

Current State of Enteric Methane Emissions and Mitigation Strategies from Tropical Grazing Systems

AUTHORS

Kwamboka Tirimba⁺

Prof. Mizeck Chagunda

Prof. Regina Birner

⁺ Corresponding author : Dep. Animal Breeding and Husbandry in the Tropics and Subtropics, University of Hohenheim

I. INTRODUCTION

- Efficient livestock production with minimum enteric methane (CH₄) adopted to reduce the emissions while maintaining optimum production.
- Cattle grazing in the tropics report high emission intensities owing to low nutritive quality and fluctuations in availability of tropical pastures.

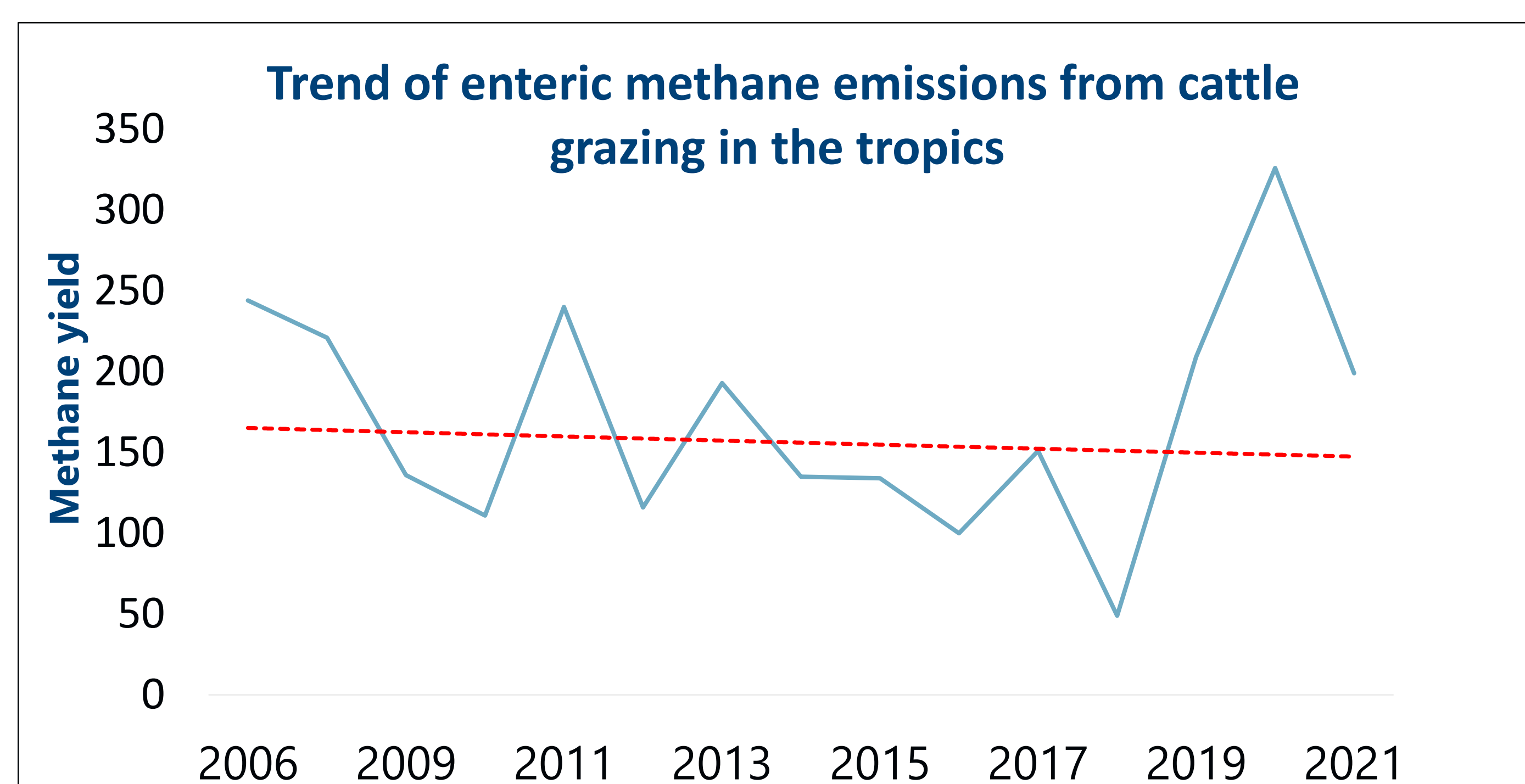
II. METHODS AND RESULTS

1. Methodology

- A meta-analysis was conducted using a Linear mixed model (LME).
- Climates analysed: Tropical, Arid, Oceanic and Subtropical zones.
- Methane was analysed from 160 observations from 29 studies across 12 tropical countries.

2. Trend of methane across the years

- Average methane yield was 130 gCH₄/animal /day.
- Decreasing trend in enteric CH₄ over a 15-year period (2008 – 2022) with a sharp rise between 2019 and 2020.



3. Variables affecting methane yield

- Factors showing a significant effect on CH₄ included: climatic zones, pasture diets, animal types and grazing systems.

Variable	Sum of Squares	Num DF	Mean Square	P-value (Significance)
Climate	12116	3	4038.7	0.00626 **
Pasture diet	8221	3	22740.3	0.03076 *
Management	6614	2	3306.9	0.02761 *
Animal types	52189	5	10437.9	1.385e-08 ***

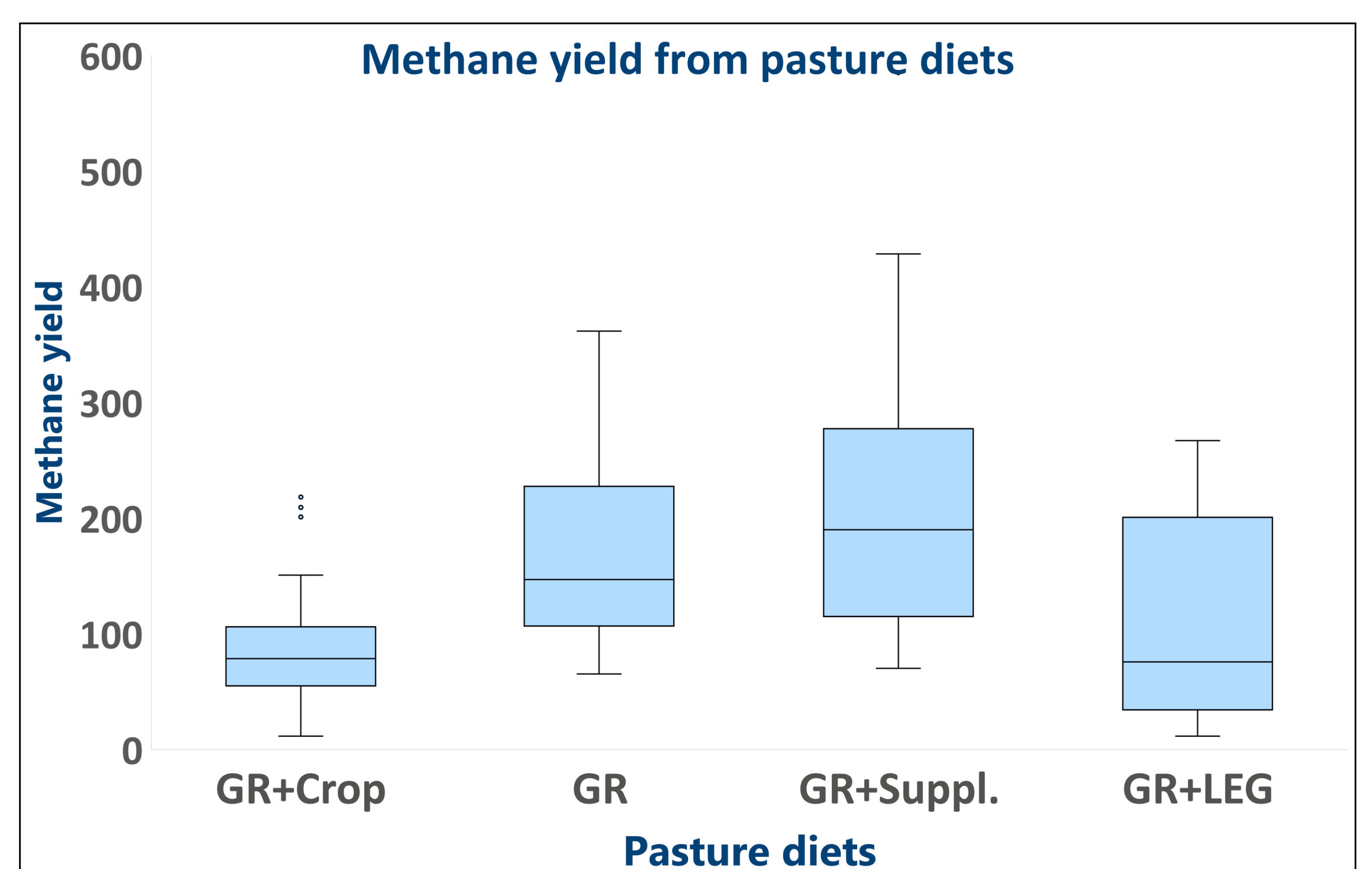
Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

III. CONCLUSION

- Improving feeding and management strategies was effective in methane mitigation.
- Feeding and management strategies are effective when adopted based on specific climatic parameters (temperature and precipitation).

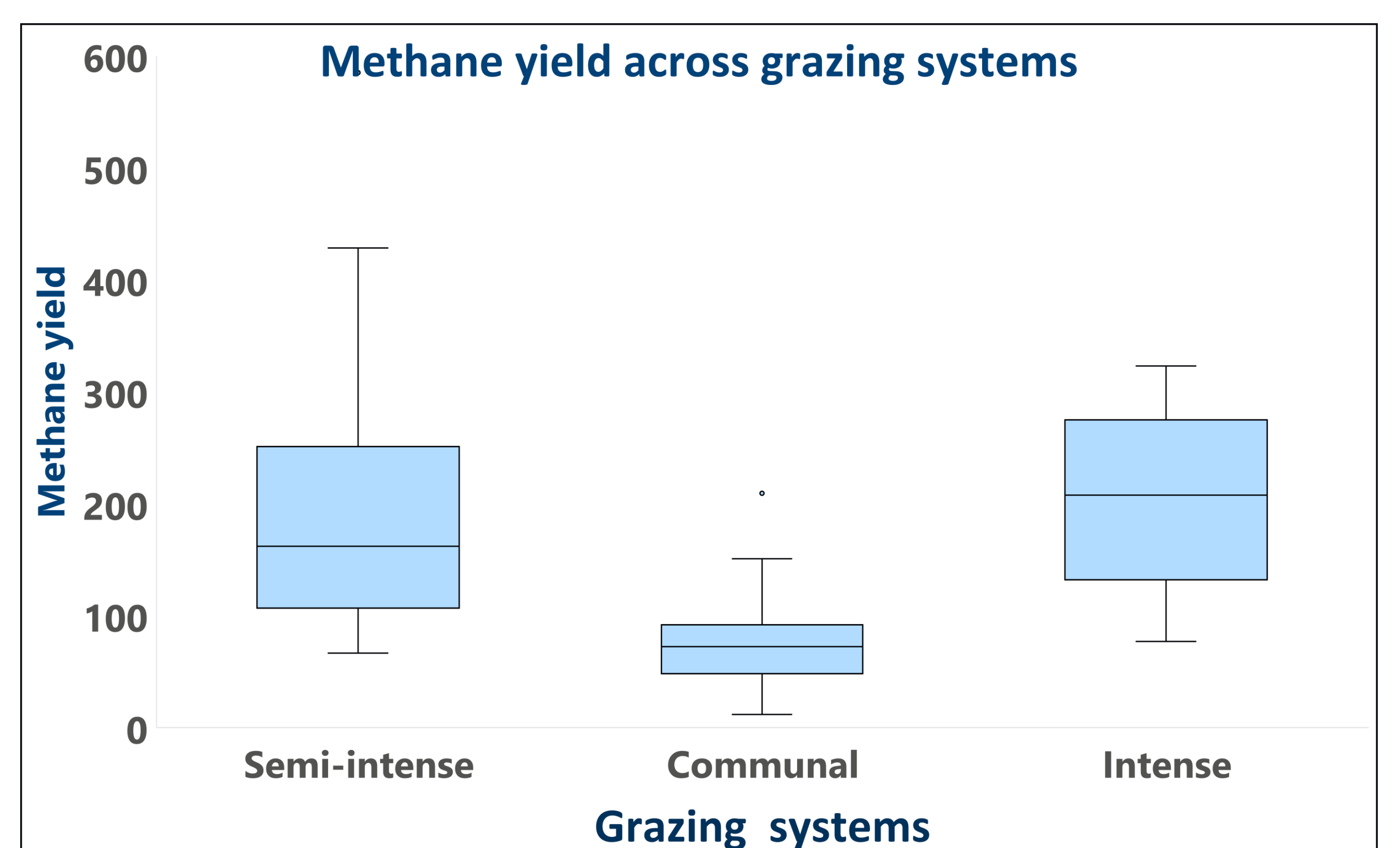
4. Methane mitigation strategies

- CH₄ reduced over the years with the adoption of improved pasture diets and management systems.
- Mixed grass-legume pastures produced 17% less emissions than the pure grass pastures.



GR = Grass pastures ; GR+Crop = Grass pastures and crop residues
GR+Suppl. = Grass pastures and feed supplements;
GR+LEG = Grass and legume pastures

- Semi-intensive systems yielded on average less methane than the intensive systems



Semi-intense=rotational and free grazing ; Communal = Free grazing; Intense = Rotational grazing with paddocks.

CONTACT



Kwamboka Tirimba
kwamboka.tirimba@uni-hohenheim.de
Garbenstr. 17, 70599 Stuttgart, Germany