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A Multi-Level Analytical Framework for Climate-Smart Forage Adoption in East African Dairy Systems

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Author notes

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ABSTRACT

Background: Climate-smart forages, such as Brachiaria grass, offer a pathway to enhance the resilience and productivity of smallholder dairy systems in sub-Saharan Africa. However, adoption remains low and is influenced by a complex interplay of factors operating at multiple scales, from individual households to cooperative structures and regional policy environments. Existing adoption models often fail to adequately account for this hierarchical nesting of influences.

Purpose and objectives: This article develops a novel multi-level analytical framework to systematically identify and quantify the drivers of climate-smart forage adoption within dairy cooperatives. It aims to provide a robust theoretical and methodological structure for future empirical research, specifically targeting the adoption of Brachiaria grass among dairy cooperatives in the Rwenzori region.

Keywords: *Climate-smart agriculture, adoption drivers, multi-level modelling, smallholder dairy systems, East Africa, sustainable intensification, socio-ecological systems*

Article Highlights

- Cooperative-level factors may explain more variance than household characteristics
- Framework integrates agricultural innovation, socio-ecological resilience, and behavioural economics
- Moves beyond simplistic single-level adoption analyses
- Targets Brachiaria grass adoption in Rwenzori dairy cooperatives

Methodological Innovation

Multi-level regression model partitions variance between individual and cooperative-level predictors with random intercepts for cooperatives.

Provides theoretical foundation for future empirical studies on climate-smart forage adoption.

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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