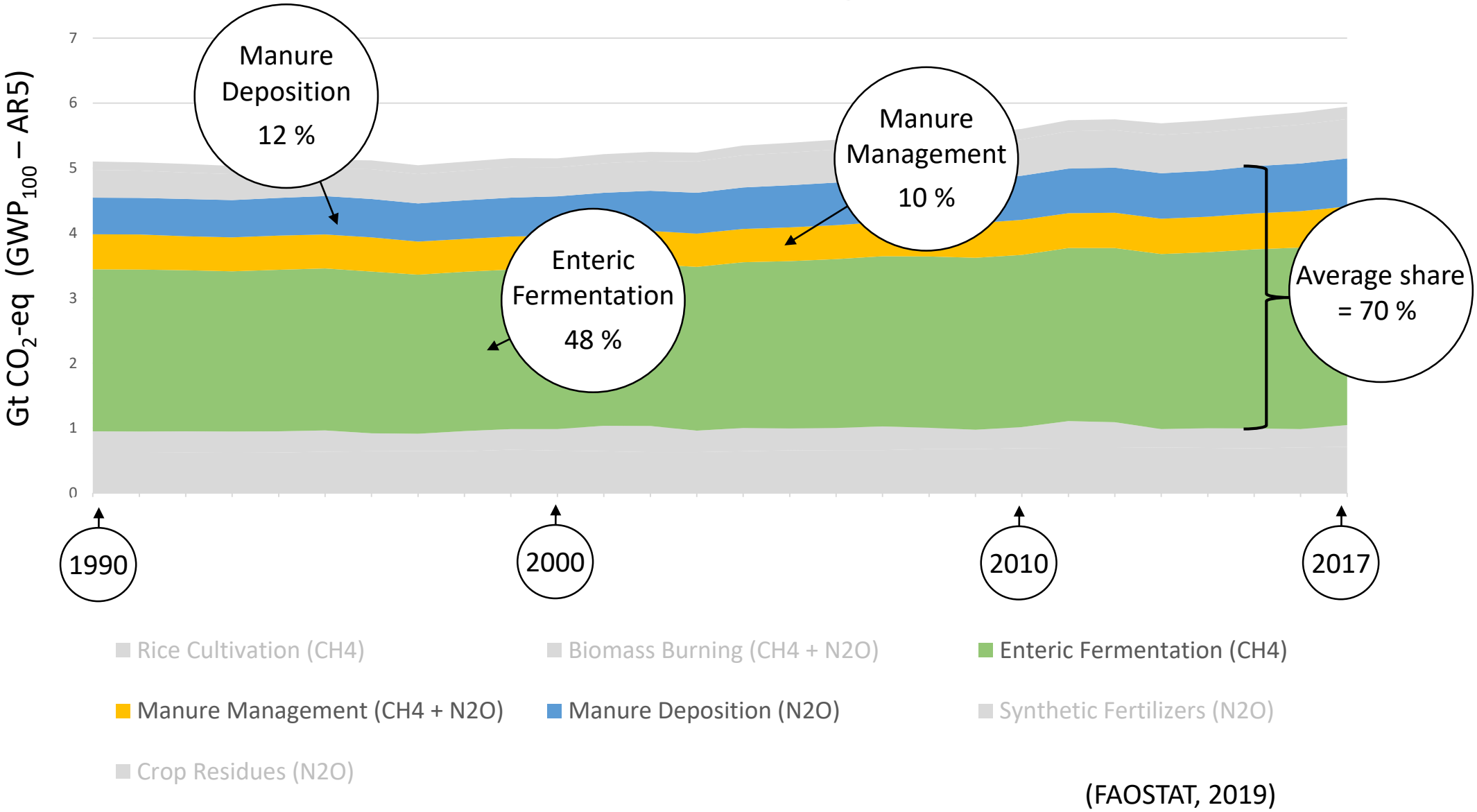
Livestock greenhouse gas emissions

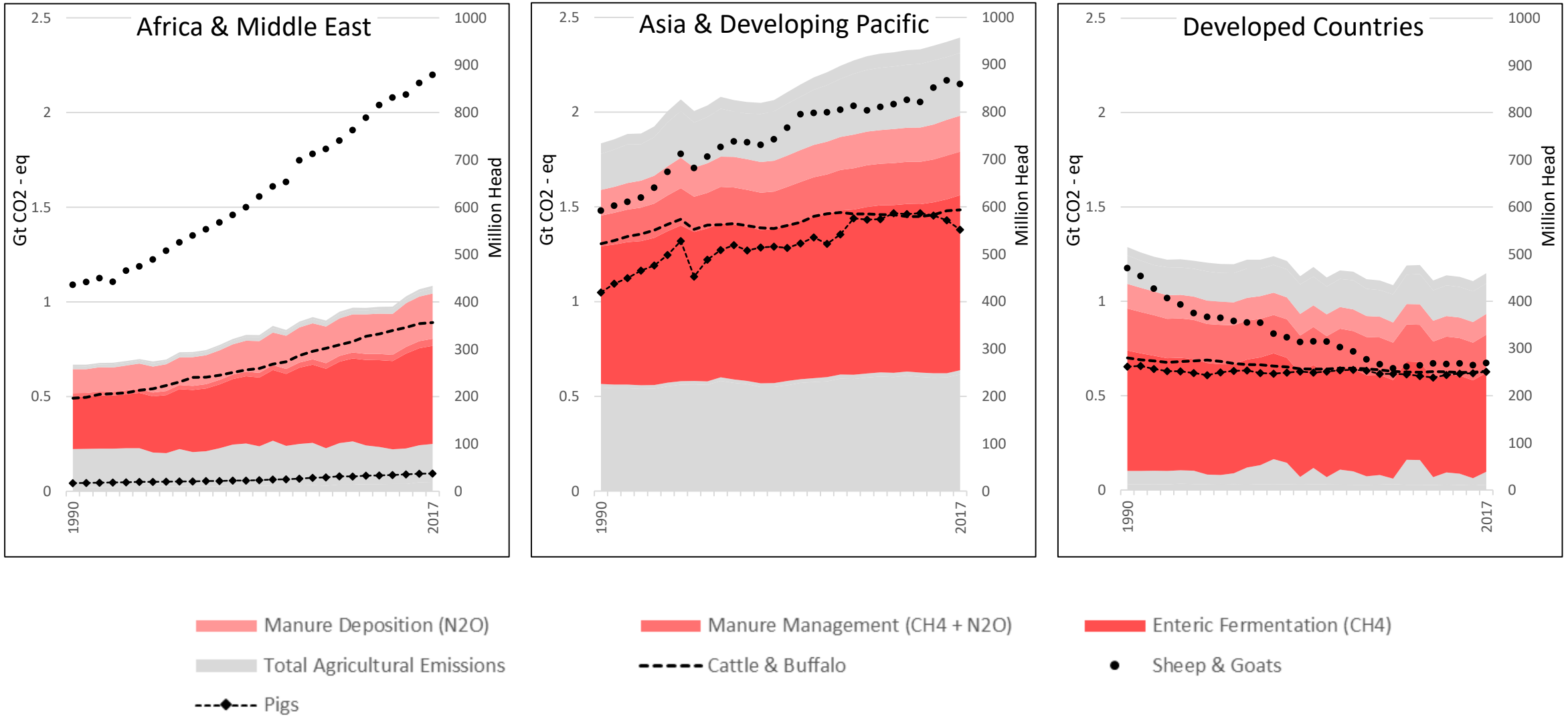
- **Impacts, measurement & pathways for mitigation**
- **Harry Clark**
- **New Zealand Agricultural Greenhouse Gas Research Centre**

Contribution of Livestock to Global Agricultural GHG Emissions

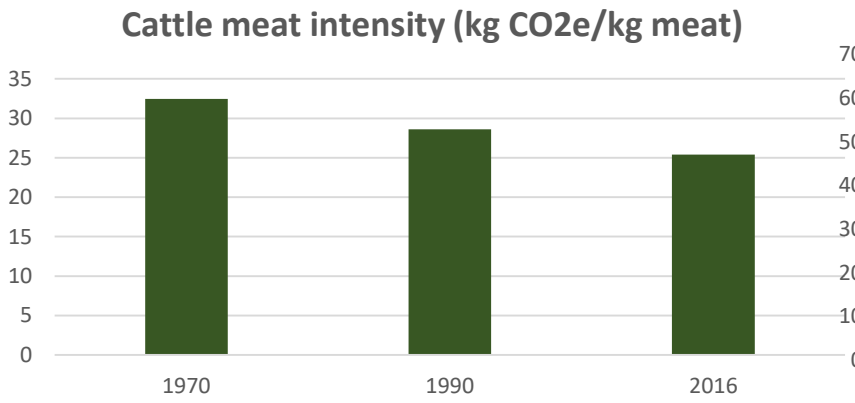


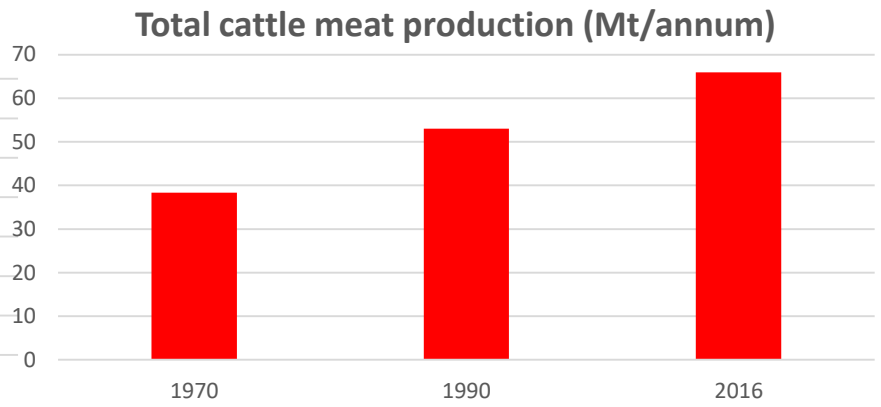
(FAOSTAT, 2019)

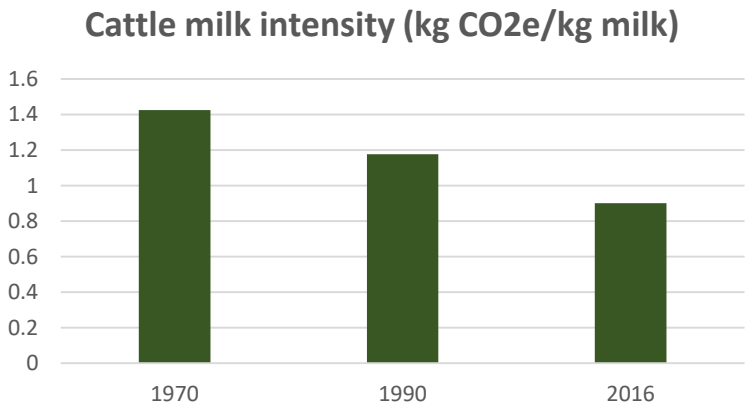
Regional Agricultural GHG Emissions & Livestock Numbers

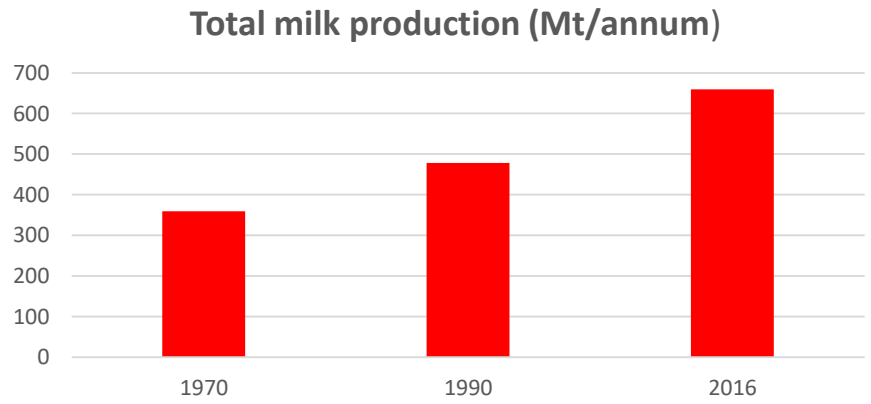


Falls in GHG intensity, increases in total product produced

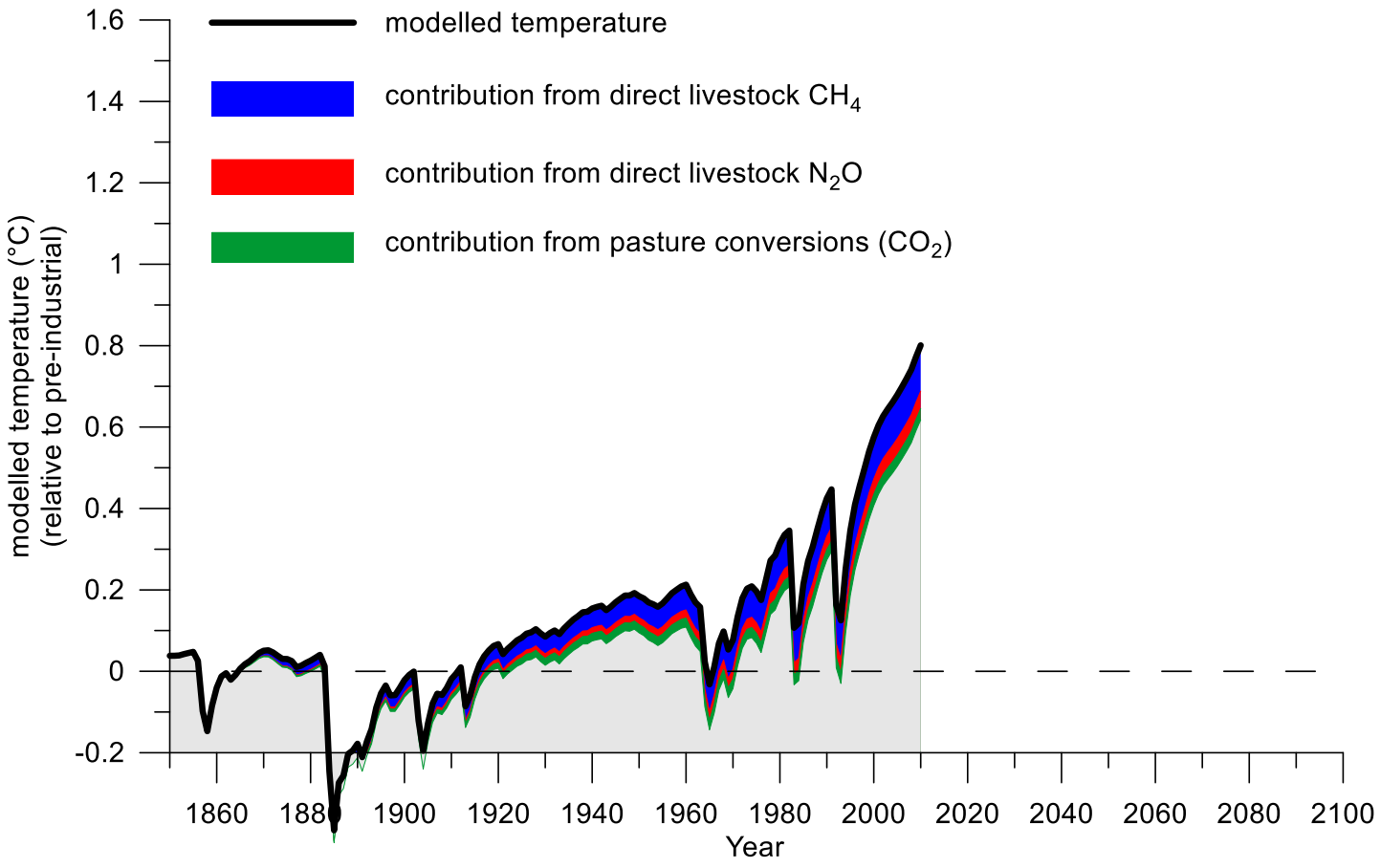








Twenty three percent: livestock's contribution to current warming



Other impacts

- Deforestation
- Water quality
- Air quality
- Zoonoses
- Land degradation
- ‘High’ consumption of animal products unhealthy

What is the future for livestock?

- Difficult to meet Paris targets without reducing livestock sector emissions (IPCC 1.5 report; 24-47% reduction in agricultural CH_4 by 2050)
- Need to recognise broad role of livestock beyond climate change: food & nutrition security, livelihoods, nutrient cycling & carbon storage, biodiversity, landscape design & maintenance etc.
- Food & dietary choices – high milk & meat consumption may not be compatible with climate & other societal goals, but livestock products are needed for global food security
- Balanced & informed discussion urgently needed

Livestock emission estimates have high uncertainty

- Activity data uncertainty – animal numbers, animal performance, diet characteristics, temporal changes
- Emission factor uncertainty – Ym, N_2O EFs strongly influence by local climatic and soil conditions
- Methodological uncertainty – multiplicity of methods used & reporting frequency varies
- Needs to be a strong focus on inventory development

How should we report and compare emissions of different gases?

- GWP_{100} - compares average warming of a pulse CH_4 & N_2O with that of carbon dioxide over a 100 year timeframe; 28 & 265
- GTP_{100} - compares warming caused by a pulse CH_4 & N_2O with that of carbon dioxide in 100 years time; 4 & 234

Do they treat CH_4 unfairly given its short lifetime in the atmosphere?

- GWP* - compares warming from a continuous emission of CH_4 with warming from a pulse of carbon dioxide; estimates additional warming relative to warming at a previous date (reducing CH_4 emissions by ~10% equivalent to reducing carbon dioxide to zero)

Generic mitigation pathways?

- **Increase efficiency – e.g. better diets, feed planning, improved animal health etc – will decrease emissions per unit of product but may not decrease absolute emissions**

- **New technologies – e.g. inhibitors, vaccines, feed additives, low emitting feeds etc – will reduce emissions per unit of product and absolute emissions**

- **Constrain production – move to lower emitting systems, dietary change etc**

Estimated POTENTIAL reductions from dietary change are 20—30% BUT there is a lack of systematic analysis on whether the identified technical mitigation potential is feasible in economic, social and political terms, particularly in developing countries

Thank You

Methane – how much is enough?