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Transforming Goat Pastoralism in Kenya: Off-taker Innovations in Kajiado and Their Implications for Sustainable Agriculture in Africa

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Pastoralism remains fundamental to Kenya's economy and culture but faces threats from climate change, market volatility, and inadequate infrastructure. This study examines off-taker-led market innovations in Kajiado County transforming goat trade through fair pricing, quality control, and sustainable resource management. These off-takers stabilise pastoral livelihoods through vaccination programs, structured trade agreements, value chain financing, and climate-adaptive strategies. The off-taker models capitalise on the African Continental Free Trade Area and boost export chances, while public-private partnerships, digital management tools and sustainable grazing techniques help animals become more resistant to climate change. Findings highlight the need for investment in rural infrastructure, standardised livestock grading, disease surveillance, and inclusive financial solutions. Policymakers must align national trade policies with international standards, promote digital traceability, and incentivise investment in logistics and processing. Kenya's evolving goat pastoral system is an example that African countries can follow for sustainable livestock development.

Pastoralism remains vital to Kenya's economy but faces mounting pressures from climate change, diminishing grazing lands, and market instability (Yator, 2024). Inefficiencies characterise traditional goat markets; farmers sell at low prices due to limited bargaining power and unpredictable demand. In response, off-takers have emerged as innovative market intermediaries who create structured, reliable goat markets and provide comprehensive end-to-end services to farmers while offering structured agreements with pre-arranged purchasing conditions that ensure fair pricing, stable income, and export standards compliance. Off-takers differ from traditional brokers since they bundle packages with pre-arranged purchasing conditions, improving productivity and quality standards while enhancing economic strength in pastoral communities. Therefore, they protect Kajiado's income stability and introduce sustainable modern practices (FAO, 2023).

Pastoral systems now benefit from combining solar-powered boreholes and fodder cultivation projects. The off-takers expand access to water throughout the year through their financing of borehole development projects. The off-taker model helps Kenya meet its economic targets and African Continental Free Trade Area (AfCFTA) rules, whilst enabling the regional market access for livestock that meets international export standards. Off-takers provide financial inclusion opportunities through their activities by offering credit and insurance services previously inaccessible to clients.

Kajiado County stands as a critical research area for Kenyan pastoral transition because its 21,292.7 km² Arid

and Semi-Arid Lands (ASAL) space hosts more than 70% of its 1,117,840 population who practice pastoral livestock management (Kenya National Bureau of Statistics, 2019). Kajiado County delivers the largest livestock sales in Kenya, yielding KSh 5 billion yearly from livestock purchases and produces 70% of the region's income through livestock trade (County Government of Kajiado, 2023). Off-takers in Kajiado pursue innovations that transform pastoral economies by modernising their market systems. The findings reveal that private institutions can develop efficient solutions that bridge rural development challenges and promote agricultural sustainability. Policymakers and agribusiness leaders can reference this knowledge base to establish similar models in dry territories of Africa (FAO, 2023).

CHALLENGES AND OPPORTUNITIES

Kajiado County faces severe environmental constraints impacting pastoral livelihoods, such as prolonged droughts and land degradation, contributing to declining grazing pastures (Herrero et al., 2021). Drought frequency has increased over two decades, reducing water and fodder availability, resulting in higher livestock mortality and lower productivity. Soil erosion and desertification further limit grazing land, forcing migration that exposes pastoralists to resource conflicts and market access difficulties (Kirui et al., 2022).

Pastoralists face unstable markets with volatile and low-cost livestock sales. Many pastoralists participate in panic

sales during droughts due to the absence of trade frameworks, which exposes them to unclear pricing systems (Wangui, 2024). The restricted access to financial service functions restricts pastoralists from maintaining their livestock stock while market values rise.

Water scarcity adversely affects livestock health and decreases productivity (Opiyo, Wasonga, Nyangito, Schilling, & Munang, 2018). Furthermore, pastoralists face serious challenges with veterinary services because they lack easy access to disease management and veterinary care. They also do not have proper roads or storage facilities in remote areas.

AfCFTA provides new trading possibilities to African producers through improved quality management and supply chain transparency enhancements (World Bank, 2021). Pastoralists achieve standards compliance with the help of off-takers who establish quality control and certification programs (UNCTAD, 2022).

Process and Business model innovations within sustainable livestock farming face obstacles, yet generate new chances for long-term success.

PROCESS INNOVATION IN PASTORAL FARMING

Off-takers collaborate with agricultural experts to deliver climate-proof fodder systems where farming and storage of high-quality feeds occur during dry seasons, according to Opiyo et al. (2018). Storage facilities and irrigated farms work together with these initiatives to deliver steady nutrition for meat production while minimising rainfall dependence, according to Herrero et al. (2021).

The same level of necessity applies to dependable water access. The dry conditions of droughts make seasonal water sources unreliable, so off-takers installed solar-powered boreholes to support livestock watering and fodder farming (Yator, 2024). These systems achieve shorter migration time while being budget-friendly, environmentally sustainable and reducing reliance on fuel-diesel water pumps.

From off-takers, pastoralists receive vaccination services, disease detection, and grading systems to maintain their animal stock's health while achieving international market quality standards (FAO, 2023). A combination of grading systems, weight controls and standardised feeding techniques helps off-takers meet global requirements, according to Mahmoud (2013). Such innovations reduce mortality numbers, raise product value, boost market prices and yield steady income. The financial literacy training programs and negotiation assistance ensure that pastoralists become knowledgeable about market prices to escape unfair practices (World Bank, 2021).

Off-takers have modernised their logistics processes to solve ineffective transport systems with many fragmented points. They use specialized transport networks, direct purchasing routes, and centralized aggregation points to minimize costs and increase operational speed. The integration of pastoralists with regional trade centres under AfCFTA creates new inter-border trading possibilities and facilitates their entry into world supply chains (UNCTAD, 2022).

These process innovations have transformed traditional production into a structured, market-driven industry, reducing climate risks, improving livestock health, and creating sustainable income opportunities. They are summarized in [Table 1](#) below.

BUSINESS MODEL INNOVATION IN PASTORAL FARMING

Traditional goat trade in Kajiado County operates through unregulated market methods, resulting in intermediaries focusing on maximizing their revenues resulting in unfair pay and unreliable farming incomes (FAO, 2023). Off-takers have improved market dynamics by establishing sustainable business agreements that deliver fair prices, help minimize risks, and create more economically stable income streams (Wangui, 2024). Pastoralists have assurance through such contracts to invest in top-quality production while market collapses no longer pose threats. Off-takers role as a connection between farmers and international customers increases market participation rates and creates pathways for farmers to join formal business networks (UNCTAD, 2022).

Off-takers offer technical assistance, veterinary care, and nutritional programs to meet established quality requirements. Pastoralists achieve price stability through these trade agreements since they receive protection against variable market conditions.

Pastoral farming has struggled for growth due to restricted credit availability throughout history. Pastoralists generally do not have access to banking services because they have no borrowing record or assets that could be used as loan collateral. Off-takers solve this by establishing value chain financing, payment guarantees, savings arrangements, and insurance structures supporting livestock agreements. Through these innovative financing approaches, pastoralists receive credit by placing their livestock assets as security (FAO, 2023).

These successful innovations supply key knowledge to other regions that experience equivalent pastoral sector challenges. AfCFTA creates new prospects for Kenyan livestock export growth (World Bank, 2021), but the expansion requires combined actions between policymakers, infrastructure spending and trading service standardization (UNCTAD, 2022). [Table 2](#) below summarises the before and after scenarios.

VALUE CHAIN ANALYSIS

Value Chain Analysis Theory provides a systematic framework for understanding how different actors in Kajiado's livestock sector create, transform, and capture value. The theory effectively maps how pastoralists (primary producers), off-takers (market intermediaries), processors, policy regulators, and international investors interconnect to transform traditional goat farming into a structured export industry. By applying this theoretical lens, we can identify critical bottlenecks such as pastoralists' limited bargaining

Table 1. Process Innovation

Innovation Area	Description	Impact on Goat Pastoralism
Climate-Smart Fodder	Irrigated fodder and feed storage	Better nutrition, year-round market supply
Water Access	Solar-powered boreholes for livestock and irrigation	Less migration, steady clean water access
Animal Health	Mobile clinics, vaccines	Lower deaths, higher export quality
Logistics and Transport	Hubs, direct buying, traceability tools	Lower costs, quicker market access
Capacity Building	Finance Training, animal care, and markets	Smarter herd care, stronger market role

Table 2. Before and After Models

Business Element	Traditional Goat Trading	Off-Taker-Led Innovation
Market Access	Informal, fragmented, broker-driven	Formal contracts with export-ready value chains
Pricing	Unpredictable, Broker-determined	Pre-agreed pricing based on quality standards
Quality Incentives	Low, No premium for better animals	Higher prices for certified, selectively bred goats
Financial Access	Rare or non-existent	Value Chain Financing, microinsurance, digital savings
Risk Exposure	High (Drought, price crashes)	Lowered via bundled services and contractual stability
Technical Support	Minimal	Integrated: Veterinary, grading, transport, and nutrition services
Traceability and Compliance	Absent	Linked to certification and AfCFTA trade standards

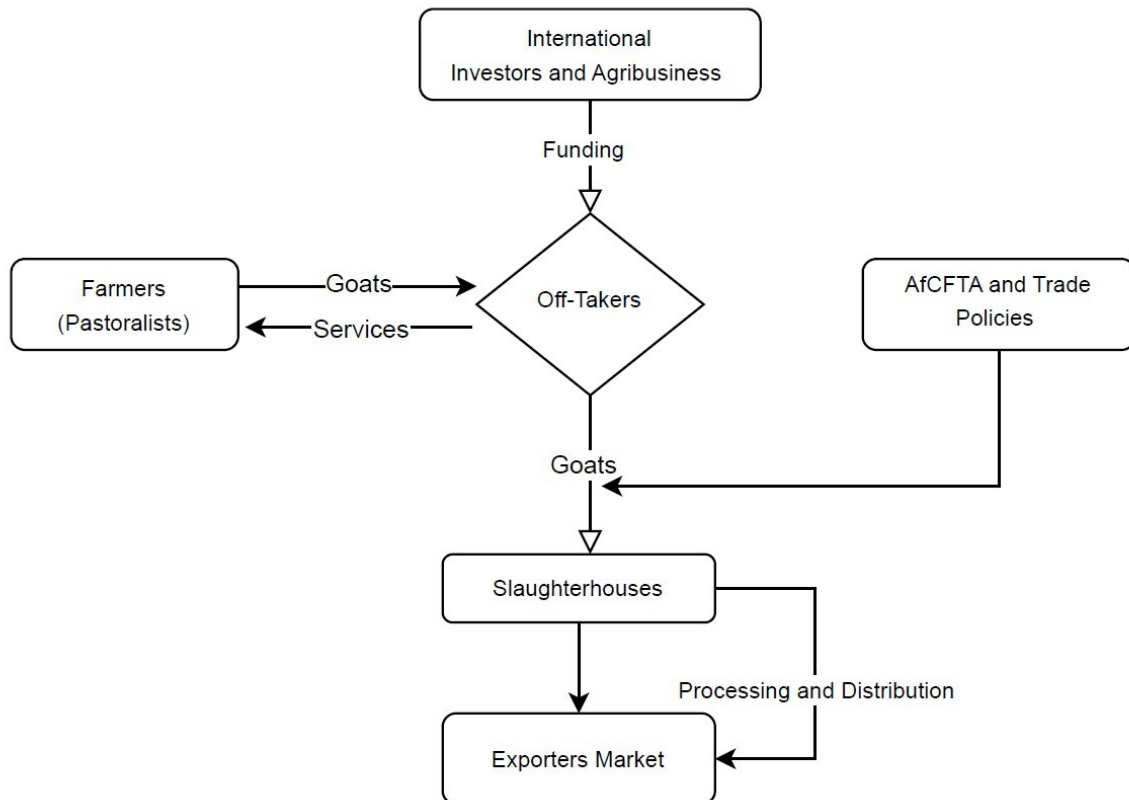
**Figure 1. Relationships between Actors**

Table 3. Value Chain and Key Actors

Actor	Role in the Livestock (Goat) Value Chain	Key Contributions	Impact on Pastoral Economy
Farmers (Pastoralists)	Primary producers of livestock (goats).	- Breed and rear the goats.	- Livelihood source for rural communities. - Limited bargaining power in traditional market settings.
Off-Takers	The bridge between pastoralists and export markets.	- Buy livestock from farmers at pre-agreed prices. - vaccination, quality grading, and fodder supply. - Ensure livestock meets export standards.	- Reduces market inefficiencies and price exploitation. - Expands market access for pastoralists beyond local sales.
Processing and Distribution (Slaughterhouses, Exporters, Meat Processors)	Handle livestock processing for domestic and export markets.	- Ensure compliance with hygiene and health standards. - Manage cold storage, packaging, and meat processing.	- Improves the value of livestock products for higher earnings. - Facilitates export readiness for processed meat and live animals.
AfCFTA and Trade Policies	Regulate livestock trade at national and regional levels.	- Set export tariffs, trade regulations, and livestock health policies.	- Encourages livestock trade and expands access to markets. - standardizes quality certification.
International Investors and Agribusiness	Provide financial backing and global market access.	- Invest in livestock infrastructure, export processing, and logistics. - Support research and innovation in sustainable livestock practices.	- Increases capital investment in the livestock sector. - Encourages adoption of climate-smart and technology-driven solutions.

power and infrastructure gaps, while highlighting off-takers' crucial role in bridging market inefficiencies through vaccination, quality grading, and pre-agreed pricing.

PERSPECTIVES OF INTERNATIONAL BUSINESS AND POLICY

International stakeholders can learn from observing the changes in Kajiado's pastoral farming. Pastoralists used to deal with fragmented markets, uncertain prices, and limited access to funds, which off-takers solved by streamlining market operations and opening possibilities for quality control and border trade investments (FAO, 2023). The off-takers in Kajiado reduce transaction costs while providing fair market prices and establishing trade links that work with global standards (UNCTAD, 2022).

The changing approach in Kajiado creates many potential investment opportunities for investors. The World Bank shows that value chain financing, livestock management tools, and cold chain logistics developed a settled investment sector (World Bank, 2021). Public-private partnerships enable investors to construct contemporary slaughterhouses, export-oriented processing facilities, and animal health centres. At the same time, agribusiness companies can build their presence in Kenyan livestock markets.

Standardization, financial inclusion, and infrastructure development remain significant issues in Kenyan policy-making. The Kenyan government needs to create supportive policy and regulatory frameworks to drive private in-

vestments and improve trade negotiations to enhance competitiveness for attracting foreign direct investment (World Bank, 2021).

AfCFTA presents exceptional potential for Kenyan livestock traders to grow their agricultural business by eliminating trade barriers and establishing an integrated agricultural market (UNCTAD, 2022). Complete realization of benefits requires Kenyan investments into logistics infrastructure, standardization of veterinary certifications according to international levels and market-specific trade agreement development to high-demand countries. Enhanced international cooperation between private organizations and regional economic communities through cross-border trade operations should be accompanied by strengthened disease surveillance and sanitary measures that comply with global regulations per FAO (2023).

Climate change creates continuous hazards, including droughts, water shortages and problems related to land health. The national government must back solar-based boreholes combined with routines for fodder storage and livestock lines that adapt well to drought conditions and practices for sustainable grazing (FAO, 2023). International agencies should support climate adaptation projects through Sustainable Development Goal investments to create sustainable and profitable conditions for Kenya's pastoral economy.

Table 4. Policy Recommendations

Policy Area	Recommendation	Responsible Stakeholders
Livestock Market Standardization	Harmonize livestock grading, certification, and pricing frameworks.	Off-takers, Ministry of Agriculture, AfCFTA Secretariat
Financial Inclusion and Credit Access	Expand value chain financing, introduce micro-loans for pastoralists.	Off-takers in partnership with Banks, Microfinance Institutions, Private Sector
Infrastructure and Logistics	Invest in roads, cold storage facilities, and livestock transport systems.	Government, Development Partners, Private Investors
Animal Health and Disease Control	Strengthen disease surveillance, intervention, and SPS compliance.	Farmers, Offtakers, Ministry of Livestock, WHO, Veterinary Associations
Climate Resilience and Sustainability	Promote fodder conservation, drought-resistant breeds, and solar-powered boreholes.	Off-takers, UNEP, FAO, NGOs, Private Sector
Regional Trade and AfCFTA Integration	Facilitate bilateral trade agreements, reduce non-tariff barriers.	International Investors, Government, Off-takers, EAC Secretariat, Trade Ministries, WTO

THE WAY FORWARD

Kenya's livestock sector will be best integrated into international markets through strategic investments. Better infrastructure throughout rural Kajiado can enhance market exposure and competitive strength of its pastoralist communities (FAO, 2023). Standardized grading protocols and digital tracing systems can provide international export standard certifications (World Bank, 2021). A robust system of legislation with tax benefits together with beneficial terms for agribusiness investment should be adopted to motivate funding (Lutta, Mungo, Kehbila, & Osano, 2023).

The lack of financial resources stops pastoralists from acquiring productivity-enhancing technologies. Financial institutions must create credit systems based on livestock collateral as security (Lutta et al., 2023). Expanding financing through value chains linked to off-taker agreements would create stable financial support during production. Mobile banking solutions and climate insurance programs should be promoted to help pastoralists enter formal financial systems and develop drought and disease protection (World Bank, 2021).

Long-term sustainability depends on the successful expansion of climate-smart innovations because climate change intensifies. The resilience to drought can improve when innovations like solar-powered boreholes, regenerative grazing, and fodder conservation systems receive additional development (Lutta et al., 2023). Investing in climate-adaptive animal breeds should be the priority while supporting pastoralist-controlled collectives that focus on rangeland management because this will optimize the use of resources (FAO, 2023). Public-private partnerships must fund climate-smart research about environmental practices because environmental uncertainty demands it (UNCTAD, 2022).

Special economic zones established to process livestock products would draw investments and enable value addition for higher export returns (Mahmoud, 2013). Kenya needs to enhance its veterinary cooperation efforts across borders because this will establish disease-free trade zones that also normalize livestock policies across East Africa to

maximize market benefits throughout the economic transformation process.

CONCLUSION

Off-taker-led innovations in Kajiado County have evolved the local pastoral livestock markets into an example of sustainable development for arid regions. Off-takers transform market systems through their practices by providing fair prices, quality control systems, and access to essential services, including vaccination programs, financial opportunities, and fodder distribution. The formal agreements between parties have achieved income stability and productivity growth alongside improved resilience for the sector (FAO, 2023). Off-takers achieve market standardization and health regulations to connect traditional farming with modern agribusiness supply chains through structured business relationships.

The World Bank (2021) shows that trade policies remain inadequate as various important issues need urgent interventions to strengthen the regulatory framework, policy harmonization, and improve infrastructure development. Enhancing global integration is hampered by inconsistent grading practices, trade regulations, and inadequate disease control methods. This paper shows that the government must allocate funds toward policy and certification framework development, transportation infrastructure development, and supportive financial programs (Wangui, 2024). There is a need for public-private partnerships to build new cold chain infrastructure while expanding slaughterhouses and storage facilities as both quality improvement measures and market entry solutions.

Livestock policies will reap maximum benefits if they comply with both regional agreements and international standards (World Bank, 2021). AfCFTA can only function smoothly by improving veterinary collaboration and developing disease detection methods and digital tracking procedures (FAO, 2023). Kenya can be top of African livestock markets by reducing non-tariff barriers and implementing climate-resilient practices.

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