Methane from agriculture: Opportunities for reducing methane emissions from agricultural sources

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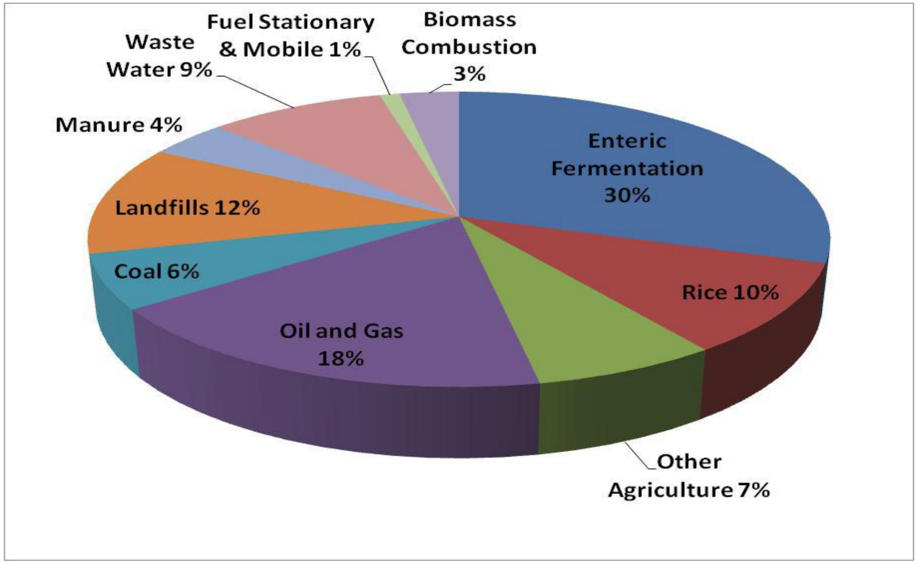
Methane emissions from Agriculture

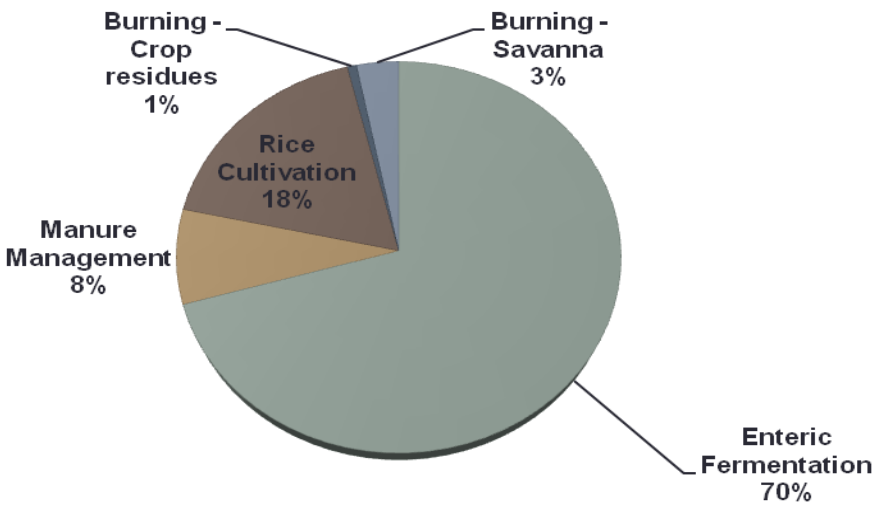
Agricultural sector contributes almost half of global methane emissions

Within agriculture, 78% of methane emissions are from livestock sector



Estimated Global Anthropogenic Methane Emissions by Source

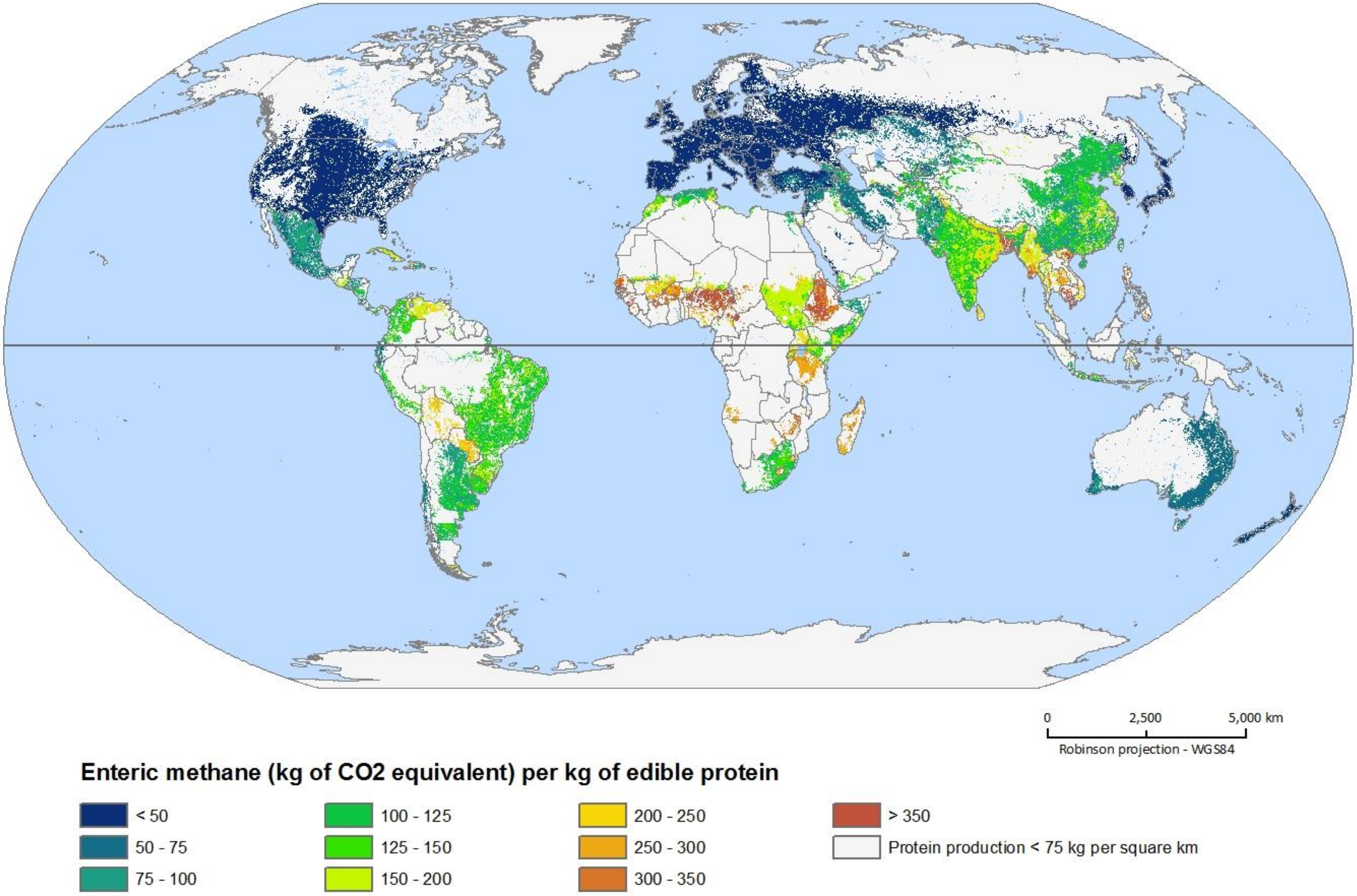
- Enteric fermentation from livestock: 30% of global emissions
- Rice cultivation: 10%
- Livestock manure: 4%
- Biomass burning (savannah, crop residues): 3%



FAOSTAT, 2014

Geography of enteric methane emissions

Enteric methane: 2.7 Gt CO2 eq. (39% of all livestock emissions)



Strategies for reduction of enteric methane

ANIMAL

HERD

PROD. SYSTEM

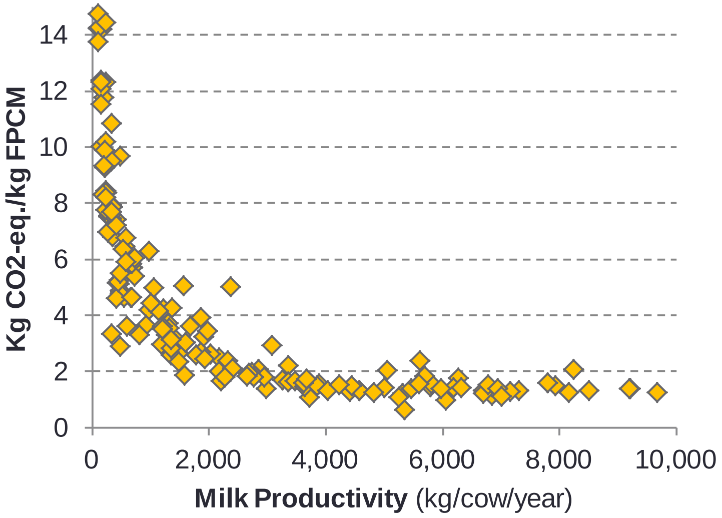
	Feeding practices						Supplements & additives								Herd mgt.		
	Improved forage	Feed processing	Feeding of concentrates	Nutrient balancing	Precision feeding	Alkaline treatment	Lipids	Nitrates	Ionophores	Growth hormones	Tannins	Probiotics	Halogenated compounds	Vaccination	Culling practices	Reproduction management	Improved genetics
Mitigation potential w/in the relevant production sector	◯ (large)	○ (small)	◯ (medium)	◯ (medium)	○ (small)	○ (small)	◯ (medium)	◯ (large)	◯ (medium)	○ (small)	○ (small)	○ (small)	○ (small)	○ (small)	◯ (medium)	○ (small)	○ (small)
Size of the relevant production sector	◯ (medium)	◯ (medium)	◯ (medium)	◯ (medium)	○ (small)	◯ (medium)	◯ (medium)	◯ (medium)	○ (small)	◯ (medium)	◯ (medium)	◯ (medium)	◯ (medium)	◯ (large)	◯ (medium)	◯ (medium)	◯ (large)
Level of certainty	✓	✓	?	?	✓	?	?	?	✓	✓	??	??	??	??	✓	✓	?
Productivity gains	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↓	–	↓	–	–	↑	↑
Cost	$	$	$$	$$	$$$	$	$$	$	$$	$$	$$	$$$	$$$	$$$	$	$$	$$$
Risk / tradeoffs	• (small)	• (small)	• (small)	• (small)	• (small)	• (small)	• (small)	● (large)	● (large)	● (large)	● (large)	• (small)	⬤ (very large)	• (small)	● (large)	• (small)	● (large)

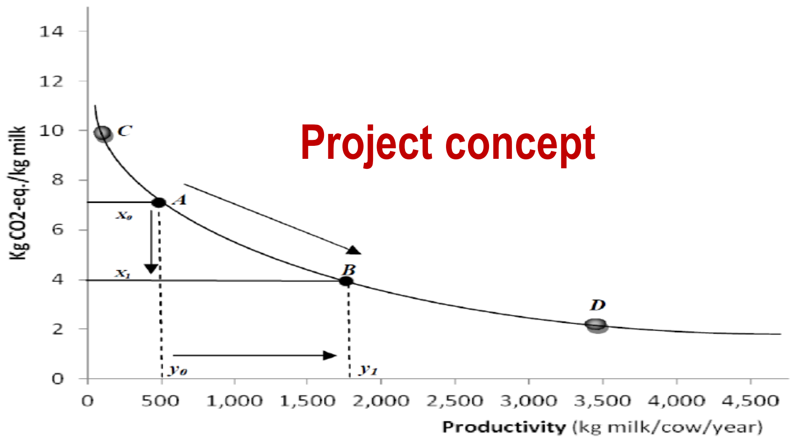
- A wide range of mitigation options for reducing methane from enteric fermentation, but many have some mitigation uncertainty, are not cost effective, have poorly understood interactive effects with other emission sources, or other associated risk.
- Mitigation options that have relatively small risk and are uniformly associated with increased productivity and improved feeding practices.
- In regions of the world that have not yet adopted these practices, significant GHG reductions are possible while also providing a steady or growing supply of animal products.

Dickie et al. 2014

Accelerating the adoption of existing practices: Case of smallholder dairy

- Strong correlation between mitigation and productivity gains, especially among low productive systems





- Possibility of linking gains in productivity to emissions reductions and link GHG reductions to payment schemes?
- Move from A to B: improve productivity and generate Carbon credits
- What are mechanisms for certifying reductions and for accelerating adoption of mitigation actions?

To test concept we need …

A methodology

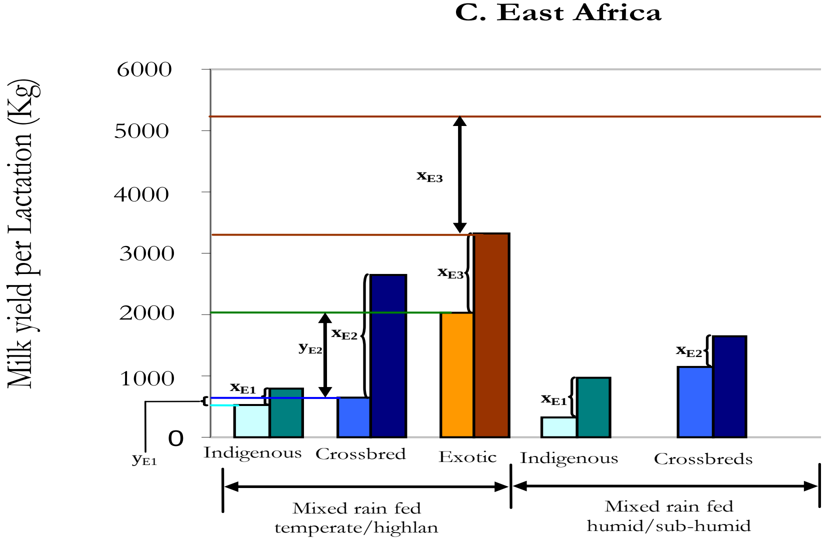
- Validated by third party, to certify that C credits are being generated, i.e. that emission reduction is taking place

A pilot project

- In favorable conditions (dairy production, supply chains, stakeholders, baseline information)
- Project design (location, participants, technical packages, economic feasibility, etc.)
- Financing mechanism to facilitate adoption of mitigation actions

Accelerating the adoption of existing practices: Case of smallholder dairy in Kenya

- Yield gap to exploit

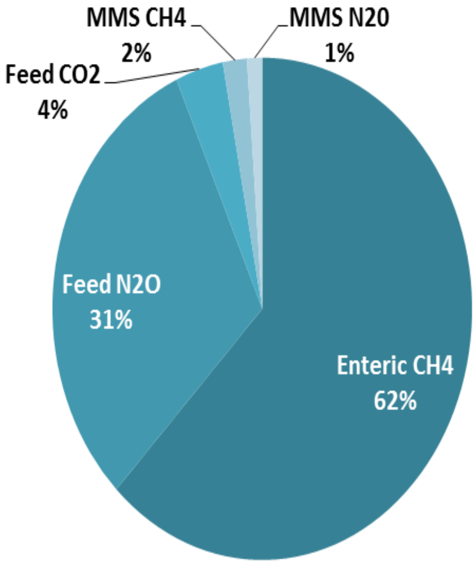


- x_i= Yield gaps due to "animal husbandry practices"
- y_i= Gap in productivity due to "genotype"

ACTVITIES TO-DATE

1. Stakeholder consultations: awareness, feedback on project concept and approach
2. Preliminary site selection
3. Project feasibility survey: emissions, institutional structure to inform methodology development
4. Finalization of methodology development
5. Validation and approval of methodology
6. Project design and piloting to inform on methodology applicability and upscaling potential

- Important economic and nutritional role
- 800,000 smallholder farmers in Kenya depend on dairy farming for their livelihood; Dairy products contribute 30 percent of livestock GDP
- Low input >> low productivity
- Low resilience to climate change
- Enteric methane largest source of emissions from Ag. Sector.
- High GHG emissions per kg milk e.g. 5.7 vs 2.8 kg CO2 eq./kg milk
- Main constraints: lack of feed, poor feeding practices, disease market access, Inadequate institutional and marketing infrastructure,



Location: High potential small holder dairy systems in Western Kenya

Partners: ***Research***: ILRI; ***Development***: EADDP, ***National stakeholders***: Ministry of Livestock, Climate Change Unit; ***Producer groups***: Dairy hubs in North Rift, Western Kenya; **Methodological development**: UNIQUE Forestry

Time frame: Ongoing

Concluding remarks

- Pilot project offers the opportunity to address some barriers to adoption.
  - By demonstrating the important role of the dairy sector in contributing to food security, smallholder income, reduction in emissions and increased resilience to CC;
  - By identifying new avenues for financing livestock development by providing methodology for MRV and investment to support technology transfer and uptake;
  - Strong link between proposed pilot and nationally appropriate mitigation actions (NAMAs).

- Why focus on methane in agriculture?
  - **Opportunity for high impact**: accounts for ~ 50% of global methane emissions; Emissions from methane (and other GHGs) are expected to grow:
  - **Wide-ranging benefits from addressing Ag. methane emissions** (climate, productivity and profitability, food security and nutritional benefits, human health benefits, adaptation (green energy), other environmental benefits, etc.)
  - **Technologies are available**: Existing, cost-effective reduction opportunities (esp. for low productive systems) using relatively common practices >> number of barriers need to be overcome.
  - Potential mitigation opportunities and types of barriers vary by region and sector, and over time. This is caused by the wide variation in mitigation capacity and several national and local circumstances.

THANK YOU

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