Tropentag, September 10-12, 2025, hybrid conference

"Reconcile land system changes
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Making the case for crop-livestock integration: financial, technical, and policy insights from kumbungu, ghana's savannah

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Abstract

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In the face of intensifying climate challenges and food insecurity in West Africa, crop-livestock integration (CLI) is emerging as a sustainable alternative to traditional cropping systems. However, adoption remains limited due to uncertainty about its long-term financial viability, efficiency, and institutional support. This study contributes to the science-policy-practice interface by providing robust economic and technical evidence on CLI systems compared to mono-cropping in the Kumbungu district of Ghana's Northern Savannah, a region vulnerable to erratic rainfall, degraded soils, and rural poverty.

Using a quantitative approach, we conducted a comparative analysis of 380 smallholder farms across CLI and cropping systems. Financial profitability was assessed through net income and benefit-cost ratios, while technical efficiency was evaluated using Stochastic Frontier Analysis. Additionally, a logistic regression model identified key factors influencing CLI adoption, including access to credit, extension services, and farm size. The results show that CLI systems deliver higher gross margins and improved efficiency metrics, underscoring their potential for resilient and economically viable agriculture. However, structural constraints such as limited access to inputs, market linkages, and farmer cooperatives hinder broader adoption.

The findings provide critical insights for policymakers and development practitioners working at the intersection of climate adaptation and food systems. By presenting empirical evidence on the advantages of CLI and identifying the policy and practice bottlenecks, this research advocates for targeted interventions, such as climate finance schemes, farmer-based organisations, and extension reforms, to promote widespread adoption. Strengthening the enabling environment for CLI can significantly enhance the resilience and sustainability of food systems across Africa's savannahs.

Keywords: Adoption barriers, agricultural economics, aiccra, climate adaptation, climate-smart agriculture, crop-livestock integration, food systems, Ghana, Kumbungu, science-policy interface, sustainable agriculture, technical efficiency

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