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Integrated digital extension and capacity building strategy to improve manure management among smallholder farmers in Kenya and Uganda

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Abstract

Effective manure management is critical for soil health and farm hygiene in smallholder farming systems, yet evidence on current practices, constraints, and effective pathways for improvement in East Africa remains limited. We have conducted household surveys to assess current manure management practices and constraints and drivers of improved manure management practices among smallholder pig farmers in Uganda and cattle farmers in Kenya. We found that in Kenya, 85 % of households reported using cattle manure for fertilisation, and in Uganda, 81 % of the surveyed households use pig manure for fertilisation. However, we also observed sub-optimal manure management practices among most farmers, characterised by improper storage and application practices. In addition, we frequently found inadequate use of protective gear and disinfectants, low awareness of manure-borne pathogens, and lack of understanding how management affects manure nutrient losses, all of which can contribute to increased disease transmission, environmental contamination, low manure-fertiliser quality, and greenhouse gas emissions.

A lack of information emerged as the major barrier to improved manure management (Relative Importance Index [RII] = 0.65), representing a key entry point for extension interventions. Despite this constraint, farmers are highly motivated to adopt safer practices, particularly those that reduce zoonotic disease risks (RII = 0.70) and improve the fertilising quality of their manure (RII = 0.60).

In response to this farmer demand, we have developed an integrated outreach strategy to address informational, accessibility, and capacity constraints. First, tailored and inclusive digital tools will be deployed in the forms of an AI-powered WhatsApp chatbot in Kenya and an Interactive Voice Response (IVR) hotline in Uganda to deliver accessible, inclusive, and scalable advisory services adapted to varying levels of digital access and literacy. Second, capacity building activities including training of trainers, farmers and stakeholders workshops on improved manure management, identification of model farmers who integrate manure improvements with existing management practices, and assessment

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of farmer acceptability and uptake of promoted practices, will be conducted. This multi modal approach aims to bridge knowledge gaps, overcome logistical constraints, and support adoption of safer and more efficient manure management among smallholder farmers in East Africa.

Keywords: AI, chatbot, crop-livestock integration, extension, interactive voice response, socioeconomic barriers