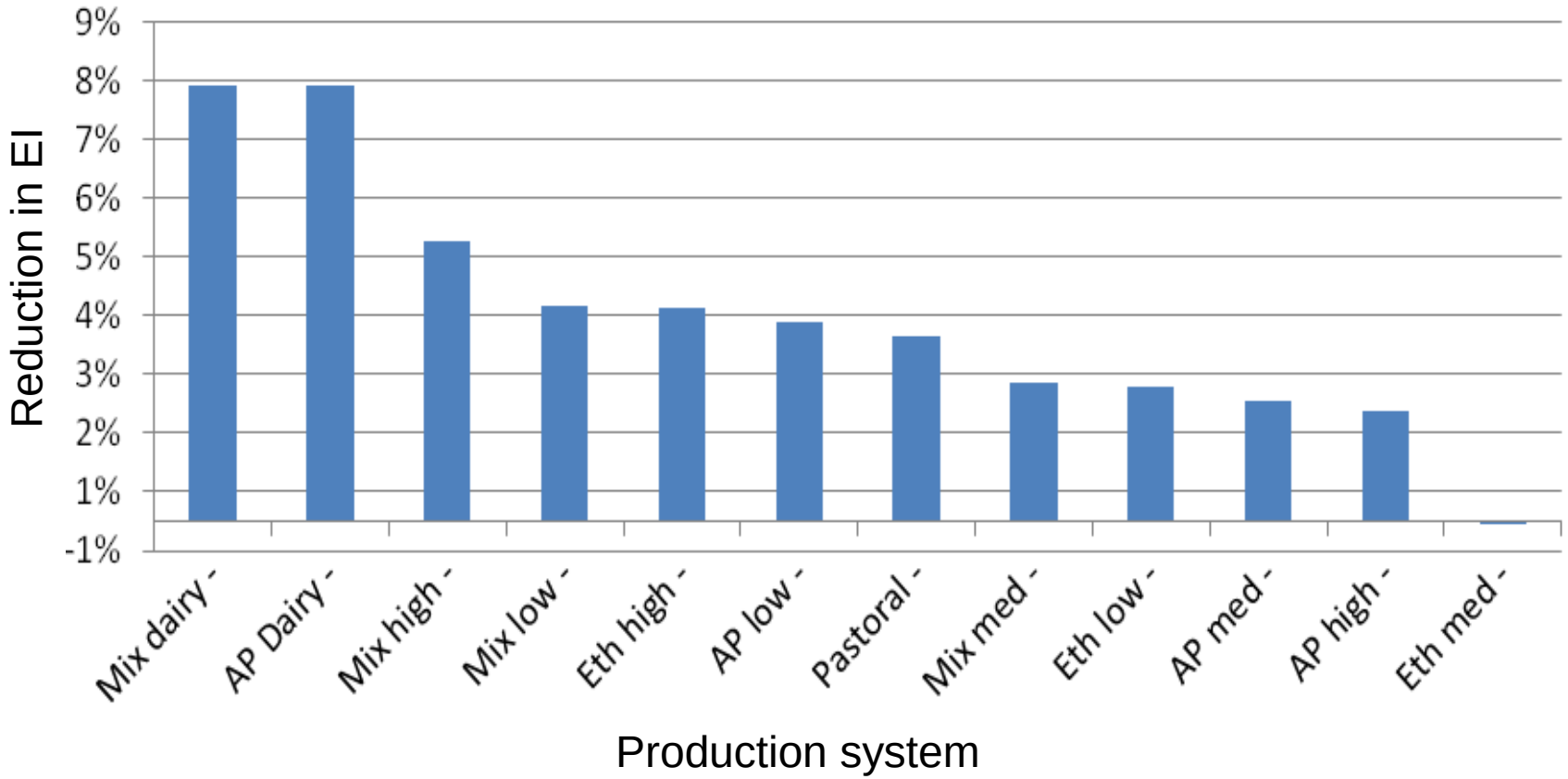




- There are significant increases in production and emissions across all the systems.
- Production increases by more than emissions so EI decreases
- The biggest decrease in EI is in the high yield dairy systems
- There appears to be a link between improving productivity and decreasing EI.
- What is driving the changes in EI?

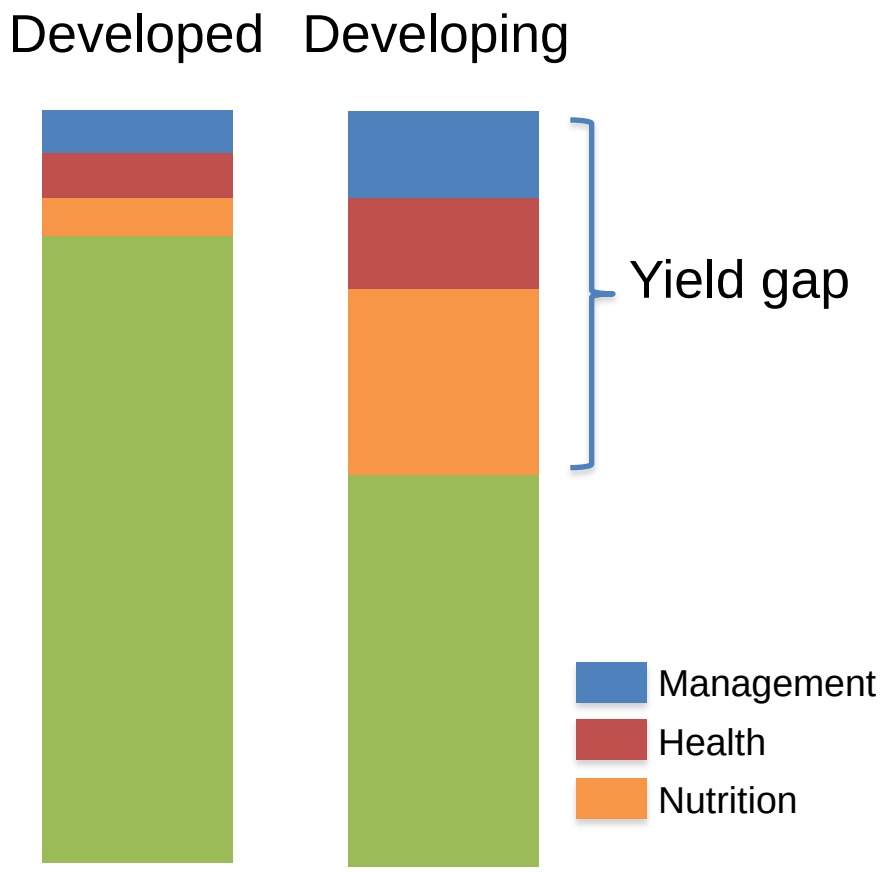
Results

Decrease in emissions intensity arising from trypanosomosis removal



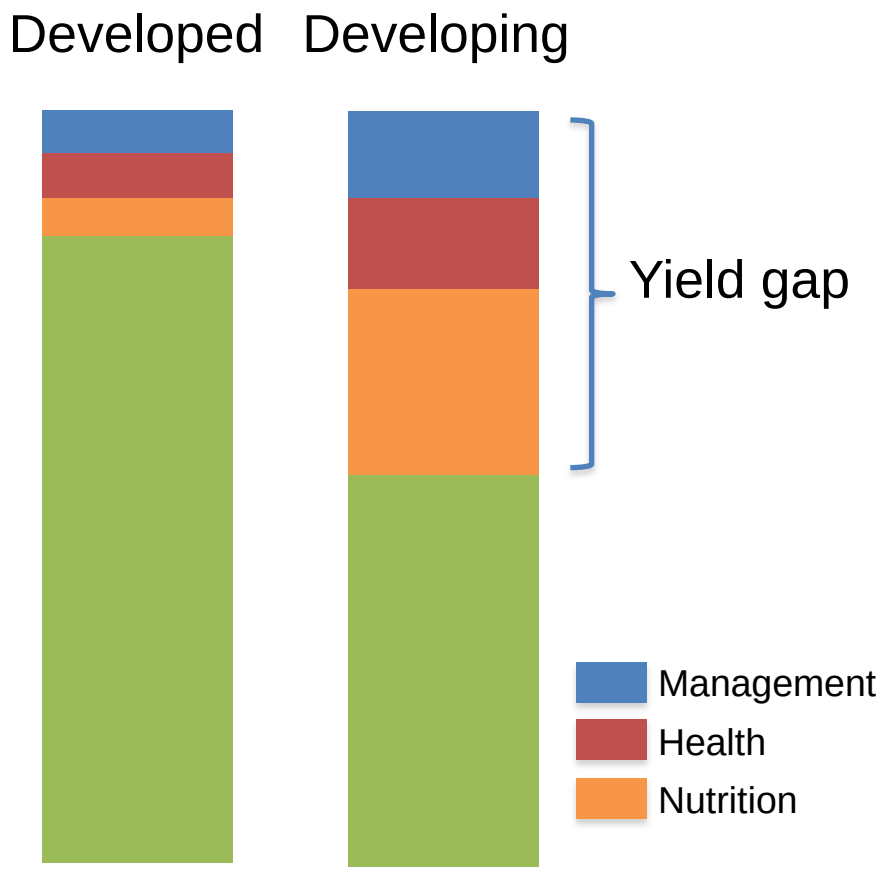
Some issues

- 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 the factors contributing to the yield gap?
- Can animal health be treated in isolation?



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