MRS Journal of Accounting and Business Management
ISSN *(Online) 3049-1460*
Vol-3, Iss-11 (November-2026)
Journal homepage: https://mrspublisher.com/journals

Factors Constraining the Performance of Pastoralism as the Predominant Livestock Production System in Northern Kenya: A Critical Narrative Review

Ekiru Francis Anno*

Selinus University of Sciences and Literature (SUSL), Ragusa, Italy

Received: 14 / 09 / 2026	Accepted: 23 / 10 / 2026	Published: 02 / 11 / 2026

Abstract: Pastoralism supports livestock production, household livelihoods and the use of variable rangeland resources in the dryland counties of Kenya. However, its contribution to productivity, income, food security and resilience is constrained by interacting environmental, institutional and economic pressures. This paper examines these constraints through a critical narrative review of 24 sources published between 2020 and 2025, combining dryland counties-specific research with Kenyan, regional and international evidence. Sources were identified through targeted searches of publisher platforms, institutional repositories and official agency websites and assessed for geographical relevance, methodological transparency and the distinction between observed outcomes and policy intentions. The synthesis identifies recurrent drought and heat stress, inadequate access to forage and water, restricted mobility, land-use change, insecurity, livestock disease, weak market coordination, financial exclusion, uneven service provision and socially differentiated adaptive capacity as factors of concern. These factors impact pastoralism through three connected processes: deterioration of livestock condition and reproduction; restriction of access to resources, services and markets; and erosion of household assets and recovery capacity. The review argues that poor outcomes cannot be explained by climatic exposure alone or treated as evidence that pastoralism is inherently unproductive. Performance depends on whether the institutions and services surrounding livestock production support flexible resource use and timely risk management. A proposed intervention framework combines negotiated grazing access, animal-health services, anticipatory finance, transparent markets and inclusive governance. Longitudinal research is required to test the relative importance of these pathways and distinguish viable diversification from involuntary withdrawal from pastoral production.

Keywords: *Pastoralism; Turkana; Livestock production; Mobility; Market access; Drought resilience; Rangeland governance.*

Cite this article: Anno, E. F. (2026). Factors Constraining the Performance of Pastoralism as the Predominant Livestock Production System in Northern Kenya: A Critical Narrative Review. *MRS Journal of Accounting and Business Management, 3(11),8-16.*

Introduction

Pastoralism is an extensive livestock production system in which households use rangeland resources through flexible grazing, herd management and, frequently, seasonal movement. Its performance must be assessed in relation to the environments where it operates and the livelihood functions it supports. Milk, meat and livestock sales are important outputs, but animals also provide household reserves, social transfers and a means of responding to uncertain conditions. Recent scholarship therefore emphasises flexibility and negotiated resource access as productive capabilities rather than treating movement as an obstacle to development (Scoones, 2023).

Northern Kenya Counties provides an important setting for examining the gap between the contribution expected from pastoral production and the outcomes experienced by livestock-dependent households. County development planning identifies livestock among the foundations of local economic development, while Kenya's livestock policy seeks improved food and nutrition security, income, commercialisation and environmental management (County Government of Turkana, 2023b; Republic of Kenya, 2020). These expectations create a practical question: which conditions prevent livestock production from delivering these benefits consistently, and which interventions can address the underlying constraints?

The problem requires more than a catalogue of drought, disease and poverty. A herd may encounter adequate pasture that is inaccessible because of insecurity; livestock may survive a dry season but sell at prices that do not reward production costs; and a technically useful intervention may fail when maintenance or recurrent financing is absent. The paper consequently examines the connections between production conditions, access institutions and the conversion of livestock outputs into household benefits. It does not assume that all households share the same objectives or face the same barriers.

The review has three objectives: to clarify what constitutes anticipated pastoral performance in dryland counties; to synthesise the factors inhibiting that performance and their interactions; and to develop policy priorities and testable propositions for subsequent empirical research. Its contribution is a framework linking ecological exposure, institutional access and economic returns, while distinguishing direct northern Kenya counties evidence from comparisons drawn from other pastoral settings especially of horn of Africa. The map below shows the counties that comprise northern Kenya. These counties are classified as arid and semi-arid lands, where pastoralism is the predominant livestock production system.

Copyright © 2026 The Author(s): This open-access article is distributed under the Creative Commons Attribution–NonCommercial 4.0 International License (CC BY-NC 4.0), permitting non-commercial use, sharing, and reproduction with proper credit to the author(s) and source.

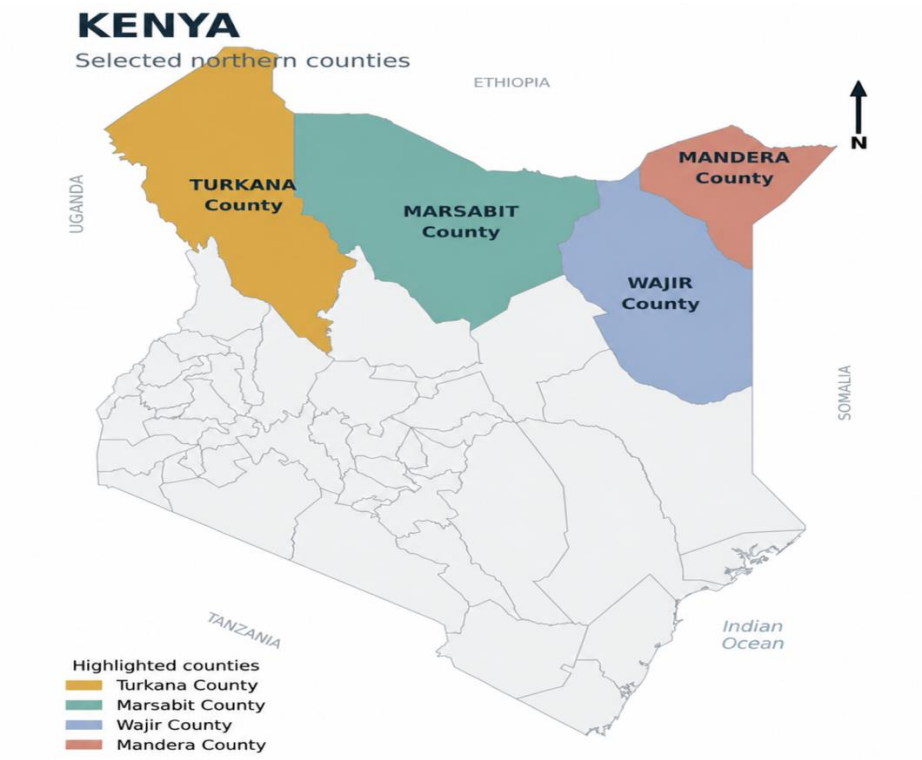


Figure 1: Map of Kenya showing the northern Kenya dryland counties. Source: Researcher made.

Conceptual and Analytical Framework

Defining anticipated performance

Anticipated performance is defined here as the sustained capacity of pastoral production to generate livestock outputs and household benefits without undermining the resources required for future production. This is an analytical definition, not a claim that an established countywide numerical benchmark exists. Five dimensions are proposed for assessment.

These dimensions prevent two analytical errors. Herd numbers alone cannot establish economic success, and low marketed output cannot establish that a household obtains little value from livestock. Conversely, the social importance of animals does not excuse persistently avoidable mortality or poor returns. Evaluation should document both benefits and costs over several seasons, including the value of livestock products consumed at home and the costs of herding labour.

Proposed Dimensions of Pastoral Performance

DIMENSION	MEANING	INDICATIVE MEASURES
Biological productivity	Healthy livestock produce and reproduce under local conditions	Survival, reproductive success, juvenile mortality, body condition and milk output by species and season
Economic returns	Producers retain adequate value after production and transaction costs	Net livestock income, price per comparable animal, transport costs and livestock-to-staple-food terms of trade
Household wellbeing	Livestock benefits support food consumption and essential expenditure	Milk access, dietary diversity, food insecurity and income control within households
Resilience	Households protect productive assets and recover after shocks	Breeding-herd retention, time to herd recovery, distress sales and timing of assistance
Ecological sustainability	Resource use preserves future grazing and water options	Vegetation and soil condition, seasonal grazing distribution, water-point pressure and access to reserve areas

Figure 2: Pastoral performance dimensions: Source: Researcher made.

Interactions between exposure and response capacity

The analytical framework treats performance as the result of exposure to hazards, the ability to respond and the capacity to retain benefits. Climate assessment distinguishes physical hazards from the vulnerability shaped by social and institutional conditions (Intergovernmental Panel on Climate Change [IPCC], 2022). In pastoral settings, uncertain rainfall cannot always be managed

through fixed predictions. DeMartino et al. (2024) argue for decision approaches that take uncertainty seriously, supporting an emphasis here on revisable decisions and flexible resource use.

Three pathways organise the synthesis. The biological pathway connects resource shortages and disease to survival, reproduction and product output. The access pathway connects land governance, security, services and market arrangements to households' ability to obtain resources and realise returns. The recovery pathway connects livestock losses, income depletion and social protection to the assets available for the next production cycle. These pathways constitute a proposed interpretation of the literature; they are not estimated causal relationships.

Review methodology

Design and source identification

The paper uses a critical narrative review, appropriate for integrating ecological, economic and institutional evidence produced through different research designs. Targeted web-based searches were undertaken from June-August 2026 using combinations of dryland areas, pastoralism, livestock production, drought, mobility, animal health, land tenure, market access, insurance, gender and resilience. Publisher websites, university and research repositories, government documents and official international-agency resources were prioritised. Publication dates and bibliographic details were checked against publisher records, report title pages or institutional publication records.

The final reference set contains 24 publications dated 2020-2025. The period provides recent evidence while including policy and conceptual documents needed to interpret pastoral performance. This is a selected evidence base rather than an exhaustive inventory of all relevant publications. No systematic-review protocol, complete database search or PRISMA screening count is claimed.

Selection and interpretation

Sources were selected when they addressed at least one performance dimension or constraint pathway and provided an identifiable publication record. Evidence was considered in three geographical categories: direct Turkana evidence; comparable Kenyan or neighbouring pastoral evidence; and wider conceptual or technical guidance. Direct local evidence received priority for statements about northern Kenya. Comparative studies were used to identify plausible mechanisms, with their geographical limits retained. Duplicate online versions were treated as one publication.

Accessible full texts and official reports were examined for relevant findings, study location, methods and limitations. Where complete text could not be retrieved, interpretation was restricted to accessible abstracts, institutional summaries or publication records. Such sources were used for their stated findings or conceptual scope, without attributing additional numerical results. Policy documents established objectives and proposed actions; they were not treated as proof that implementation achieved those objectives.

3.3 Synthesis and limitations

The synthesis grouped evidence under environmental stress, mobility and tenure, insecurity, animal health, market access, finance, inclusion and governance. For each theme, it considered the constraint, the pathway through which it could affect performance, its relationship to other constraints and the strength of geographical inference. No effect sizes were pooled because the sources differ in populations, periods, methods and outcomes.

Several limitations affect interpretation. Local qualitative and cross-sectional studies cannot establish countywide prevalence or isolate independent causal effects. Administrative reports may document activities more clearly than outcomes. Some concepts are supported by studies outside Turkana and northern Kenya, while abstract-level access limits detailed methodological appraisal. Accordingly, the review offers an evidence-informed explanation and research agenda rather than a statistical ranking of determinants. The number of references should not be interpreted as an independent measure of evidential strength.

Findings and Thematic Synthesis

Recurrent drought and inadequate recovery

Northern Kenya climate risk profile identifies drought, heat stress and intense rainfall among important threats to agricultural livelihoods. Their effects include loss of pasture, drying water sources and damage associated with flooding (Ministry of Agriculture, Livestock, Fisheries and Cooperatives [MoALFC], 2021). These pressures inhibit production through reduced feed availability, greater demands on livestock and disruption of the seasonal conditions needed for reproduction. Their consequences depend partly on access to alternative resources and the assets available before a shock.

Direct evidence from Turkana County illustrates these connections. Imana and Zenda (2023) interviewed 59 pastoralists and identified drought, livestock disease and resource availability among the pressures affecting livelihoods and livestock movement. Respondents also described adaptive practices, including herd diversification and adjustments to grazing. The study supports the importance of these constraints locally, although its descriptive design and sample do not establish their relative causal contributions across Turkana.

Recovery must be distinguished from rainfall improvement. FEWS NET's December 2023 assessment reported continuing Crisis food-security outcomes in Turkana alongside improvements in livestock production following rains (Famine Early Warning Systems Network [FEWS NET], 2023). This coexistence indicates that environmental recovery does not immediately restore household wellbeing. The review interprets the lag as a reason to monitor rebuilding of productive assets and access to food, rather than using renewed vegetation alone as evidence that pastoral households have recovered.

Forage and water shortages as problems of both supply and access

The availability of forage and water influences livestock condition, but their effective usefulness also depends on location, timing and accessibility. A water point may operate while nearby grazing is depleted, or usable grazing may lie beyond a safe watering route. For intervention design, the relevant unit is therefore the connected grazing-and-water system rather than an isolated facility.

Global rangeland assessment identifies land conversion, degradation and weak governance as interacting pressures on pastoral livelihoods (United Nations Convention to Combat Desertification [UNCCD], 2024). This wider evidence supports examining how resource management contributes to shortages,

without assuming that every poorly vegetated area in northern Kenya is degraded through livestock use. Seasonal dryness and persistent degradation require different diagnoses. Field observations across seasons should establish whether vegetation can recover when rainfall improves and access patterns change.

The practical implication is to evaluate proposed boreholes, water pans or fodder reserves against surrounding grazing capacity, maintenance arrangements and user access. Additional water may be useful where it opens underused grazing, but could intensify concentration where animals remain in the same area. This is a conditional design proposition arising from the framework, not a measured outcome for every water investment in dryland areas.

Restricted mobility and changing land governance

Mobility enables herders to connect livestock with resources distributed unevenly across space and time. Odhiambo and Manzano (2022) identify legal recognition and protection of pastoral mobility as important for sustaining its economic and social benefits. Movement becomes less effective when routes are blocked, access agreements lapse or reserve areas are converted to other uses.

Akall's (2021) study of the lower Turkwel River basin documents how development interventions and changing land use affected pastoral livelihood options. Its findings draw attention to the loss of strategically important grazing and water access associated with irrigation development. This evidence is geographically specific; it supports scrutiny of land-use decisions in dryland areas rather than a conclusion that irrigation or all external development is necessarily harmful.

Comparative evidence also cautions against equating formalisation with secure access. Drew and Knutsson (2025), studying West Pokot and Karamoja, show how demarcation, commercialisation and boundary-making can reshape tenure insecurity and conflict. Their findings cannot be reported as direct Turkana results, but they identify a relevant issue for neighbouring rangelands: securing land rights should also preserve negotiated seasonal access. Tenure reform must consider who gains recognition and whose flexible use rights become less visible.

Insecurity and the loss of productive options

Insecurity inhibits performance through more than the immediate loss of animals. Threats can prevent use of grazing, discourage buyers and service providers, and increase the cost of movement. Etzold and Müller-Koné (2023), drawing on northern Kenyan research, distinguish pastoral movement, settlement, displacement and educational or labour mobility. Their analysis shows why movement under drought and conflict cannot be interpreted as one uniform adaptation process.

For Karamoja cluster region, the inference is that peace arrangements should be assessed partly through their effect on safe resource and trade access. An agreement that reduces reported incidents but leaves key grazing routes unusable may deliver limited production benefits. Conversely, negotiated access can enlarge the resource options available during dry periods. The review does not attribute all conflict to resource scarcity: political and institutional processes must be investigated alongside environmental pressure.

Animal disease and unreliable veterinary access

Animal health connects directly to survival, reproduction, product quality and sale value. The challenge extends beyond identifying diseases to ensuring that livestock owners receive timely advice, prevention and treatment. Kenya's livestock policy recognises disease surveillance, cross-border management and animal-health services as priorities (Republic of Kenya, 2020). These policy commitments establish the importance of service delivery but do not demonstrate adequate coverage in every pastoral production zone.

Tasker and Scoones (2022) examine animal-disease knowledge networks in a northern Kenyan pastoral area. Their work identifies the value of locally embedded networks and the brokers connecting local knowledge with development and political networks. This suggests that formal veterinary services should work with trusted pastoral information systems. It does not establish that local treatments are uniformly effective or remove the need for diagnosis and professional oversight.

The proposed service model combines professional supervision, local reporting and outreach matched to seasonal herd distribution. Its performance should be measured through timeliness, access, treatment quality and prevention outcomes, rather than campaign attendance alone. Because undernutrition and disease can occur together, service assessment should record feed and water conditions as well as clinical information.

Weak market access and limited value retention

Livestock production contributes to wellbeing only when households can consume its outputs or exchange them on workable terms. Anno et al. (2023) examined competition and market access in Turkana's secondary markets using evidence from livestock traders and development stakeholders. The study identifies insecurity, limited capital, informal marketing arrangements and unequal trader capabilities among market constraints. Its population and methods concern market actors, so its findings should not be converted directly into household-level causal estimates.

The review interprets market weakness as a limitation on the conversion of livestock assets into reliable income. A producer facing urgent expenditure may have little scope to wait for a better sale opportunity. Where information, transport and buyer access are limited, technically successful production can still yield inadequate returns. Market analysis should distinguish useful intermediation, which connects dispersed sellers to buyers, from practices that restrict entry or obscure prices.

Proposed improvements include transparent sale records, comparable grading, publicly accessible price information and aggregation services with clear fees. Their feasibility depends on buyer demand and total transaction costs. Constructing market yards or processing facilities should follow assessment of throughput, logistics and operating costs; infrastructure alone cannot guarantee commercial viability.

Financial exclusion and limits to insurance protection

Risk management requires resources before losses become irreversible. Savings, suitable credit, insurance and social transfers perform different functions and should not be treated as interchangeable. Credit can finance productive activities, but repayment schedules that ignore seasonal income and widespread drought losses may increase household pressure. Insurance can transfer specified risk while leaving other production and marketing constraints unresolved.

Plevin and Jones (2023) document perceptions of the Kenya Livestock Insurance Programme in four Kenyan ASAL counties. They identify concerns involving registration clarity, communication, payment arrangements and timing, alongside perceived benefits. These are comparative service-delivery findings rather than a dryland county-specific impact evaluation. They nevertheless highlight conditions that should be checked when assessing pastoral insurance: households need to know whether they are covered, what triggers payment and how quickly funds become usable.

A proposed finance package should therefore distinguish protection of breeding assets from financing commercial transactions. Drought-linked finance should be evaluated against the time needed to purchase feed, obtain water or move animals. For households with insufficient livestock to sustain production, consumption support and viable income alternatives may be more appropriate than debt or automatic restocking. Such targeting requires household assessment rather than a uniform assumption that all pastoral families need the same instrument.

Social inequality and uneven adaptive capacity

Household averages can conceal who supplies labour, controls animals and receives livestock income. Bullock et al. (2023) show that young women's and men's climate adaptation practices and capacities in Kenyan livestock systems are shaped by gender and social context. This comparative evidence supports examining access to assets and decisions separately from participation in training.

Yurco's (2024) research with Maasai pastoralists demonstrates how gendered management of grazing and milking units influences milk resources and wellbeing within households. The study is not based in Turkana, but its distinction is useful for research design: household herd size alone may not reveal the milk available to different members. Local investigation is needed before transferring specific gender arrangements across communities.

The resulting research priority is to measure labour responsibilities, income control and decision authority directly. Women, youth and persons with disabilities should not be grouped into a single category with assumed common barriers. Their access needs and livelihood choices require separate assessment. Extension and enterprise programmes should track practical benefits and control over resources, not only enrolment numbers.

Weak links between early warning and timely action

Warning information can inhibit losses only when it informs feasible decisions. Sandström et al. (2020), examining Kenya's drought early warning system with Turkana as a case, identify differences in rainfall methods and an emphasis on food availability relative to access and utilisation. Their findings support broadening assessment beyond rainfall indicators and ensuring consistency in how information is interpreted.

The National Drought Management Authority's (2024) annual report documents early warning, contingency planning, response and safety-net activities. It provides evidence of institutional functions and interventions, rather than a causal estimate of avoided livestock losses. The analytical issue is whether warnings are connected to agreed responsibilities, accessible funds and operational delivery before herd condition deteriorates.

The guidance published by Livestock Emergency Guidelines and Standards (2023) emphasises appropriate, feasible and timely interventions, including feed, water, veterinary support and livestock offtake. Applied to northern Kenya counties, this suggests pre-agreed response options that change with severity, available resources and household objectives. Warnings should specify what action is possible, who will deliver it and when it must occur.

Development design and institutional fragmentation

The county climate action plan and integrated development plan provide frameworks for adaptation and investment (County Government of Turkana, 2023a, 2023b). However, the existence of plans cannot establish that services are funded, maintained or coordinated. Evaluation must follow the connection between stated priorities, expenditure, functioning services and household outcomes.

Semplici and Campbell (2023) question development approaches that retain misleading assumptions about drylands while giving insufficient space to pastoral knowledge and agency. Their analysis includes Turkana-related research and supports attention to how interventions are designed, not merely their scale. International Organization for Migration reporting also identifies drought-related mobility and multisectoral needs in Turkana (International Organization for Migration [IOM], 2024). Together, these sources suggest that production programmes should coordinate with social protection and services for households experiencing displacement or livelihood loss.

The institutional constraint is therefore not simply an absence of projects. It may involve short funding cycles, disconnected objectives, unsuitable service locations or weak recurrent budgets. These possibilities require local verification. A livestock investment should be reviewed as part of a continuing service system, with responsibility for maintenance and an explicit link to the resource-access conditions on which producers depend. The figure below synthesises the key factors constraining the performance of pastoralism in Kenya’s northern counties and the wider Horn of Africa region.

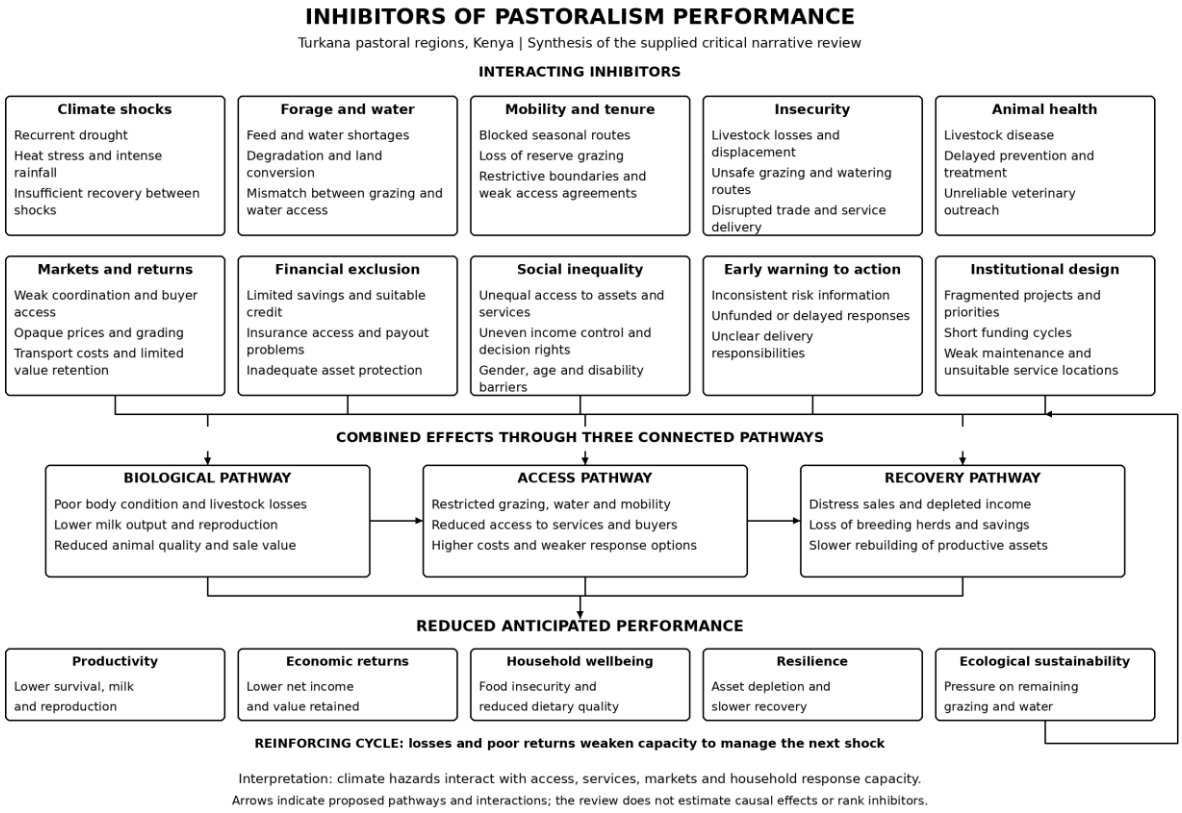


Figure 3: Factors inhibiting pastoral performance: Source: Researcher made.

Discussion

How constraints reinforce one another

The synthesis proposes that three reinforcing processes account for the gap between anticipated and realised performance. First, resource shortages and disease reduce animal condition, output and reproductive capacity. Second, insecurity, restrictive access arrangements and weak markets reduce the options available to respond or secure returns. Third, losses and poor returns deplete the assets needed to manage the next shock. Repetition can therefore deepen vulnerability even when individual shocks are followed by favourable rains.

These processes help explain why a single intervention may have limited effects. Veterinary outreach cannot offset prolonged lack of feed; market information is less useful when animals cannot reach buyers; and a financial transfer cannot purchase a service that is unavailable. Conversely, coordinated interventions may address several constraints at once. These complementarities are propositions for testing, not quantified findings from the review.

Distinguishing pastoral viability from constrained performance

Observed hardship does not establish that mobile livestock production is ecologically or economically unsuitable for northern Kenya counties. Nor does the historical persistence of pastoralism establish that it can sustain every household under current conditions. Assessment must identify which households have viable herds, labour, access and market opportunities, and which require additional livelihood pathways.

The relevant comparison is between feasible alternatives operating under comparable climatic and institutional conditions. Any proposed shift to settled or more intensive production should include the costs of water, purchased feed, animal health, labour and market access. The review offers no evidence that one production arrangement should replace pastoralism throughout northern Kenya. It instead proposes targeted improvement of the conditions supporting livestock production, alongside voluntary diversification where viable opportunities exist.

Diversification and withdrawal require different responses

Diversification may strengthen pastoral production when additional income finances animal health, protects breeding animals or reduces urgent sales. It may also reflect the inability to maintain a viable herd. These outcomes require different programme responses. A household investing income in livestock has a different trajectory from one relying on low-return activities after losing most animals.

Programme evaluation should consequently examine the sequence of events and household preferences. Relevant questions include whether diversification was chosen before or after asset loss, whether livestock production continues, and whether alternative earnings are adequate and stable. Counting all non-livestock activity as adaptation would conceal important differences in security and opportunity.

Policy and implementation priorities

Protect productive access and coordinate services

The proposed framework begins with safe access to connected grazing and water resources. County land-use planning should identify seasonal routes and reserve areas through participatory mapping and negotiate access arrangements with neighbouring communities. Investments should document who can use the resource, under what conditions and through which dispute-resolution process. Animal-health and extension outreach should then follow seasonal production patterns rather than depend entirely on fixed offices.

Financial and market services should be linked to this production foundation. Anticipatory support needs agreed triggers, delivery responsibilities and accessible payment channels. Transparent trading arrangements should reward comparable animal quality, disclose charges and allow entry by additional buyers. These recommendations are derived from the synthesis and require feasibility assessment with local actors.

Proposed Implementation Priorities

Priority	Proposed action	Main coordination partners	Outcome to monitor
Resource access	Map routes and reserves and negotiate seasonal use agreements	Communities, county authorities and neighbouring jurisdictions	Safe access to agreed grazing and water areas
Service reliability	Align veterinary outreach and local reporting with herd movements	County veterinary services, supervised providers and herders	Timely prevention, diagnosis and treatment
Anticipatory protection	Connect warnings to funded actions and accessible payments	NDMA, county government, financiers and communities	Support delivered before severe asset loss
Market value	Pilot transparent grading, price reporting and aggregation	Producers, traders, market committees and buyers	Net returns after all transaction costs
Inclusive participation	Assess labour, decision rights and access barriers separately	Producer groups, extension teams and social-service actors	Benefits and income control by participant category
Institutional accountability	Fund maintenance and assess outcomes across seasons	County departments and development partners	Functioning services and sustained household benefits

Figure 4: Pastoral development implementation pathways: Source: Researcher made.

Sequence investments and assess tradeoffs

Implementation should first establish the local constraint and baseline, then test a manageable package of interventions. Service coverage, costs and access arrangements should be confirmed before infrastructure is expanded. A pilot should span relevant seasonal conditions and record both intended benefits and adverse effects, including resource concentration, exclusion or costs transferred to households.

Scaling decisions should depend on evidence of service use, production benefits and financial sustainability. Contracting private providers may improve reach where demand can support them, while public financing may remain necessary for surveillance, inaccessible areas and protection of vulnerable households. An explicit division of responsibilities is preferable to assuming that either government or commercial actors can deliver every function alone.

Research agenda

Three propositions follow from the framework. First, restricted access to grazing and water may amplify drought-related livestock losses beyond the effect of rainfall alone. Second, market access and transaction costs may influence how changes in livestock productivity translate into household income. Third, timely protection of productive assets may shorten recovery, conditional on access to feed, animal-health services and viable markets. Each proposition requires empirical testing.

A longitudinal household-and-herd panel across northern Kenya pastoral production zones would provide stronger evidence than a single-season survey. It should record species, age and sex composition, reproduction, mortality, movement, resource access, animal-health expenditures, sales, product consumption and household wellbeing. Market observations and service-provider records would allow analysis of production and exchange conditions together.

Sampling should include mobile households and families that have lost substantial livestock assets, avoiding a design that observes only accessible settlements or surviving enterprises. Qualitative enquiry should examine access negotiations, household decisions and institutional reliability. Analysis must distinguish association from causation, account for spatial and seasonal differences and avoid attributing all changes to climate. Intervention evaluations should include costs, distributional effects and recovery over more than one production cycle.

Conclusion

Pastoral performance in northern Kenya is inhibited by interconnected pressures affecting livestock biology, access to resources and services, and household recovery. Drought and heat stress are substantial hazards, but their consequences are shaped by mobility, tenure, security, animal health, market conditions and the timing of support. Social differences also influence who can adapt and who receives the benefits of production.

The principal policy implication is to assess and strengthen the conditions that make flexible livestock production workable. Safe resource access, reliable services, transparent markets and timely financial protection should be pursued as coordinated functions. Support for diversification should reflect household viability and choice. The proposed framework offers a basis for prioritisation, while longitudinal and intervention research is needed to establish the relative effects and cost effectiveness of specific responses.

Disclaimer

- The views stated in this article are those of the author and do not necessarily represent those of any of the entities mentioned.

Interest Conflicts

- The author declares no conflict of interest whatsoever in this publication.

Funding Statement

- This research study was conducted in its entirety without any form of funding from external sources. Fieldwork and publication costs were covered by the author.

References

1. Akall, G. (2021). Effects of development interventions on pastoral livelihoods in Turkana County, Kenya. *Pastoralism, 11*, Article 23. https://doi.org/10.1186/s13570-021-00197-2
2. Anno, E. F., Eipa, J. S., & Emase, J. N. (2023). Impact of competition and market access factors on the performance of secondary livestock markets in Turkana, Kenya. *International Journal of Business and Economics Research, 12*(3), 87–98. https://doi.org/10.11648/j.ijber.20231203.12
3. Bullock, R. M., Miriti, P., & DuttaGupta, T. (2023). Young women's and men's climate adaptation practices and capacities in Kenya livestock production systems. *Frontiers in Sustainable Food Systems, 7*, Article 1197965. https://doi.org/10.3389/fsufs.2023.1197965
4. County Government of Turkana. (2023a). County climate change action plan 2023–2027. https://faolex.fao.org/docs/pdf/ken234017.pdf
5. County Government of Turkana. (2023b). Third county integrated development plan 2023–2027. https://maarifa.cog.go.ke/sites/default/files/2024-06/TURKANA%20CIDP%202023-2027.pdf
6. DeMartino, G., Grabel, I., & Scoones, I. (2024). Economics for an uncertain world. *World Development, 173*, Article 106426. https://doi.org/10.1016/j.worlddev.2023.106426
7. Drew, J., & Knutsson, P. (2025). Boundary-making, tenure insecurity, and conflict: Regional dynamics of land tenure change and commodification in East Africa's pastoralist rangelands. *World Development, 194*, Article 107068. https://doi.org/10.1016/j.worlddev.2025.107068
8. Etzold, B., & Müller-Koné, M. (2023). Intersecting (im)mobilities in the context of drought, hunger and conflict – Reflections inspired by research in Kenya. *International Migration, 61*(6), 345–348. https://doi.org/10.1111/imig.13202
9. Famine Early Warning Systems Network. (2023, December). *El Niño enhanced rains support recovery despite flooding and high food prices*. https://fews.net/east-africa/kenya/food-security-outlook-update/december-2023
10. Imana, C. A., & Zenda, M. (2023). Impact of climate change on sustainable pastoral livelihoods in Loima Sub-County, Turkana County, Kenya. *South African Journal of Agricultural Extension, 51*(1), 13–33. https://doi.org/10.17159/2413-3221/2023/v51n1a11367
11. Intergovernmental Panel on Climate Change. (2022). Climate change 2022: Impacts, adaptation and vulnerability. Cambridge University Press. https://doi.org/10.1017/9781009325844
12. International Organization for Migration. (2024, July 30). Kenya – Mobility tracking and multi-sectoral location assessment in Turkana round #2. https://dtm.iom.int/reports/kenya-mobility-tracking-and-multi-sectoral-location-assessment-turkana-round-2
13. Livestock Emergency Guidelines and Standards. (2023). Livestock emergency guidelines and standards (3rd ed.). Practical Action Publishing. https://www.livestock-emergency.net/legs-handbook-third-edition/
14. Ministry of Agriculture, Livestock, Fisheries and Cooperatives. (2021). Climate risk profile for Turkana County (Kenya County Climate Risk Profile Series). https://cgspace.cgiar.org/server/api/core/bitstreams/ef694bdb-c3c2-479b-b89a-415422693df7/content
15. National Drought Management Authority. (2024). Annual report and financial statements 2023–2024. https://knowledgeweb.ndma.go.ke/Content/LibraryDocuments/ Annual Report 2023-20242025053014472 2.pdf
16. Odhiambo, M., & Manzano, P. (2022). Making way: Developing national legal and policy frameworks for pastoral mobility (FAO Animal Production and Health Guidelines No. 28). Food and Agriculture Organization of the United Nations. https://doi.org/10.4060/cb8461en
17. Plevin, J., & Jones, L. (2023). Perceptions of the service delivery and value of the Kenya Livestock Insurance Programme (KLIP). World Bank. https://documents1.worldbank.org/curated/en/099653111072339695/pdf/IDU0f42240a300dfc046280890c0efdd68ff1ec0.pdf
18. Republic of Kenya. (2020). Sessional paper no. 3 of 2020 on the livestock policy. Government Printer. https://kilimo.go.ke/wp-content/uploads/2024/08/Livestock-Policy-Sessional-Paper-Number-3-of-2020-2.pdf
19. Sandström, S., Juhola, S., & Räsänen, A. (2020). Fluctuating rainfall, persistent food crisis-Use of rainfall data in the Kenyan drought early warning system. *Atmosphere, 11*(12), Article 1328. https://doi.org/10.3390/atmos11121328
20. Scoones, I. (Ed.). (2023). Pastoralism, uncertainty and development. Practical Action Publishing. https://doi.org/10.3362/9781788532457
21. Semplici, G., & Campbell, T. (2023). The revival of the drylands: Re-learning resilience to climate change from pastoral livelihoods in East Africa. *Climate and Development, 15*(9), 779–792. https://doi.org/10.1080/17565529.2022.2160197
22. Tasker, A., & Scoones, I. (2022). High reliability knowledge networks: Responding to animal diseases in a pastoral area of northern Kenya. *The Journal of Development Studies, 58*(5), 968–988. https://doi.org/10.1080/00220388.2021.2013469

23. United Nations Convention to Combat Desertification. (2024). Global land outlook thematic report on rangelands and pastoralism. https://www.unccd.int/sites/default/files/2024-05/GLO%20rangelands%20full.pdf

24. Yurco, K. (2024). From grazing units to milking units: The gendered nature of intra-household livestock management and food security for pastoralists in Kenya. *World Development, 174*, Article 106469. https://doi.org/10.1016/j.worlddev.2023.106469