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Can climate-smart livestock practices increase milk yield of dairy cattle in the Tropics? Evidence from sub-Saharan Africa

Roland Mugumya, Eva Schlecht, Christian. A. Bateki

Animal Husbandry in the Tropics and Subtropics, Universities of Kassel and Göttingen, Germany

Introduction

- Demand for livestock products exceeds the supply in sub-Saharan Africa (SSA)
- Expanding smallholder dairy farming requires proven strategies to mitigate greenhouse gases (GHG) especially methane (CH_4)
- Climate-smart livestock feeding (CSLF) practices can increase milk yield (MY) and lower emission intensity (EI). However, their regional potential is yet to be systematically analyzed

Objective

Estimate the effects of CSLF practices on MY of dairy cattle in SSA and assess their implications for EI of enteric CH_4

Methodology

- **Systematic literature review**
  - Web of Science and Google Scholar
- **Inclusion criteria and selection**
  - English peer-reviewed
  - 2000–2024
  - Feeding dairy cattle
  - SSA
  - MY clearly reported and complete
- **Data handling and analysis**

Effect size

- Standardized mean difference (SMD)
- Random effects model

Emission intensity

- Daily enteric CH_4 production per fat and protein-corrected MY (FPCM)

Analysis

- STATA software (version 16)

Results

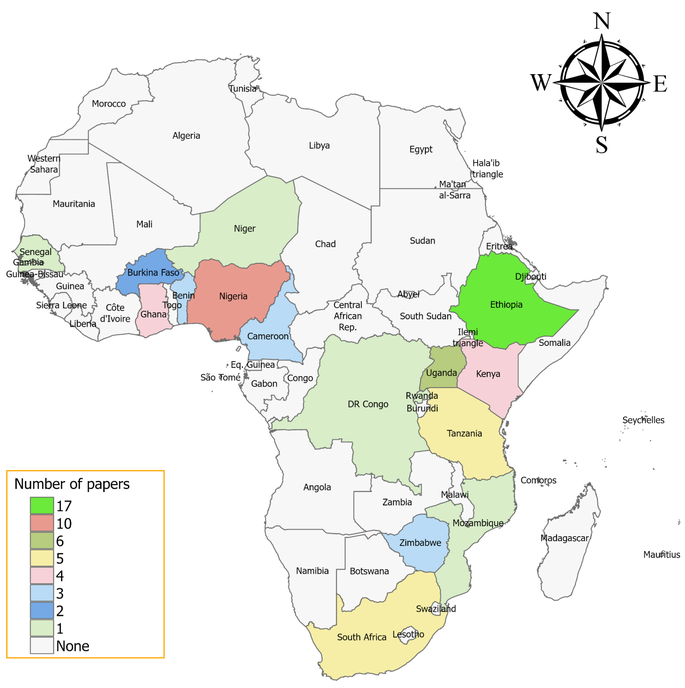

Fig 1. Distribution of publications by country

Data

- 68 papers from 17 countries (Fig.1)
- 78 control groups, 234 test data sets
- Five CSLF practices (Tab. 1)

Table 1: Effect size of CSLF practices on MY

CSLF practice	Effect size (SMD)	95% CI
Silage (n=8)	2.1	1.0 - 3.1
Concentrate (n=47)	1.3	1.0 - 1.6
Hay (n=10)	0.9	0.4 - 1.5
Forage legumes (n=10)	0.6	0.2 - 1.1
Fodder cereals (n=3)	1.0	0.6 - 1.5
Combined (n=78)	**1.2***	**1.0 - 1.5**

n = the number of comparisons (control vs CSLF practice)
*denotes significant at 1%

CSLF practices had an overall SMD of 1.2 on MY (Table 1) and led to a 42.5% reduction in enteric CH_4 EI (Fig. 2)

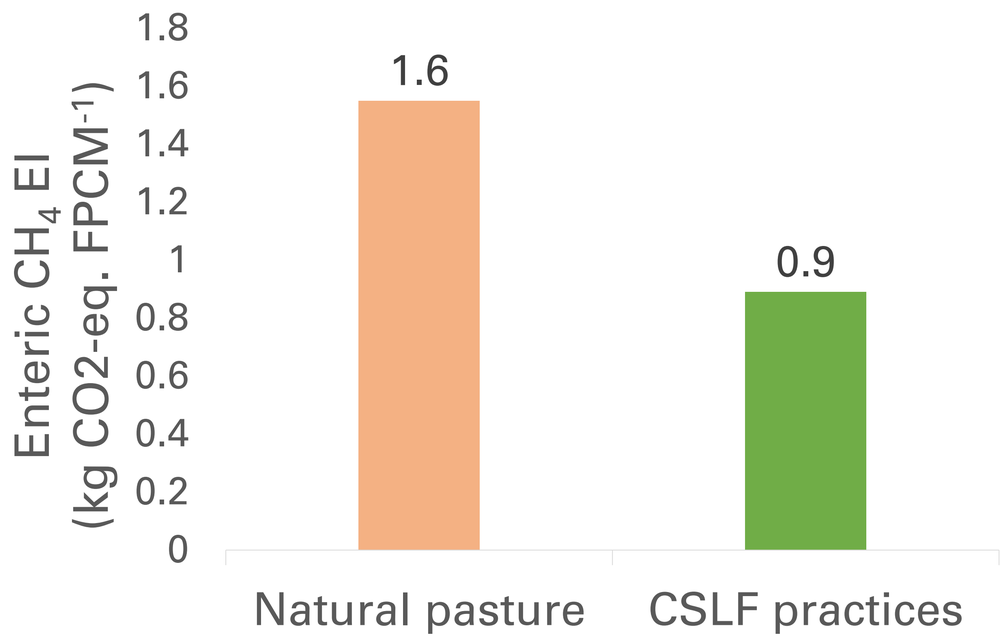

Fig 2. Emission intensity (EI) of enteric CH4 of control versus improved feeding

Conclusion

Dairy farmers should prioritize locally feasible CSLF packages for dairy development and for methane mitigation strategies

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