Current State of Research on Livestock GHG Emissions and Mitigation

Challenges and research in Sub-Saharan Africa

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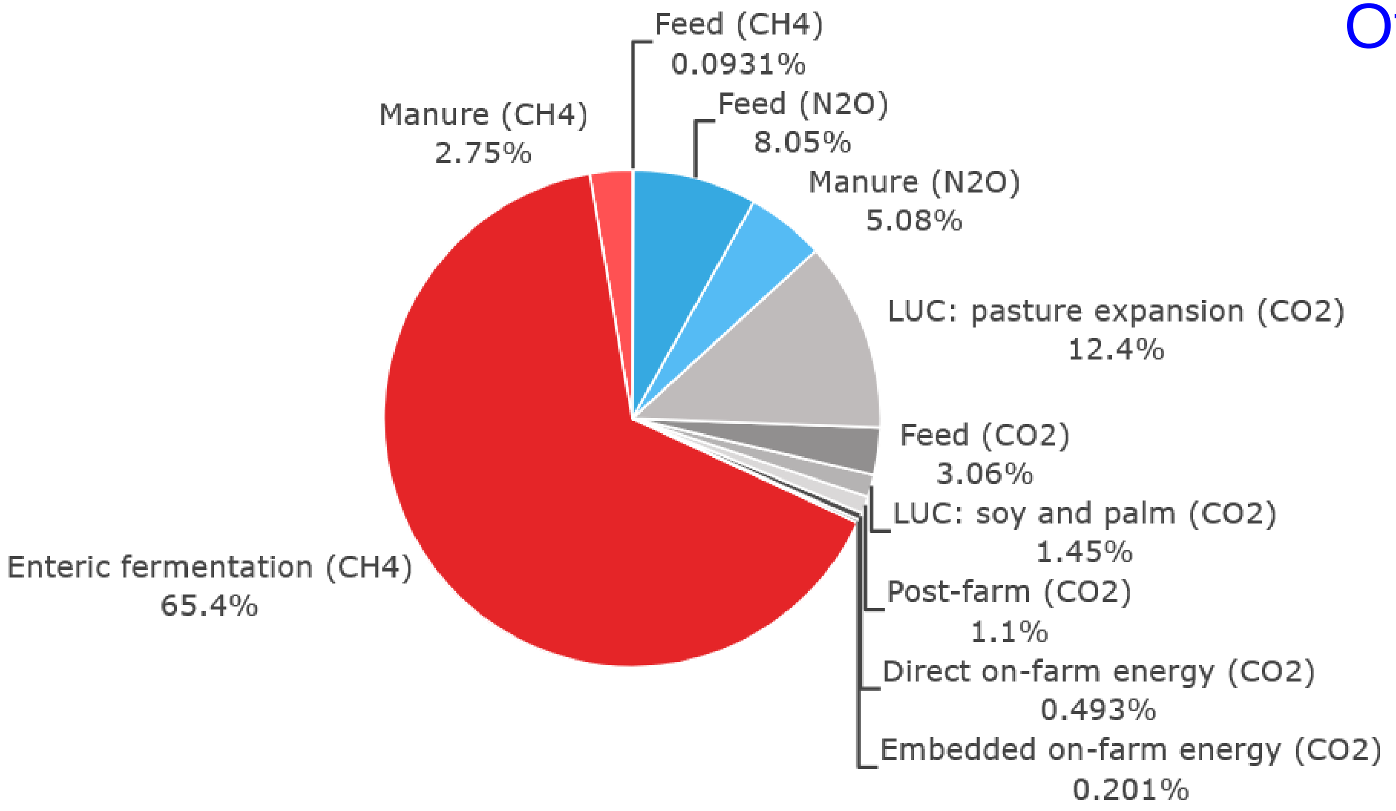
GHG Emissions of Livestock Value Chain in SSA

Livestock in 2015



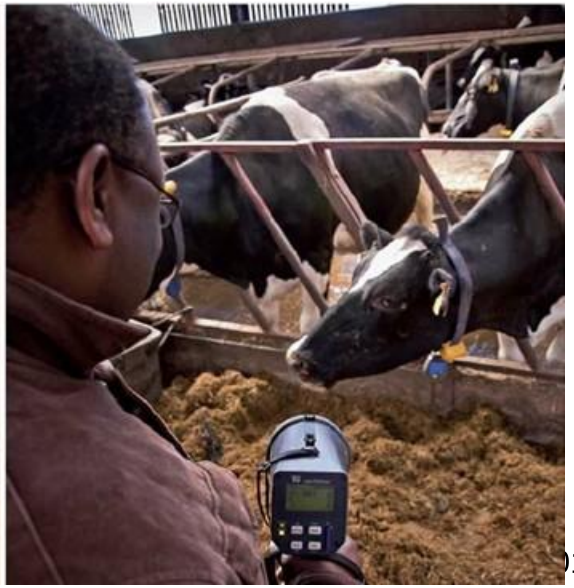
Source: Gleam, 2022

World: 6.2 Gt ~ 12 Percent
Of total global GHG emissions

SSA: 0.57 Gt ~1.0 Percent
Of total global GHG emissions

68% CH_4
27% N_2O
5% CO_2

Techniques to estimate and measure enteric methane emissions



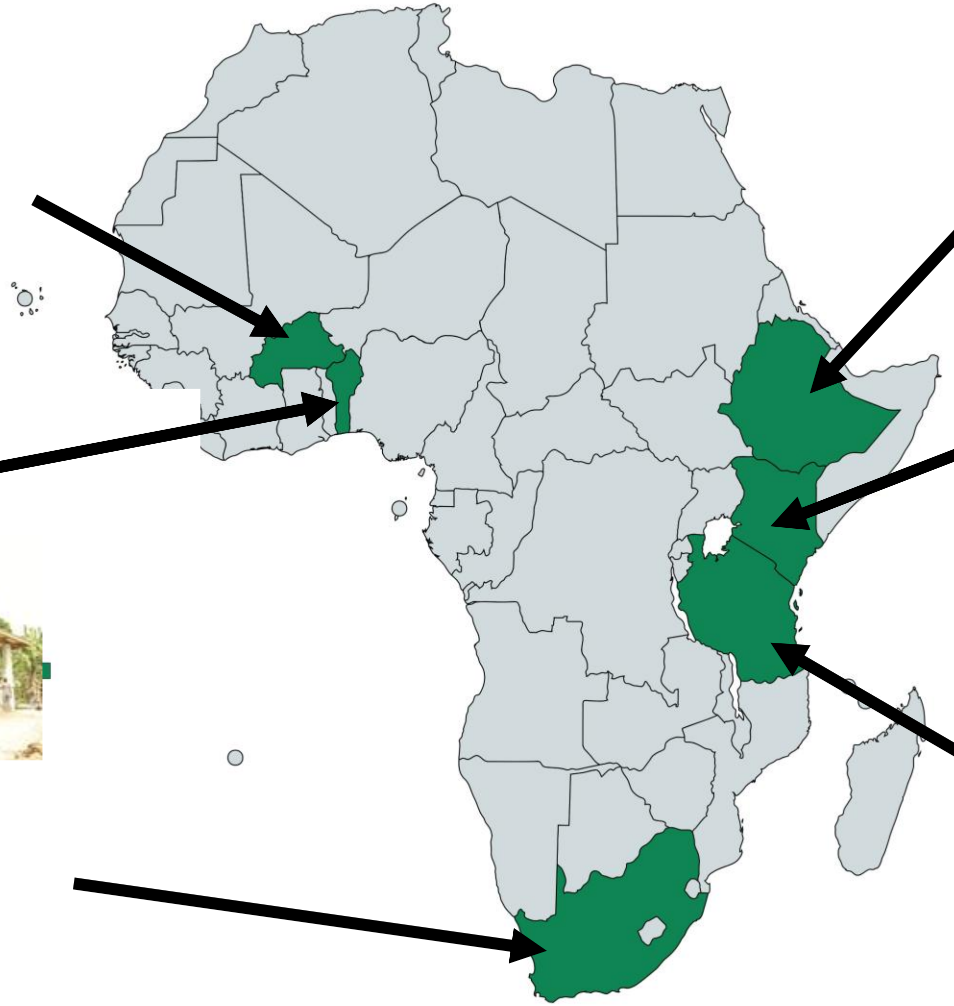
- **Direct measurement techniques:** various devices.
- **Indirect measurement techniques:** estimation through a model (IPCC, CISRO)

(Gbenou et al., 2024) https://doi.org/10.20870/productions-animales.2024.37.1.7648

Locations With Equipment to Measure Enteric Methane

Burkina Faso
- 1 GreenFeed for small ruminants & 1 for cattle
- Methane Laser

Benin
- 1 GreenFeed for sheep & cattle
- 1 GreenFeed for cattle
- Methane Laser



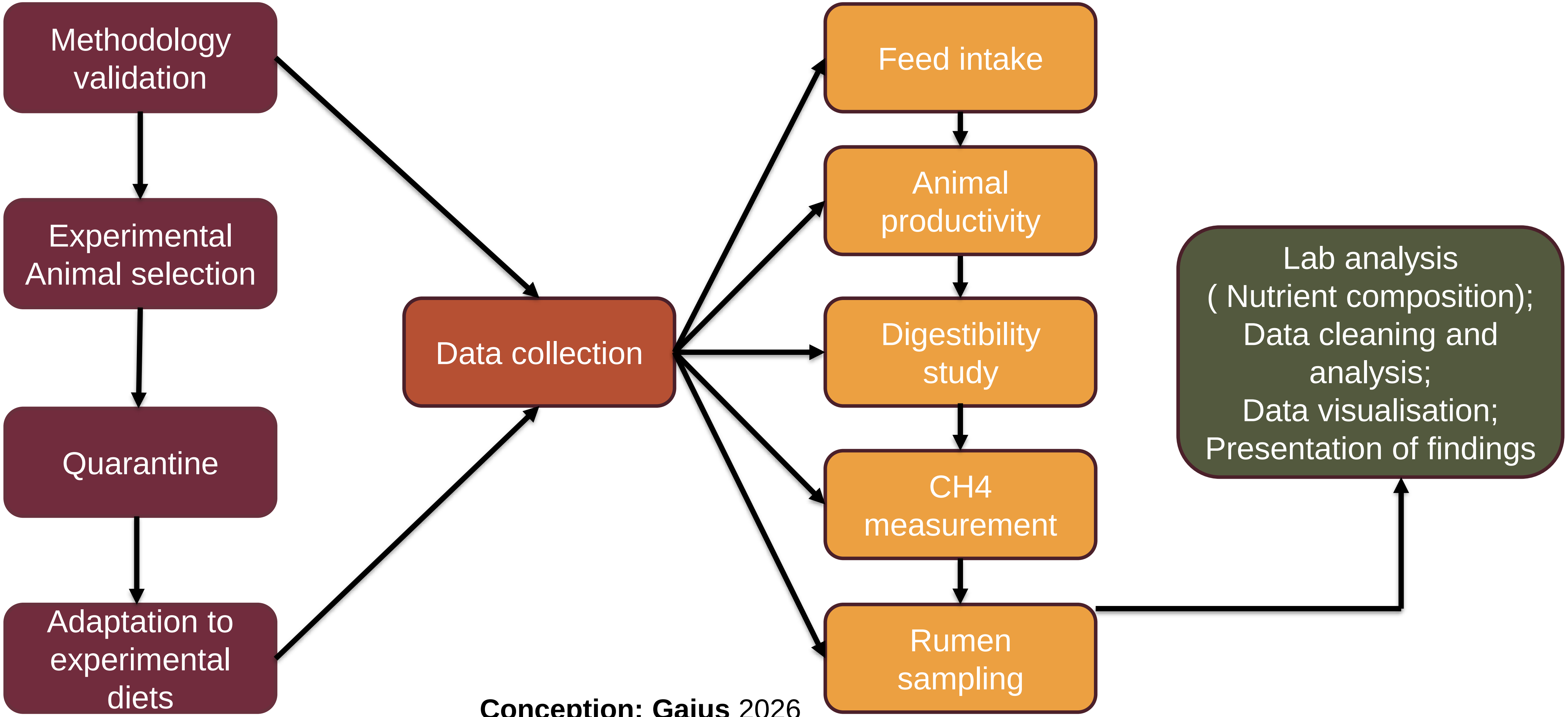
Ethiopia
- 1 GreenFeed for cattle
- Methane Laser

Kenya
- Cattle and small ruminant chambers
- SF6
- 1 GreenFeed for Cattle
- Methane Laser

South Africa
- Small ruminant chambers
- 3 GreenFeed for cattle to be delivered
- SF6
- Laster methane detector

Tanzania
- Methane Laser

General methodology for enteric methane emission measurement



Conception: Gaius 2026

Stylosanthes hamata L.: suckler cows (case study 1)

Experimental facility for direct measurement of enteric methane emissions in cattle

25% protein supplementation with *S. hamata*

Since August 2021

Green Feed + stalls for intake monitoring & enteric methane measurements

Stylosanthes hamata L.: suckler cows (case study 1)

Item	Brach	Brach+Stylo	SEM	P value
eCH_4 (g/d)	98.0	99.8	2.58	0.753
eCH_4 (g/kg BW)	0.48	0.48	0.013	0.886
eCH_4 (g/kg DMI)	28.4 ^{A}	24.4 ^{B}	1.54	0.043
eCH_4 (g/kg dDMI)	61.2 ^{A}	58.7 ^{B}	3.37	0.035
eCH_4 (g/kg OMI)	30.3 ^{A}	25.6 ^{B}	1.67	0.022
eCH_4 (g/kg dOMI)	63.6 ^{A}	58.0 ^{B}	4.02	0.026
Ym (% GEI)	8.3 ^{A}	7.0 ^{B}	0.45	0.048
eCH_4 (g/kg milk)	72.2 ^{A}	50.4 ^{B}	4.10	0.001

⬆ DMI (g/kg BW) by 16%, DM digestibility by 13%, and milk yield by 43%,

⬇ eCH_4 yield (g/kg DMI) and intensity (g/kg milk) by 17% and 25%, respectively

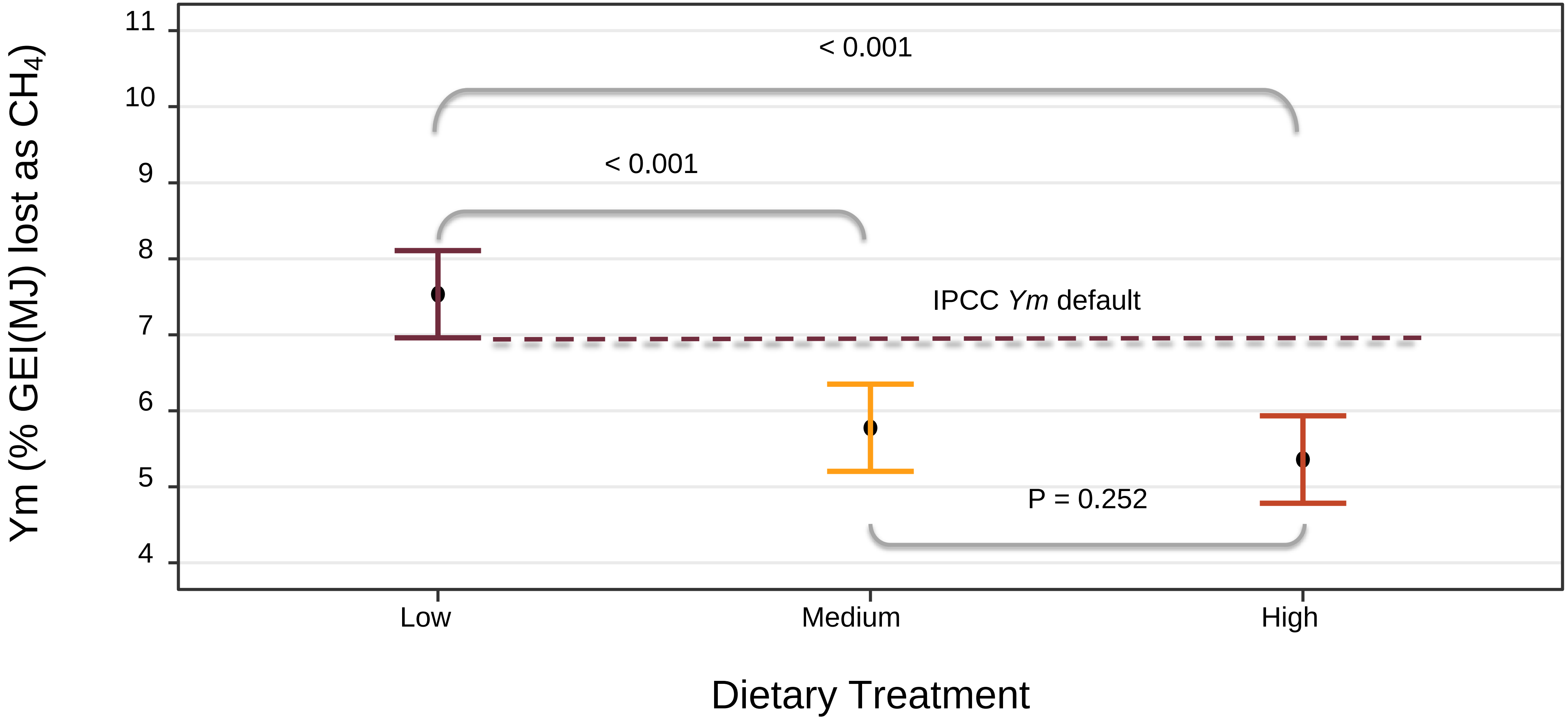
Methodology (case study 2)

- 3 x 3 Latin Square design.
- Milking, total collection of urine and feces.

Animals number
(09 Boran crossbreed cows).

Gaius et al., 2025

Methane Conversion Factor *Ym* (case study 2)



(Gaius et al., 2025) https://hdl.handle.net/10568/179321

LOCAL FEEDING PRACTICES AS MITIGATION OPTION IN SUB-SAHARAN AFRICA (case study 3)

- Intake, digestibility, and eCH_4 emissions

Item	GRASS	CEREAL	LEGUME	LEGTREE	SEM	P-value
DMI (g/kg LW)	16.4 ^{B}	18.0 ^{B}	25.5 ^{A}	26.2 ^{A}	0.31	0.006
DMd (g/kg DMI)	46.0	48.1	49.7	48.8	0.00	0.092
eCH_4 (g/kg DMI)	30.6 ^{A}	- 19%	- 33%	- 47%	0.53	<0.001
eCH_4 (% GEI)	9.3 ^{A}	- 22%	- 27%	- 38%	0.17	<0.001

GRASS: 100% grass; CEREAL: grass + cereal coproduct (75:25); LEGUME: grass + legume coproduct (75:25); LEGTREE: grass + tree legume (75:25); DMI: dry matter intake, DMd: dry matter digestibility; eCH_4: enteric methane, GEI: gross energy intake

Tackling Emissions and Food Security in East Africa through Improved Animal Health

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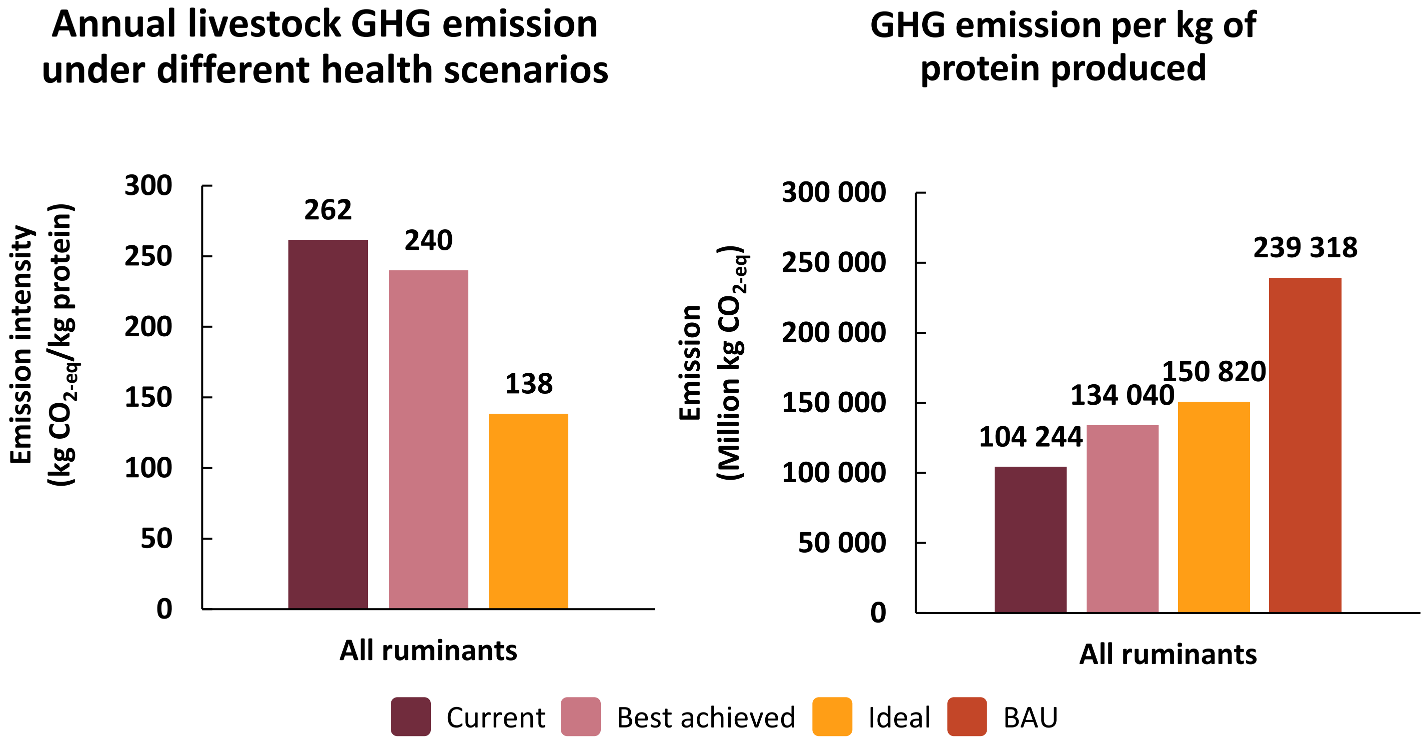
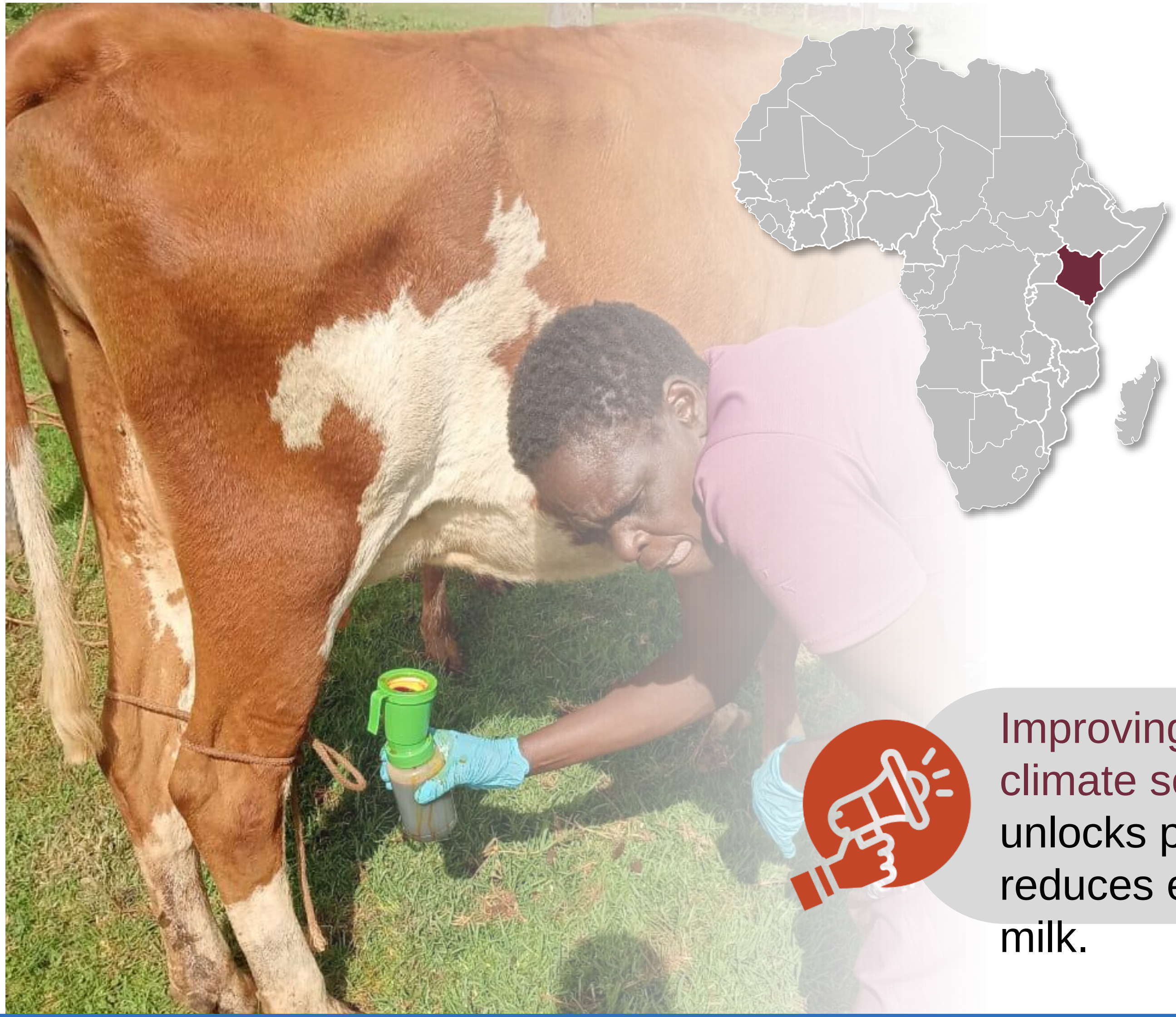
Case 4 - Evidence from Ethiopia: Poor Animal Health Drives National Emissions

- **Healthy animals** produce more food with fewer emissions.
- **Poor health** can raise livestock GHG intensity by up to 90%.
- **Improved health practices** can cut emission intensity by ~10% and boost productivity.
- **Without action,** emissions could rise 130%, versus only 44% with better animal health.



Investing in animal health reduces emissions and strengthens food security.

Case 5 – Subclinical Mastitis in Kenyan Dairy



- **> 50% of cows** affected in smallholder systems
  - Silent milk loss of 0.2 kg/cow/day
  - 13% higher emission per kg
- Simple hygiene + basic diagnostics can fix it.
- Pilot intervention ongoing (Kenya)

Improving herd health is a smart climate solution — prevention unlocks productivity gains and reduces emissions per liter of milk.

Takeaways - Measurement Capacities

- We need to collect more local data on emission and mitigation strategies
- There existing strategies to mitigate enteric emissions but are not sufficient to meet climate goals (Health and Feeding)
- Diets based on cereal and legume co-products, and legume trees resulted in significant eCH4 yield mitigation and consequently low-carbon livestock systems

Thank you very much for your attention!

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