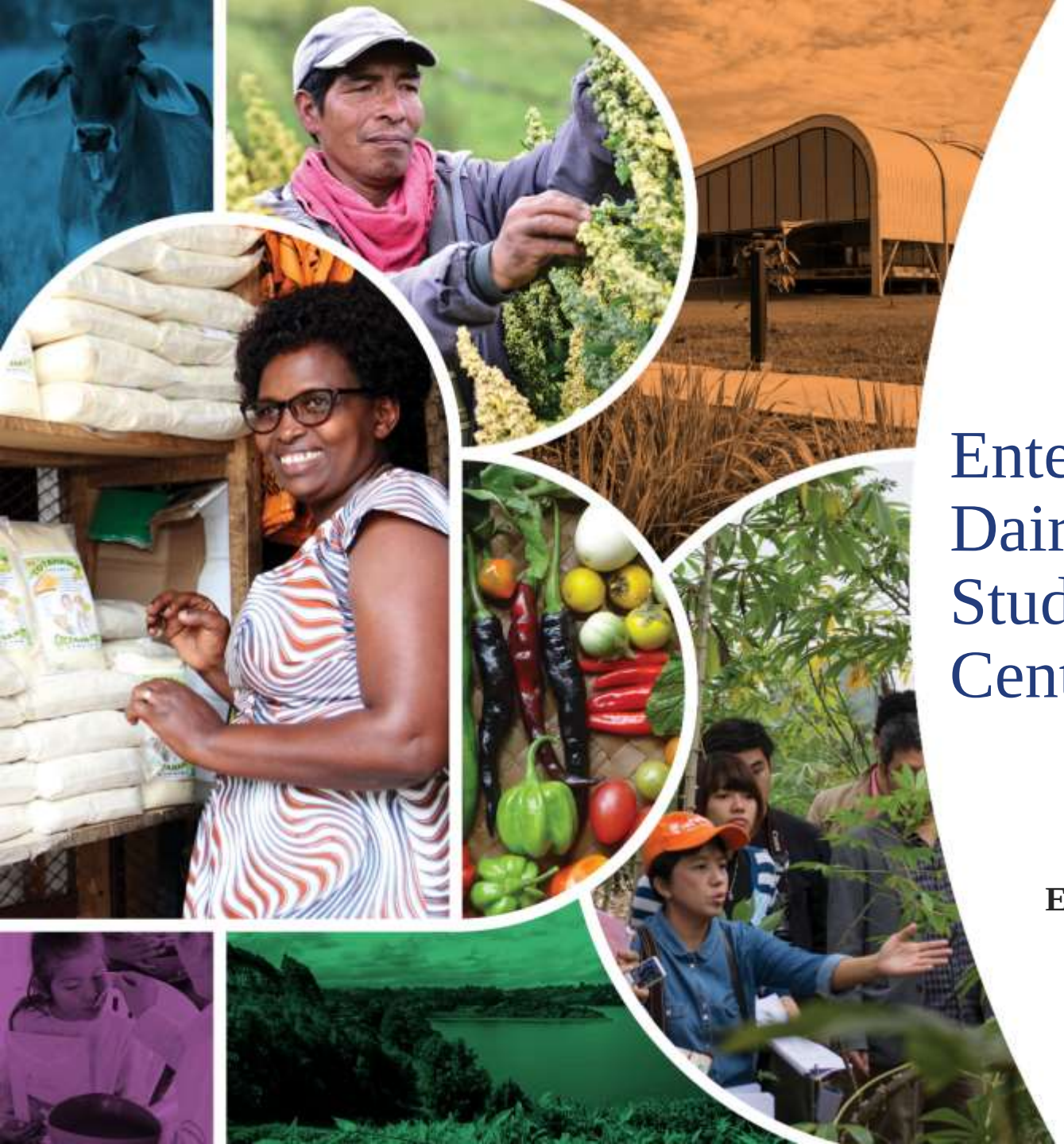

Enteric Methane Emissions from Dairy Systems in Kenya: A Case Study of Kenyan Rift Valley and Central Highlands Regions

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Preliminary Results Presented to Venture37

November 18, 2025; Nairobi, Kenya.

The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) is part of CGIAR, a global research partnership for a food-secure future

Background

- Dairy contributes 12-14% of Kenya's agricultural GDP but also emits ~12.3 Mt CO_2-eq (80% from enteric methane).
- Methane is highly potent but short-lived→ big mitigation opportunity.
- Emissions vary widely across dairy production systems in the country.
- Identifying mitigation measures with quick gains offers long-term benefits!
- Improved feeding through cultivated forages is one of such promising mitigation options.

Objectives

Overall:

Evaluate mitigation potential of improved forages promoted by V37's NPA

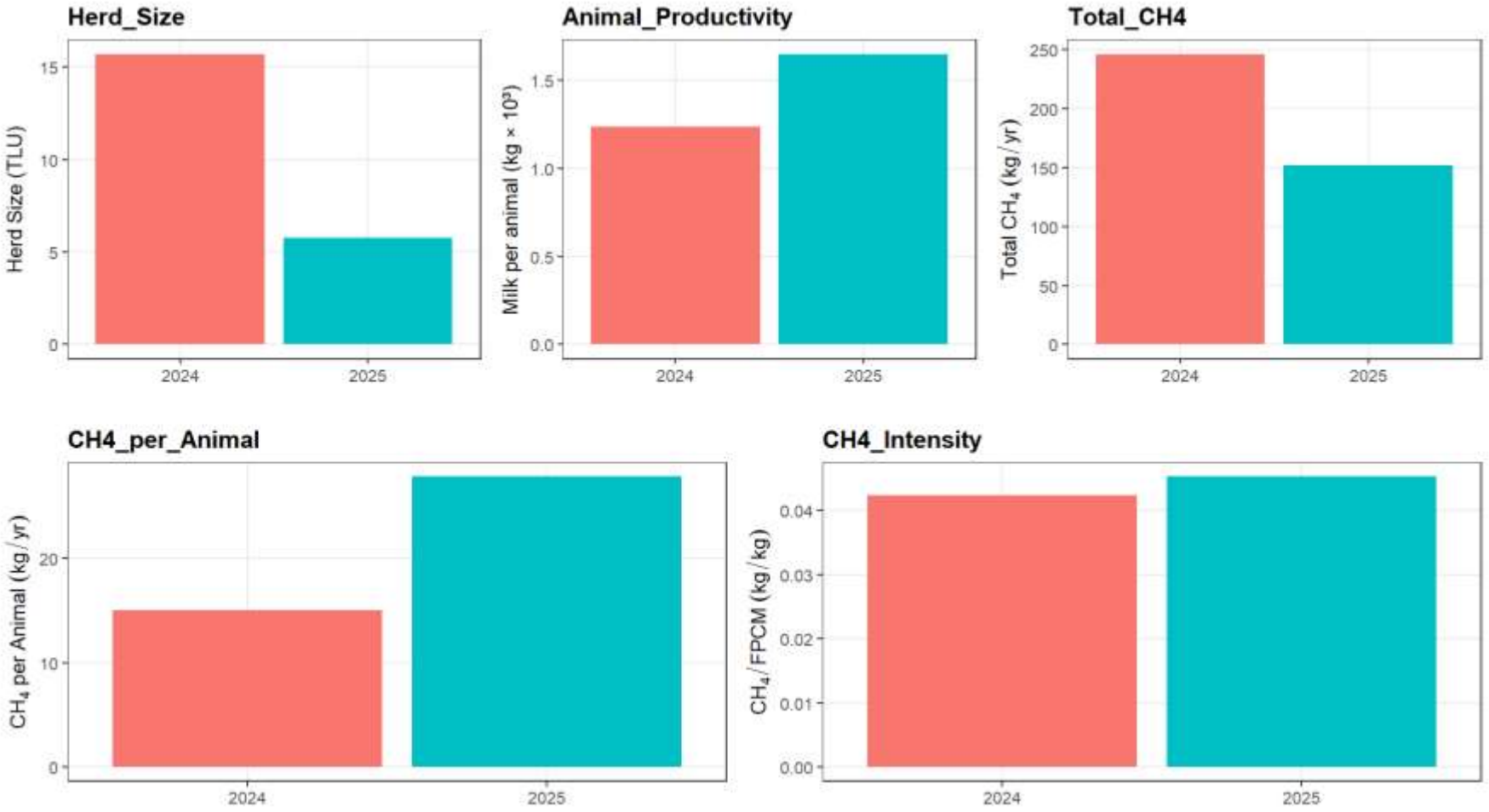
Specific

1. Quantify methane emissions across smallholder dairy farming systems in 2024 vs 2025.
2. Compare productivity–emission relationships.
3. Identify leverage points for low-emission dairy development.

Methods

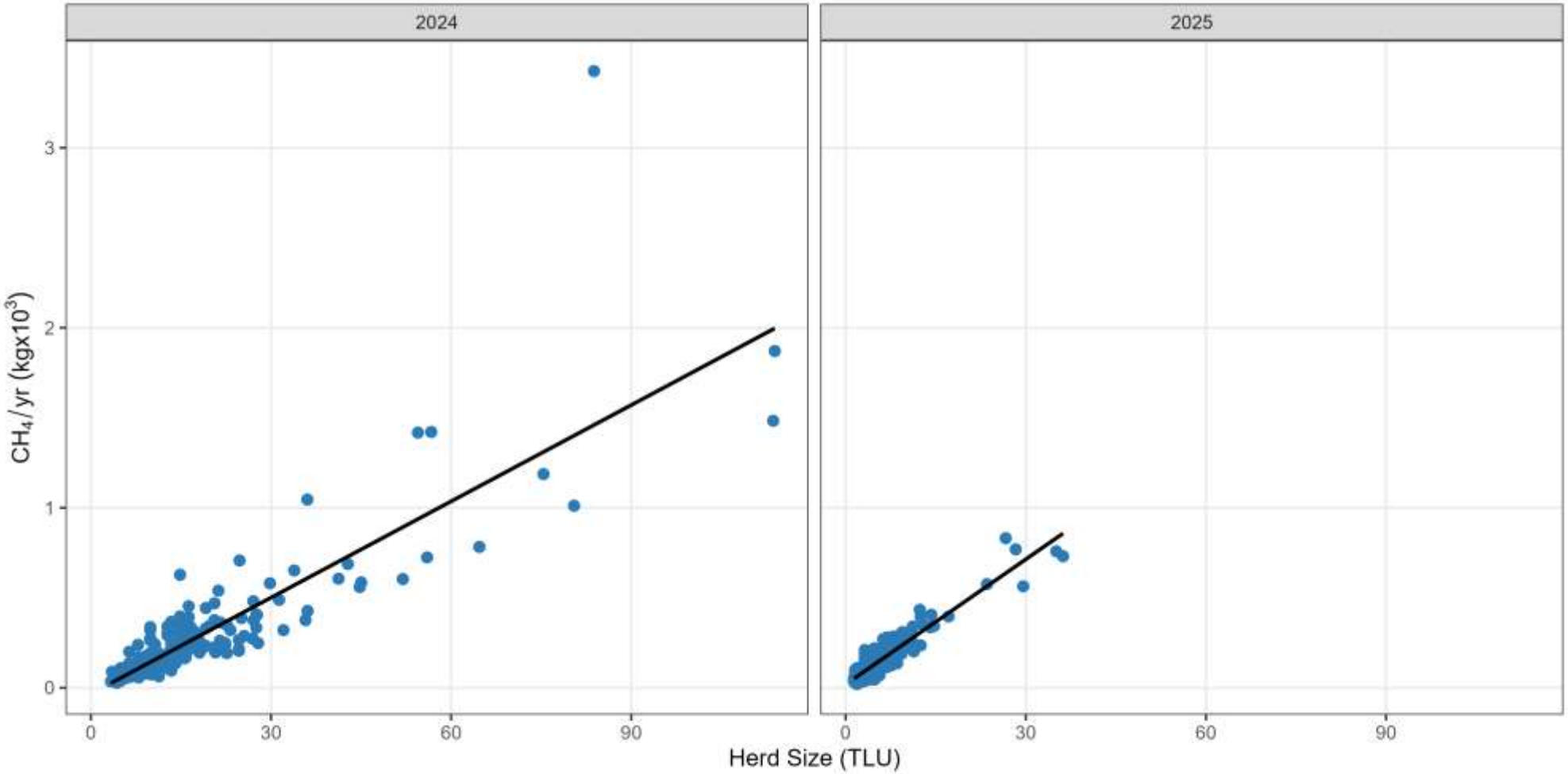
- **Study sites**: 7 counties
  - Baringo, Kericho, Meru, Nakuru, Nyandarua, Nyeri and Uasin Gishu.
- **Data**: Household survey on feed, herd structure, and performance.
  - Farmers sampled: 834
  - 600 and 234 observations in 2024 & 2025, respectively.
  - Only 251 and 221 farms had relevant and complete data.
- **Methodology:** IPCC Tier 2 → $CH_4 = (GE \times Ym) / 55.65$.
- **Tool:** ICLEANED GHG module (run for all herds).
  - https://github.com/CIAT/cleaned_batch/tree/v1.0.0
- **Key metrics:** CH_4 per animal, per kg of fat-protein corrected milk, and per farm.

Systems Overview: Average of 2024 vs 2025



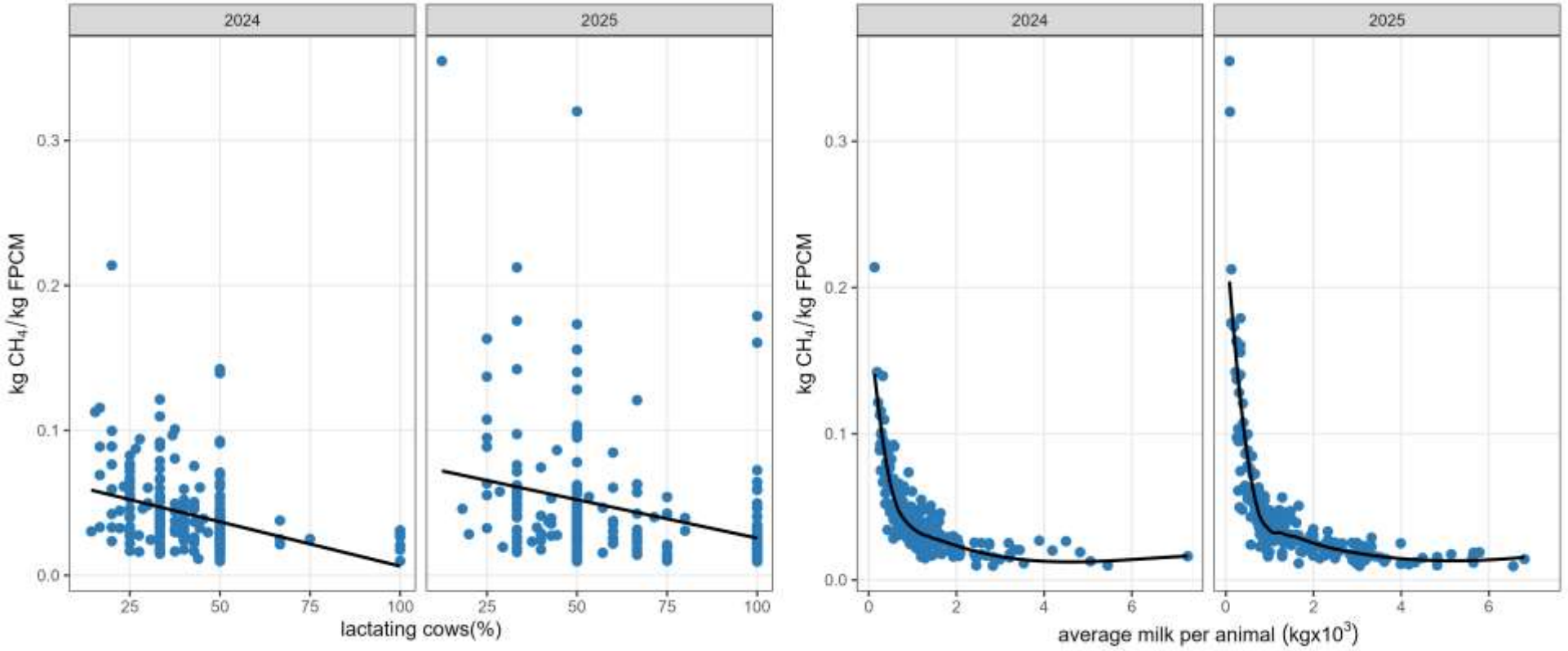
- 2025 herds were smaller, but animals were more productive than in 2024.
- Differences in total CH_4 are primarily driven by herd size.
- CH_4 Intensity is slightly higher in 2025 (no dilution effect due to outliers).

Herd Size vs Enteric CH_4 Emissions



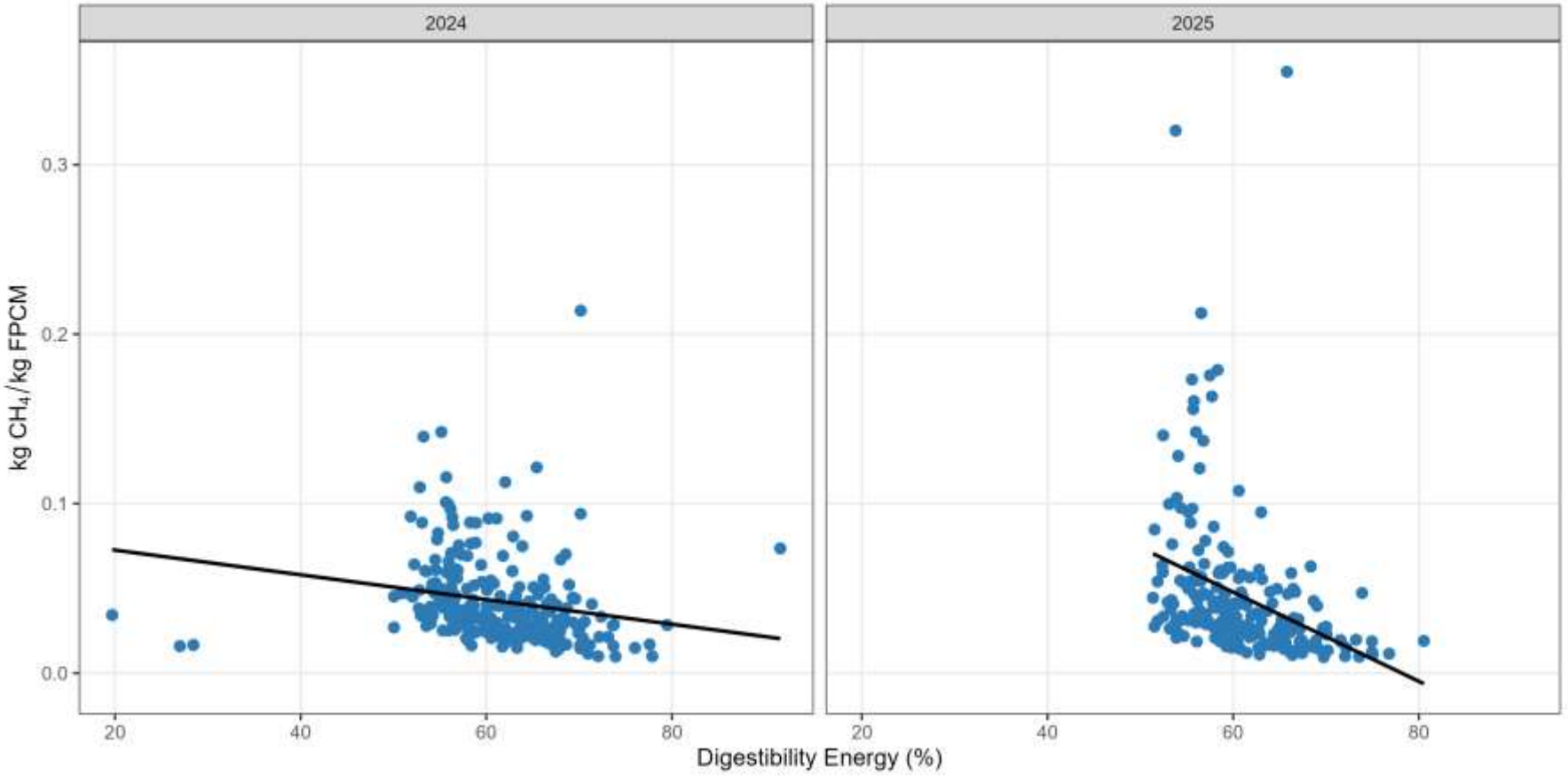
- Larger herds (TLU) have higher total CH_4 due to higher total feed intake.
- Most farms emit below 5 tons of CH_4 per year.

Productivity and Emission Intensity



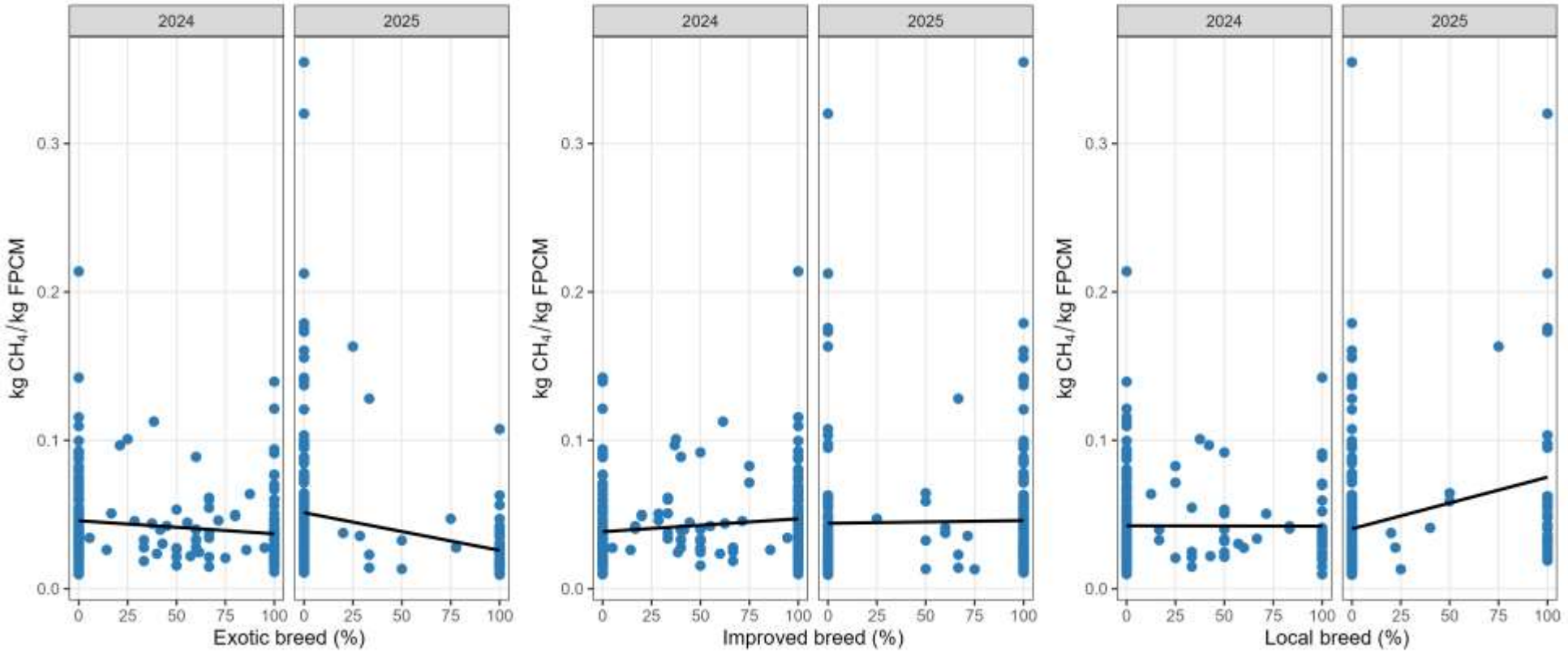
- A higher share of lactating herd lowers CH_4:
  - More specialized for improving overall farm productivity.
  - May not necessarily reflect higher output per animal.
- Emission intensity goes ↓ with higher milk yield per animal.

Feed Digestibility vs Emission Intensity



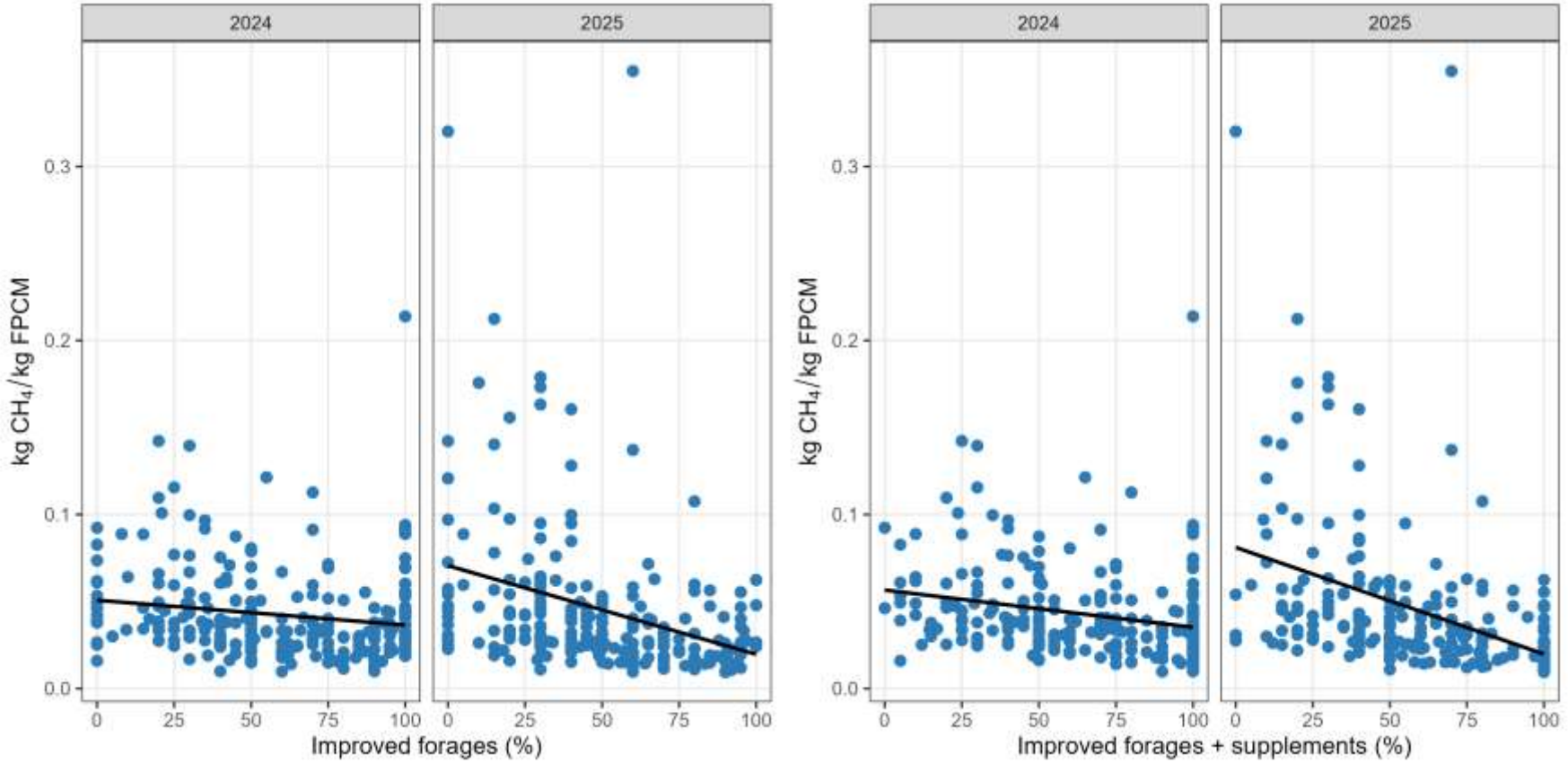
- Higher digestibility generally leads to lower methane per kg FPCM
  - Strong effect in 2025 compared to 2024
  - Less waste and faster conversion of feed into milk (final product)

Breed Composition vs Emission Intensity



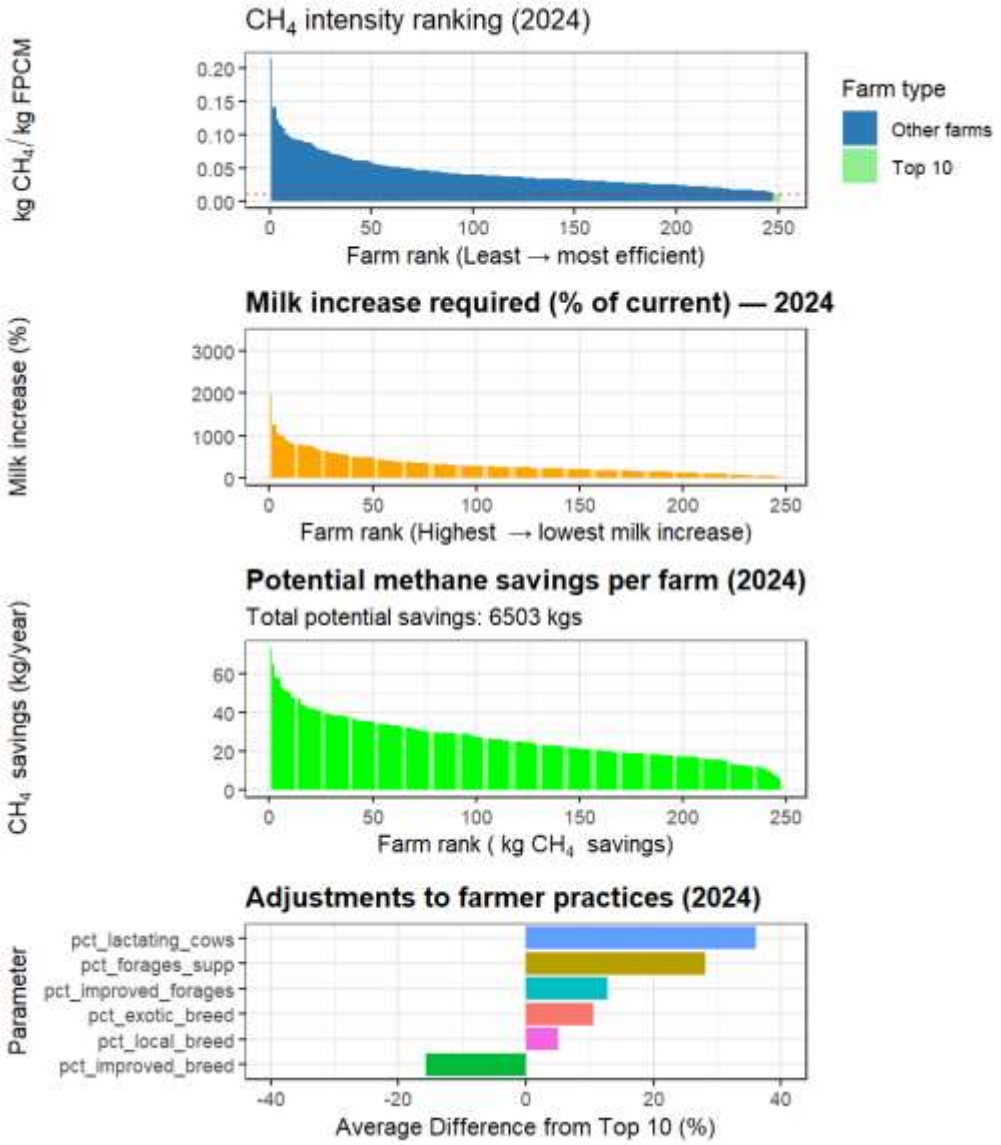
- Genetic improvement boosts output per unit CH_4.
- Local breeds increase CH_4 intensity.

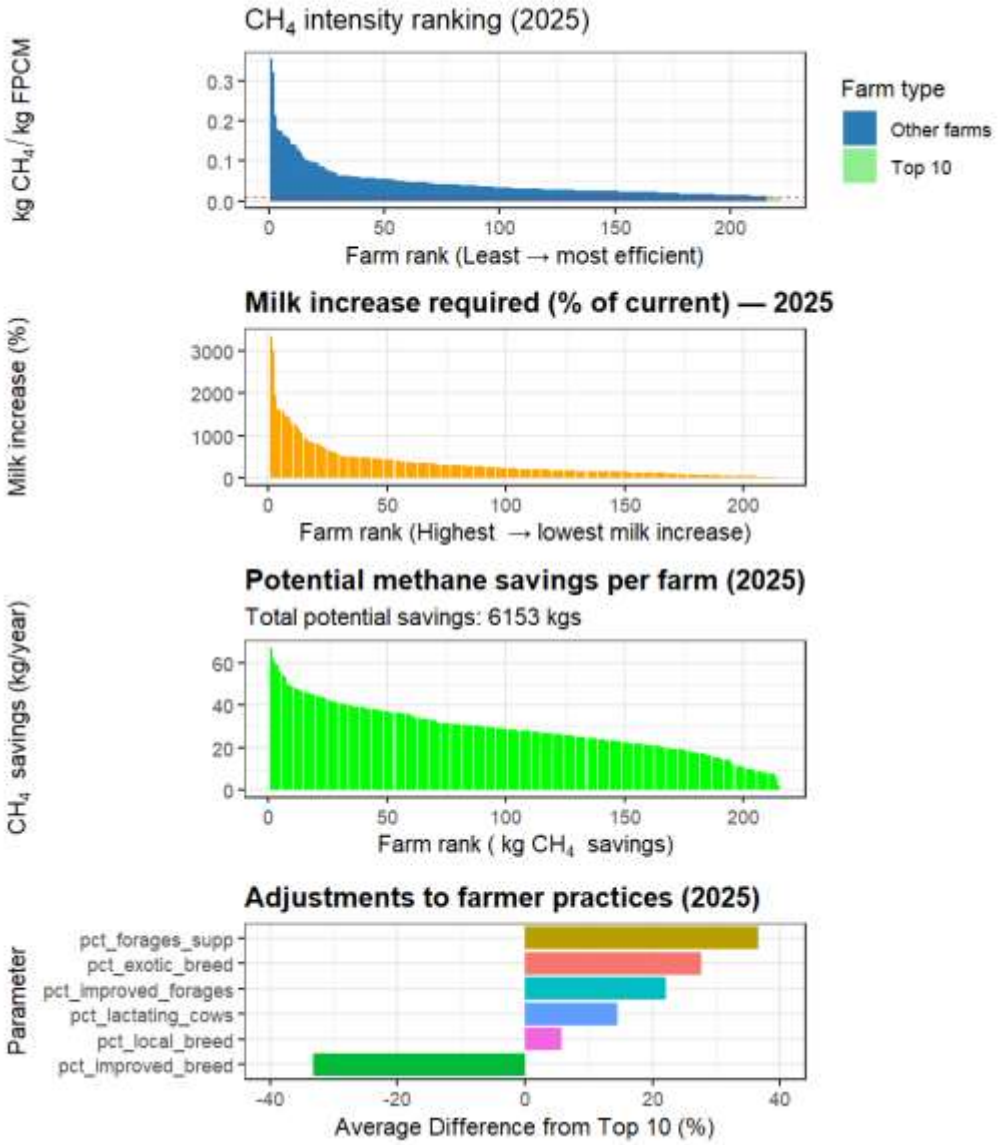
Feed Basket Composition vs Emission Intensity



- Methane intensity declines as the share of improved forages increases.
- Combining improved forages with supplements further strengthens this reduction.
- Trends are consistent across 2024 and 2025.

Shifting Farms Towards Efficiency





Conclusion

- Shifting herd composition toward more productive animals improves CH_4 emission efficiency.
- Higher milk productivity per animal reduces CH_4 per kg of milk, profitability and mitigation.
- Better feed quality and conversion efficiency lower methane yield while sustaining output.
- Adoption of improved/exotic breeds supports low-emission pathways when paired with good feeding and management.
- Study points to strong evidence for integrated, climate-smart dairy investment pathways.
- Farms are highly dynamic; solutions should contextualize and adapt.

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Thanks!

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