Exploring mitigation potential of GHG emissions from livestock farming systems at the global level

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FAO-AGA’s work on GHG emissions in the livestock sector to identify low emission pathways

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- Produce disaggregated assessments of global GHG emissions and related mitigation potential
- Carry out economic analyses of mitigation costs and benefits
- Engage in multi-stakeholder initiatives on methods and practice change
GLEAM
Global Livestock Environment Accounting Model

- Life Cycle Assessment modelling
- Cradle to retail, all major sources of emissions included
- Computes emissions at local level (cells on a map)
- Can generate averages and ranges at different scales
- Developed at FAO, in collaboration with other partners
- Allows for scenario analysis

A tool to improve the quantification of GHG emissions from livestock supply chains; will be expanded to other livestock-environment interactions (e.g. land use, nutrients, water)
Total GHG emissions from livestock supply chains (2005): 7.1 Gt CO₂-eq per year

* Includes emissions attributed to edible products and to other goods and services, such as draught power and wool.
Source: GLEAM.

FAO 2013, forthcoming
Estimated global emission intensities

Source: GLEAM.

FAO 2013, forthcoming
Global emissions from livestock supply chains, by category of emissions

144 Mt oil eq /year

FAO 2013, forthcoming
“Hot Spots”

(Areas with animal protein production lesser than 75 kg per square km are not displayed).

Emission intensity per unit of product  Emission intensity per land area

FAO 2013, forthcoming
Mitigation potential

- **Statistical analysis**: mitigation potential of ca. 30% Bridging the emission intensity gap without system change
- **Case studies**: designed on anticipated positive effects on producers income, food security, and broader environmental performance.
  Mitigation potential of 10 to 45 % for constant output
- **Soil carbon sequestration**: 0.4 to 0.5 Gt, often resulting in an increased production of grass (ca. 7 % of baseline emissions)

  - Mitigation potential exists for all species, systems and regions,
  - System change is not require to mitigate emissions
  - Strong correlation between mitigation and productivity gains, especially among ruminant systems operating at low productivity
Distribution of intensive broiler supply chains according to their emission intensity in temperate zones of East and Southeast Asia

32% mitigation if producers in a given region, farming system and agro-ecological zone applied the production practices of the 10% producers having lowest emission intensity

Source: GLEAM.

FAO 2013, forthcoming
Case studies: mitigation packages

Mixed dairy OECD
- Lipids
- Anaerobic digest.
- Energy efficiency

Commercial pigs
- Manure management
- Energy efficiency
- Feed quality, health and husbandry

Mixed dairy
- Feed quality
- Health & husbandry

Small ruminants
- Forage quality
- Health & husbandry
- Grazing management

Specialized beef
- Pasture quality & C sequ.
- Health and husbandry

Feed quality
Health & husbandry
Grazing management
Manure management
Energy efficiency
Lipids
Anaerobic digest.
Case studies: mitigation potential

Mixed dairy OECD
-54 to -66 Mt CO2

Commercial pigs
-152 to -169 Mt CO2

Specialized beef
-753 to -874 Mt CO2

Small ruminants
-17 Mt to -21 Mt CO2

Mixed dairy
18-29%

27-41%

28-35%

38%
Concluding remarks

• A vast range of mitigation practices is already available
• Implementation will require education, awareness raising and incentives for technology transfer
• Quantification and inventory methods (common metrics): providing the right incentives
• Support the designing tailored mitigation packages
  • supply chain modeling / area wide modeling
  • economics of mitigation
  • tradeoffs with adaptation and other environmental concerns
• Move the Ei frontier: R&D (e.g. Ei gap assessment, technology break through)
Thank you

Greenhouse gas emissions from pig and chicken supply chains
A global life cycle assessment

TACKLING CLIMATE CHANGE THROUGH LIVESTOCK
A GLOBAL ASSESSMENT OF EMISSIONS AND MITIGATION OPPORTUNITIES

Greenhouse gas emissions from ruminant supply chains
A global life cycle assessment