

Climate Resilient Extension Priorities for Dairy, Poultry and Fruit Tree Value Chains in Migori County Kenya

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Abstract

Climate-resilient value-chain development requires locally attributable evidence on production practices, advisory services, institutional capacity, and market constraints. This study synthesized Migori County evidence from 12 Climate Resilient, Low Carbon, and Sustainable Agriculture (CRLCSA) assessment documents, comprising four narrative reports and eight Kobo Toolbox report exports. County-labelled submissions were separated from pooled regional summaries. A finding was attributed to Migori only when the submission location was explicit or when an item was selected unanimously in an instrument with complete response coverage, thereby ensuring that the included Migori submission(s) necessarily shared that response. The evidence identified two explicitly Migori-labelled dairy submissions, two poultry submissions, one fruit-tree submission, two extension-officer submissions, and one Migori response in each of the county agriculture and livestock director instruments. Among the included dairy submissions, verified priorities included feed conservation, timely advice, and follow-up support. Poultry submissions shared disease, feed-cost, market-access, affordable-input, and credit constraints. Fruit-tree evidence identified drought, pests and diseases, poor flowering or fruit set, water harvesting, mulching, labour burden, extension constraints, and reliance on local markets and brokers. Extension evidence consistently pointed to demonstration plots and group training, alongside inadequate staffing and logistical support. The findings support a coordinated extension package that integrates practical learning, production-risk management, input and finance access, and market support. They do not provide county-wide prevalence estimates, measured income effects, or carbon-mitigation estimates. A phased pilot using linked farmer records, verified production and sales data, and explicit monitoring indicators is recommended before wider scaling.

Keywords: Agricultural extension; Climate resilience; Dairy; Fruit trees; Migori County; Poultry; Value Chains

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I. Introduction

Climate-smart agriculture seeks to increase agricultural productivity and incomes, strengthen adaptation and resilience to climate change, and reduce or remove greenhouse-gas emissions where feasible [1]. Kenya's Climate Smart Agriculture Strategy similarly emphasizes climate information, adaptive technologies, stronger extension systems, and improved market access [2]. Across Africa, adaptation outcomes are shaped by interacting climatic and socioeconomic risks, making locally appropriate responses essential [3].

Climate resilience is not achieved through farm practices alone. Sustainable value-chain development depends on the incentives, services, governance arrangements, and market relationships that connect production to processing and marketing [4]. Extension systems are central to this process because they translate technical knowledge into locally usable decisions; however, their performance depends on institutional capacity, farmer access, and the relevance and timeliness of advisory services [5].

Regional assessments can inform county planning only when findings can be attributed reliably to the county concerned. Pooled regional percentages may obscure local variation and can create false precision when county-specific denominators are small or unclear. This challenge is particularly important when assessment reports combine submissions from several counties but policy and investment decisions are required for a single county.

This study therefore synthesizes the Climate Resilient, Low Carbon, and Sustainable Agriculture (CRLCSA) assessment evidence attributable to Migori County for dairy, poultry, and fruit-tree value chains. It asks: (1) which production practices and constraints are defensibly attributable to Migori submissions; (2) which extension and institutional limitations are consistently reported; and (3) what integrated service priorities can reasonably be proposed for testing without converting regional summaries into county estimates. The study contributes a transparent evidence-attribution approach and a practical framework for designing and evaluating locally grounded extension packages.

II. Materials And Methods

The study used a document-based evidence synthesis of 12 CRLCSA assessment documents: four narrative reports and eight automated KoboToolbox report exports covering farmer focus groups, extension officers, and county agriculture and livestock officials. The KoboToolbox materials were treated as reports of submitted responses rather than as blank questionnaires. Narrative syntheses were compared with the primary report tables to verify locations, frequencies, denominators, and question wording. Where interpretation differed, primary tables were given precedence.

The unit of analysis was a submission within an assessment instrument, not an individual farmer. Explicit county labels provided the primary inclusion rule. Two dairy instruments each contained two explicitly Migori-labelled submissions [6, 7]; the poultry instrument contained two [8]; the fruit-tree instrument contained one [9]; the extension-officer instrument contained two [10]; and each county-director instrument contained one Migori response [11, 12]. These counts were not added to produce a total sample because the same farmer groups or institutions may have appeared in more than one instrument (Figure 1). Nyatike-only entries were treated as candidates requiring linkage confirmation rather than automatically counted as separate Migori observations. Pooled frequencies were attributed to included Migori submissions only when an item was unanimous across all submissions with complete response coverage in the relevant instrument. Under this rule, if every submission selected an item, then every explicitly identified Migori submission necessarily selected it. Non-unanimous pooled frequencies, unlinked free-text responses, and regional means were not converted into Migori-specific estimates. The Homa Bay report was excluded as county evidence, and regional claims concerning coffee, tea, and African leafy vegetables were not retained because attributable primary Migori findings were not available in the reviewed corpus.

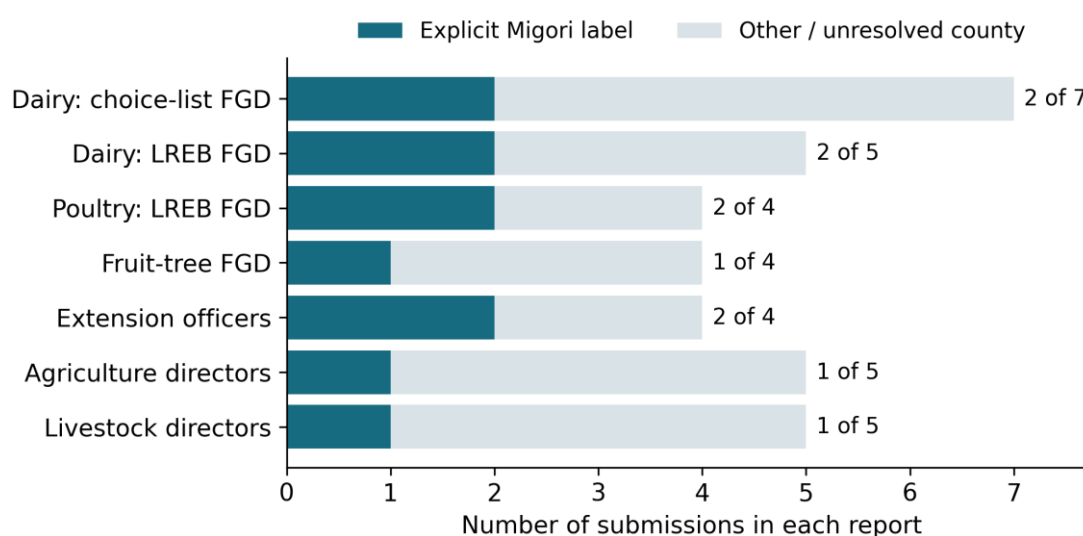


Figure 1. Conservative Migori county identification by instrument.

III. Results

Dairy production and advisory support

Konya Nyale in Rongo and Ahenyo Dream Ladies in Uriri were explicitly identified in the LREB dairy report, and variants of both names also appeared in the dairy choice-list report [6, 7]. This overlap means that the instruments cannot be treated as independent samples. In the seven-submission choice-list report, all submissions selected feed conservation through silage or hay, peer learning, gaps in timely information, and inadequate follow-up or practical support [6]. Because these fields were unanimous, they can be attributed to the two explicitly Migori-labelled submissions in that instrument (Figure 2). Feed conservation should be interpreted as a reported practice, not as evidence of measured productivity or emissions outcomes.

Poultry enterprise constraints

The poultry report contained two Migori submissions among four county responses [8]. All four submissions reported indigenous chickens, disease outbreaks, feed scarcity or high feed costs, and market-access or low-price constraints. All four also identified affordable feed or inputs and credit or microfinance as missing services [8]. These unanimous fields therefore apply to both Migori submissions. The instrument combined awareness and current use within one climate-smart-agriculture question; consequently, responses on manure management

cannot be interpreted as verified adoption. Regional mean flock size and gender composition were not assigned to Migori.

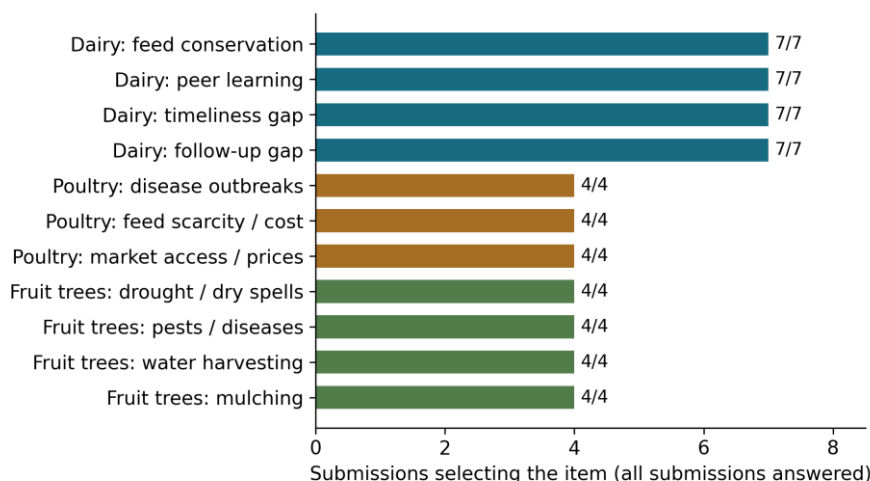


Figure 2. Verified unanimous fields in the mixed-county primary reports

Fruit-tree production and marketing

One location entry explicitly identified Migori/Nyatike and Nyabende traders, while another referred to Aringo-Nyatike and the same named trading group [9]. Across all four fruit-tree submissions, drought or dry spells, pests and diseases, and poor flowering or fruit set were reported as production challenges. Water harvesting and mulching were reported by all submissions as practices in use. Cost and pest pressure were unanimous adoption constraints; labour burden was a shared inclusion barrier; few extension officers were reported as an advisory constraint; local markets and brokers were common marketing channels; and training or extension was consistently identified as a priority [9]. These findings can be attributed to the explicitly Migori-labelled entry, but reported practice use was not independently observed.

Extension capacity and institutional consistency

The two explicitly Migori-labelled extension-officer submissions were from Nyatike and Suna East [10]. All four officers in the mixed-county report selected demonstration plots and group training, recommended both methods, and reported inadequate staffing and limited facilitation or logistics [10]. The two Migori submissions therefore share these responses. Group training was also selected by all five agriculture officials, while all five livestock officials reported public livestock extension and inadequate resources [11, 12]. Each of these director instruments contained a Migori response. The convergence across instruments identifies a delivery-capacity problem but does not establish the number of county staff, farmers reached, or county-wide service coverage.

IV. Discussion

The attributable evidence points to a common implementation challenge across the three value chains: technical advice is most useful when farmers can obtain appropriate inputs, manage production risks, receive timely follow-up, and access viable markets. Dairy submissions combine feed-conservation practices with concerns about timeliness and follow-up; poultry submissions emphasize disease, feed, finance, and market constraints; and fruit-tree evidence links drought and pest management to labour, extension, and market limitations. These are defensible priorities for the included Migori submissions, but they should not be presented as county-wide prevalence estimates.

Practical learning is a logical delivery mechanism for these priorities. East African farmer-field-school evidence has associated participatory learning with improved productivity and income [13], although systematic review evidence cautions that programme quality and sustained performance at scale vary [14]. FAO guidance likewise emphasizes locally adapted curricula, capable facilitation, observation, experimentation, and follow-up [15]. In the present evidence, demonstration plots and group training were both reported and recommended by the included extension officers, making them reasonable components of a pilot extension package rather than proven impact mechanisms in Migori.

Peer and digital approaches could complement face-to-face extension where they address a clearly identified delivery gap. Social-learning research shows that incentives and network structure can influence experimentation, communication, and technology diffusion [16, 17]. Digital agricultural advice can reduce information costs when messages are actionable, timely, and adapted to farmers' circumstances [18]. These

approaches should therefore be tested as complements to field support, not assumed to substitute for adequately resourced extension personnel.

Value-chain-specific packages should respond to the constraints identified in the source documents. Dairy coaching could combine silage and hay quality, animal health, and simple production-cost records, consistent with good dairy-farming guidance [19]. Poultry support should integrate affordable feeding, housing, flock health, and marketing [20]. Fruit-tree services should combine water harvesting, mulching, pest and disease management, labour-sensitive practices, and buyer requirements. Such packages are more likely to be useful when technical advice is linked to the resources and market conditions required for implementation.

Finance should be integrated carefully. Credit and risk constraints can shape agricultural investment decisions [21], while practical financial education and simple record-keeping tools can improve decision-making [22, 23]. Kenyan mobile-money evidence also demonstrates the importance of transaction costs in household risk sharing [24]. These mechanisms justify evaluating coordinated finance and extension support, but they do not establish a local income or repayment effect in the present dataset. Any storage, aggregation, or credit investment should therefore be based on demonstrated throughput, buyer demand, repayment feasibility, and financial viability [4].

Inclusive delivery requires more than counting participants. The fruit-tree evidence identifies labour burden, while the poultry instrument contains responses related to cultural norms [8, 9]. Broader agrifood-system and value-chain guidance distinguishes participation from access to resources, decision-making power, workload, and control over benefits [25, 26]. Monitoring should therefore record practice use, labour requirements, sales, access to services, and decision-making, with voluntary demographic disaggregation where appropriate.

Finally, adaptation and mitigation outcomes should not be conflated. The reviewed evidence supports priorities for climate resilience, advisory services, and value-chain coordination, but it contains no direct measurement of greenhouse-gas reductions. Carbon benefits require a defined baseline, appropriate activity data, and recognized emissions-accounting methods [1, 27]. Claims of low-carbon impact should therefore be evaluated separately from reported adaptation practices. Figure 3 links needs to proposed packages and outcomes.

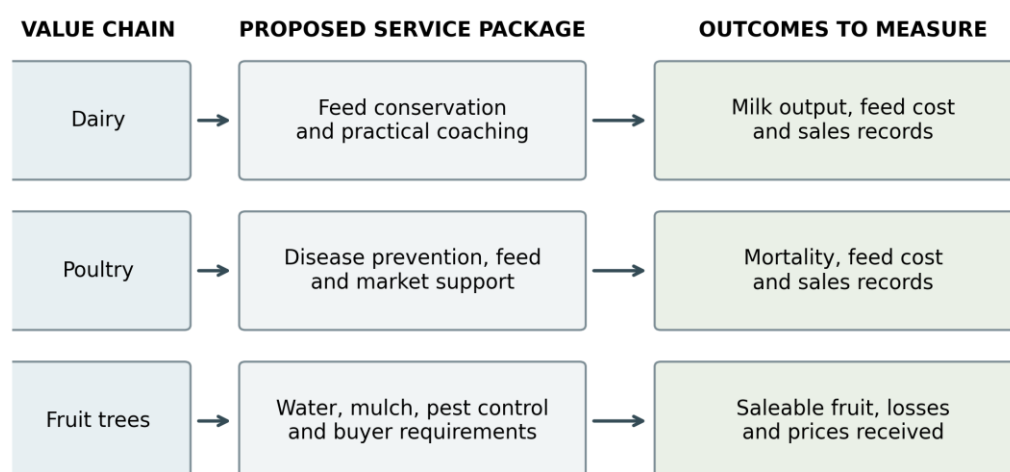


Figure 3. Proposed service packages and outcomes to evaluate. Arrows express an implementation logic.

A phased pilot could combine: (i) practical demonstrations and group learning; (ii) scheduled follow-up visits or targeted digital reminders; (iii) dairy feed-conservation and record-keeping support; (iv) poultry disease, feeding, input-finance, and market support; (v) fruit-tree water, mulch, pest, labour, and buyer-oriented management; and (vi) strengthened extension logistics. Evaluation should use linked farmer identifiers, baseline and follow-up measurements, verified production and sales records, service-use data, and clearly defined indicators. Scaling decisions should be based on measured outcomes rather than pooled regional percentages

V. Conclusion

The attributable Migori evidence supports coordinated extension for dairy, poultry, and fruit-tree value chains centred on practical learning, reliable follow-up, production-risk management, input and finance access, and market support. Feed conservation and advisory follow-up are defensible dairy priorities; disease, feed cost, finance, and market access are prominent poultry concerns; and fruit-tree evidence highlights drought, water management, pest pressure, labour, extension, and marketing constraints. Extension submissions also point consistently to staffing and logistical limitations. These findings should guide a locally tested service package

rather than be interpreted as county-wide adoption or impact estimates. A phased pilot with linked records, verified farm outcomes, sales data, and explicit monitoring indicators would provide a stronger basis for subsequent investment and scaling.

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