

Strengthening Climate-Resilient Extension for Dairy, Poultry, Coffee and Tea Value Chains in Kericho County, Kenya

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Abstract

Climate-resilient agricultural development requires extension services that integrate production risk management, environmental stewardship and enterprise viability. This study examined priorities for dairy, poultry, coffee and tea value chains in Kericho County, Kenya, using farmer-group discussions, a structured coffee questionnaire and key-informant interviews conducted within a wider regional field assessment. Analysis distinguished geographically identifiable Kericho observations from pooled regional frequencies. Feed conservation was recorded in all seven regional dairy-group submissions, while all three coffee submissions recorded coffee berry disease, leaf rust and organic-manure/soil-conservation practices; both datasets included a Kericho entry. These results describe participating groups rather than county-wide prevalence. Feed and water security, animal and crop health, input affordability and market coordination emerged as intervention priorities. Producer-level evidence was uneven across commodities, particularly for poultry and tea. Demonstrations, farmer field schools, seasonal advisories and staged investment provide an integrated extension framework. Subsequent evaluation should establish whether these interventions improve adoption, enterprise performance and environmental outcomes.

Keywords: agricultural extension; climate resilience; value chains; Kericho; farmer field schools

1. Introduction

Climate-smart agriculture connects adaptive capacity, resource-use efficiency and food security through context-specific practices, institutions and financing (Lipper et al., 2014). Effective extension must therefore address the economic and organisational conditions under which farmers implement technical advice. Research in Kenya demonstrates that adoption varies with socioeconomic, institutional and biophysical conditions, including access to extension, weather information and finance (Cavanagh et al., 2017; Autio et al., 2021; Musyoki et al., 2022). National climate-smart agriculture policy likewise emphasizes extension capacity, climate information and locally appropriate technologies (Ministry of Agriculture, Livestock, Fisheries and Cooperatives, 2020; Ministry of Agriculture, Livestock and Fisheries, 2018).

Dairy, poultry, coffee and tea constitute the four focal value chains considered in this study of Kericho County. Their differing production cycles and resource requirements call for commodity-specific advisory packages within a coordinated extension system. The study aimed to identify defensible intervention priorities and propose an integrated framework for

practical learning, enterprise support and outcome monitoring. It does not provide an exhaustive ranking of agricultural commodities in the county.

2. Materials and methods

The study drew on a field-based, descriptive assessment of agricultural practices, production constraints and extension delivery. Data collection combined dairy and poultry focus-group discussions, a structured coffee production and marketing questionnaire, and key-informant interviews with agricultural and livestock officials. The wider assessment included several counties; this article focuses on the Kericho component. Available dated field records indicate collection in December 2025. The unit of analysis was the farmer-group response or key-informant record, rather than the individual participant.

Kericho coverage included a dairy-group discussion in Bureti, a coffee-group response in Ainamoi, a poultry discussion in Belgut and agricultural and livestock key informants. The regional dairy dataset contained seven group submissions, the coffee dataset three, and each county-director dataset five. The Bureti dairy record contained an inconsistent county label; its geographic

attribution follows its sub-county and the county-level synthesis and requires verification against the original record. Detailed Belgut poultry responses were available only in consolidated form. Tea was considered through institutional evidence because direct tea-producer observations were not available for this analysis.

Analysis organised responses by commodity, location, production constraint, reported practice and extension modality. Descriptive counts were retained with their original denominators. Universal responses in a pooled question were attributed to the included Kericho record; non-universal marginal responses remained regional because respondent-level linkages were unavailable. Differently worded manure-management items were excluded from the quantitative comparison. The study identifies extension priorities; its group-level design does not support estimates of county-wide farmer adoption or causal intervention effects.

3. Results

3.1 Dairy

Dairy priorities centred on seasonal fodder availability, purchased-feed costs, reliable water access and animal health. Feed conservation was recorded in all seven regional submissions, indicating its presence in the Bureti entry, subject to verification of its county identifier. Figure 1 shows a descriptive gradient from feed conservation (7/7 submissions) to improved breeds (6/7), fodder trees (4/7) and water harvesting (3/7) across the regional sample. Their distribution within Kericho could not be established. These findings support integrated feed and water planning while leaving local uptake rates undetermined. Kenyan evidence further indicates that extension learning, farmer preferences and local production conditions should be considered when promoting climate-smart practices (Gichuki et al., 2023; Awoke et al., 2026).

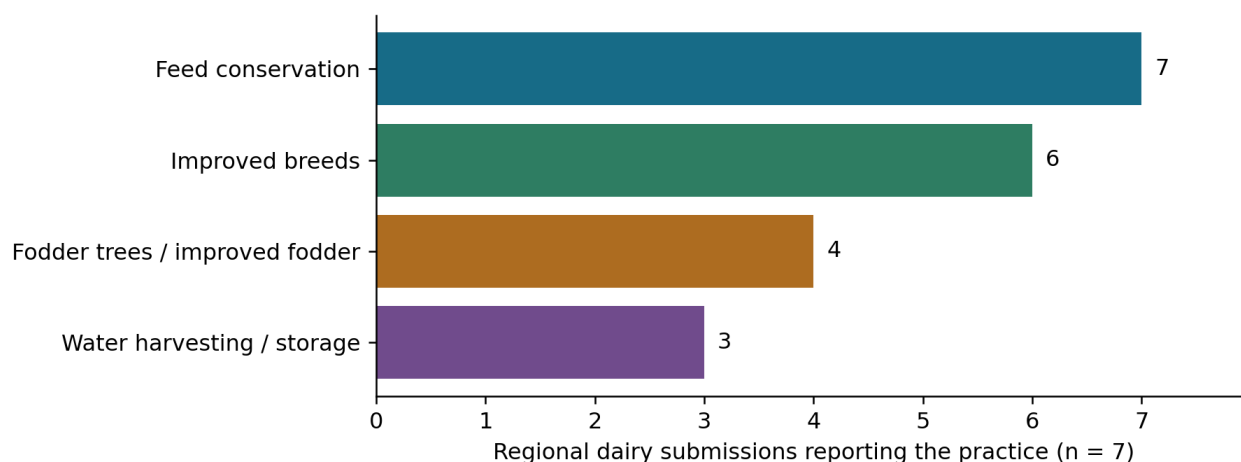


Figure 1. Practices recorded during regional dairy-group data collection (n = 7 group submissions), including the Bureti entry attributed to Kericho.

3.2 Poultry

Poultry priorities comprised disease management, feed affordability and access to remunerative markets, alongside housing, water and credit constraints. The evidence supports an intervention agenda for Belgut but does not establish local prevalence or average flock size. Veterinary-guided vaccination, adequate ventilation, biosecurity, nutritionally appropriate feed options and collective marketing are proposed as complementary components of enterprise support.

3.3 Coffee

All three regional coffee submissions, including the Ainamoi entry, recorded small-scale production, coffee berry disease and leaf rust. Disease occurrence was self-reported rather than diagnostically confirmed. All

submissions also recorded active organic-manure/soil-conservation practices, although the combined response category did not distinguish its components. Non-universal records of mulching, shade and spacing could not be assigned specifically to Kericho. Local extension priorities therefore emphasise disease assessment and soil stewardship without inferring climate trends or measured yield losses.

3.4 Tea and extension delivery

Tea research and commodity organisations provide an institutional basis for developing advisory services. In the absence of direct producer observations, soil and water conservation, targeted nutrient management and integrated pest management remain priorities for local assessment. Group training was recorded in all five agriculture-informant

submissions, establishing its reported presence in the included Kericho entry. Demonstrations, farmer field schools and lead-farmer learning constitute proposed delivery mechanisms; their comparative effectiveness in the county was not evaluated. Evidence from Kenya shows that farmer field schools can strengthen application of climate-smart knowledge, while farmer-to-farmer extension offers a complementary pathway for wider dissemination (Gichuki et al., 2023; Franzel et al., 2018).

4. Discussion

A coordinated extension system can address shared resource constraints while retaining commodity-specific advice. Dairy requires feed and water planning; poultry requires animal health and enterprise support; coffee requires disease and soil management; and tea requires producer-level diagnosis before intervention selection. This differentiated approach accords with the emphasis on locally appropriate institutions and financing in climate-smart agriculture (Lipper et al., 2014). Recent Kenyan evidence also supports participatory, inclusive and locally adapted climate-smart extension models rather than uniform top-down delivery (Onyango et al., 2025). Figure 2 translates these

priorities into commodity-specific advisory packages and corresponding indicators for implementation and evaluation.

Farmer field schools provide intensive, discovery-based learning, although evidence on outcomes and scaling requires careful interpretation (Waddington et al., 2014). In Kericho, repeated demonstrations should incorporate farmer experimentation, technical follow-up and records of labour, costs and enterprise performance. Seasonal radio and mobile-phone advisories can reinforce practical sessions where access permits. Climate-risk extension guidance for Kenya emphasizes the practical interpretation and communication of weather and climate information for farm decision-making (Hansen et al., 2024). Staged financing should accompany training because resource constraints can limit implementation even when technical knowledge is available (Cavanagh et al., 2017).

Coffee agroforestry requires site-specific design. Shade interacts with microclimate, disease, productivity and bean quality, making species selection and canopy management central to agronomic suitability (Koutouleas et al.,

2022). Manure technologies similarly require appraisal of feedstock, water, maintenance and operating costs. Environmental benefits should be evaluated against explicit baselines rather than assumed from technology adoption alone (Chepkochei et al., 2025).

Social inclusion requires attention to decision-making authority, labour allocation and control of income, alongside training attendance. Kenyan intra-household research identifies gender differences in adaptation choices,

information needs and benefits from group participation (Ngigi et al., 2017). Extension design should consequently involve women, youth and persons with disabilities, with accessible venues and suitable schedules. Recent Kenyan studies similarly identify inclusion, information access and extension contact as important dimensions of climate-smart practice uptake (Chepkochei et al., 2025; Onyango et al., 2025). Participation and enterprise outcomes should be monitored separately to assess who benefits.

Dairy	Proposed package Fodder planning and storage; water harvesting; veterinary support; locally assessed manure management.	Indicators for subsequent evaluation Months of fodder availability; milk yield per animal; feed expenditure; verified manure practice and operating costs.
Poultry	Proposed package Veterinary vaccination plans; ventilation and biosecurity; safe, costed feed options; buyer aggregation.	Indicators for subsequent evaluation Flock mortality; vaccination records; feed cost per bird; sale price and gross margin.
Coffee	Proposed package Integrated disease management; suitable varieties; moisture conservation; cooperative learning and quality handling.	Indicators for subsequent evaluation Verified disease incidence; practice use; yield; quality grade; net return.
Tea	Proposed package Producer diagnosis; slope-specific soil/water conservation; nutrient management; research-linked demonstrations.	Indicators for subsequent evaluation Erosion indicators; input use; yield and leaf quality; participation in advisory services.

Figure 2. Integrated extension framework for dairy, poultry, coffee and tea in Kericho County: proposed advisory packages and enterprise-level monitoring indicators.

Conclusion

The field assessment provides a practical basis for commodity-specific extension design, but geographic inference is constrained by aggregated responses, an inconsistent dairy identifier and limited disaggregated poultry and tea

observations. Climate perceptions were not independently tested against meteorological records, and enterprise or greenhouse-gas outcomes were not measured. The central implication is to integrate feed and water security, animal and crop health, affordable investment

and market coordination through sustained practical learning. This is consistent with Kenya-focused evidence that agricultural training and access to climate-smart information shape awareness and adoption of climate-resilient practices (Gichuki et al., 2023; Hansen et al., 2024; Onyango et al., 2025). A geographically stratified follow-up should validate identifiers and track practice uptake, labour, enterprise costs and outcomes before estimating productivity, income or emission effects.

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