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Current knowledge and research gaps for manure management in sub-Saharan Africa

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Abstract

Livestock production in sub-Saharan Africa (SSA) is expanding rapidly to meet the growing demand for animal-sourced foods. This growth generates increasing volumes of livestock manure, which represents both a critical resource for sustaining soil fertility and a significant environmental challenge. When poorly managed, manure contributes to greenhouse gas emissions, nutrient losses, and risks to human and animal health.

This presentation synthesizes current knowledge on manure management practices across mixed crop-livestock and extensive pastoral systems in SSA. We evaluate the magnitude and dynamics of nutrient losses and emissions of methane (CH₄), nitrous oxide (N₂O), and ammonia (NH₃) along the entire management chain, from housing and collection to storage and field application. To address these challenges, we assess the viability of context-specific mitigation strategies, including improved collection infrastructure, co-composting with biochar or black soldier fly larvae, anaerobic digestion, and land application.

Our review reveals substantial empirical data gaps, particularly the critical lack of whole-chain mass balance assessments and baseline field data on NH₃ emissions under SSA conditions. Furthermore, optimising manure management extends beyond agronomy and climate mitigation; it intimately intersects with public health challenges, including zoonotic pathogen transmission and the environmental spread of antimicrobial resistance. Importantly, the successful adoption of improved practices relies on overcoming socio-economic barriers, particularly regarding labour demands, gender equity, and social inclusion.

Ultimately, advancing sustainable manure management in SSA requires coordinated multi-site empirical research, refined whole-farm modelling tailored to smallholder and pastoral realities, and coherent policy frameworks. Addressing these interconnected dimensions is essential to optimise nutrient use efficiency and increase productivity while mitigating environmental and health trade-offs.

Keywords: Ammonia, circularity, methane, nitrous oxide, pastoralism

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