

Making Poultry Farming Count in Pastoralists' Livelihoods: Expanding Avenues for Food, Income and Nutrition Security in Turkana, Kenya

Ekiru Francis Anno

Unicaf University (UUM), School of Doctoral Studies, Lilongwe, Malawi

*Corresponding Author: Ekiru Francis Anno

DOI: <https://doi.org/10.5281/zenodo.18113056>

Article History	Abstract
Original Research Article	<p><i>Pastoral livelihoods in this era of climate change and production resource scarcity are becoming unstable, with negative impacts on food, income, and nutrition security, especially among populations that are nomadic or live in rural and peri-urban areas. The challenges of humanity that come with limited resources for better living necessitate a paradigm shift to create and expand socioeconomic benefits to needy populations. The study aims at adding poultry farming to the list of valued livestock species, underscoring its immediate and extended benefits throughout seasons. The study objectives were to (i) analyse the poultry value chain developments in the pastoral areas, (ii) determine the strategic poultry production and marketing initiatives priorities in Turkana, and (iii) describe the poultry industry enablers for competitiveness, profitability and sustainability. The study, which employed a survey design, was conducted in the Turkana sub-counties of Central, South, East, North, West and Loima, where 300 randomly selected respondents participated in the study. Results of the study show that poultry farming in pastoral areas is crucial for diversifying livelihoods and enhancing food, income, and nutrition security. However, production and market constraints hinder its adoption despite growing consumer demand. Key challenges include industry risks, limited access to capital, and low competitive capacity. Poultry offers immediate benefits, making it viable for rural and displaced populations. Enhancements in this enterprise can be achieved through strategic planning and market-based poultry programmes, focusing on the entire value chain, including production, marketing, and consumption, as well as management and innovation factors, to boost competitiveness and sustainability. The study recommends a comprehensive business model to facilitate production, marketing, and consumption of poultry value chains through well-analysed costs, benefits, competitiveness, and sustainability to enhance market access and maintain a competitive edge. Implementing certified local feed production, good animal husbandry standards, focused farmer training, product aggregation and supply to potential markets, enhancement of poultry breeds, and changing of household and producer groups' attitudes regarding the potentiality of poultry livelihoods will create impetus for long-term poultry farming in the targeted human settings.</i></p> <p>Keywords: Poultry Farming, Pastoralism, Sustainable Pastoral Livelihoods, Poultry Industry Enablers, Climate Change effect, Business Model Canvas.</p>
Received: 15-12-2025	
Accepted: 29-12-2025	
Published: 01-01-2026	
<p>Copyright © 2025 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.</p> <p>Citation: Ekiru Francis Anno. (2025). Making Poultry Farming Count in Pastoralists' Livelihoods: Expanding Avenues for Food, Income and Nutrition Security in Turkana, Kenya. UKR Journal of Economics, Business and Management (UKRJEBM), Volume 2(1), 1-9.</p>	

1. INTRODUCTION

The vast majority of pastoralist groups in the Eastern Africa region have a firm belief that cattle, camels, goats, and sheep are the primary animals that directly contribute to their financial well-being. Many different species of poultry are considered to be birds, despite the fact that they are kept in more than 60 percent of pastoral households. The deeply ingrained cultural beliefs of pastoralists are causing the

adoption of poultry farming to proceed at an incredibly slow pace, particularly among highly nomadic pastoral communities. This is the case although there have been numerous initiatives to popularise poultry farming and its direct benefits to food, money, and nutrition. Households in peri-urban and displaced human settlements have increased poultry farming due to the history of famine,

severe droughts, and devastating resource-based conflicts and raids. Certain households have abandoned pastoralism due to these events, seeking refuge at trading and service delivery centres. Additionally, expanded urbanisation and campaigns for diversified livelihoods have contributed to this trend. Because the effects of climate change continue to have a substantial impact on a significant amount of the resources used for livestock production in pastoralist areas, the system for transhumance livestock production, which takes place in regions that are known for dry and rainy season grazing, is becoming increasingly difficult to access and difficult to reach. This obstacle is generating a significant opportunity for some households to explore poultry farming as a viable option due to the fact that it offers both continuous and immediate benefits.

In addition to the increasing demand for white meat products and eggs, the hospitality industry has also contributed to the creation of a market for poultry products. Some poultry farming households and producer groups have taken advantage of such market opportunities to engage in poultry farming on a relatively larger scale by utilising enhanced husbandry technology. Such activity has resulted in the poultry industry becoming more competitive. The results achieved so far, though limited, show the promise of poultry farming that relies on pastoralists' livelihoods. Chicken farming is gaining popularity in Africa, with around 2.1 billion, 57 million in Kenya, playing a crucial role in food security and economic stability.

Collaborations between government and the commercial sector seeks to improve production capabilities and market accessibility to satisfy the increasing demand for poultry products, such as meat, eggs, and by-products. Turkana faces difficulties in poultry production and marketing due to the absence of an organised production model and methodical planning, which obstructs efficient collaboration among stakeholders. A strategy roadmap is necessary to enhance the poultry farming sector in pastoralist regions and address its limitations. This approach must incorporate best practices, tackle complexities, and increase market capitalisation. Implementing these ideas could render poultry farming sustainable and reliable for pastoralist communities.

2. LITERATURE REVIEW

2.1 Overview of Poultry Production and Marketing

Long-term growth in Kenya's poultry market is argued in Macharia et al. (2022) to be dependent on effective farming practices and marketing strategies, as over 75% of the population engages in poultry farming, with indigenous species primarily kept for food purposes. Poultry holds significant economic, social, and cultural importance, with

projections indicating a demand for 164.6 thousand metric tonnes of products by 2030. According to the study by Onono et al. (2017) on the identification of poultry production challenges, indigenous poultry ecotypes are valued for their taste and genetic diversity. Regrettably, productivity is hampered by limited access to inputs, high feed prices, and market fluctuations, making many enterprises operate at a suboptimal level, particularly in dryland systems, which are characterised by limited production factors. It is found in Anno et al. (2024) that increased commercialisation and genetic enhancement programmes are essential for boosting output in small-scale poultry farming.

Kenya's indigenous chicken breeds, including Kuroilers and Rainbow Roosters, demonstrate high growth rates and profitability (KIPPRA, 2016). Nevertheless, the economic potential of chicken production is underestimated due to varying management techniques and genetic differences. Extensive, semi-intensive, and intensive poultry production systems can achieve self-sufficiency (Kamau et al., 2018). Producer groups typically manage large-scale operations, where diseases and poor management lead to losses despite high market prices. The chicken value chain, according to Mwititi et al. (2021) and Gheyas et al. (2021), encompasses input suppliers, producers, traders, service providers, and consumers, facilitating the commercialisation of poultry. It consists of small, medium, and large producers, supported by various service providers from public and private sector organisations.

Constraints on poultry production include scarce and costly production inputs and multiple social, technological, and infrastructure challenges leading to the underperformance of the industry. Increasing demand for poultry products in the market brought about by population growth, urbanisation and changing consumer behaviours and the consumption of safe and nutritious livestock products depicts enormous opportunities for expanded poultry farming and marketing activities (Kgosikoma and Malope, 2016). The current research, especially by entities such as the Kenya Agricultural and Livestock Research Organization (KALRO), the International Livestock Research Institute (ILRI) and government technical departments for livestock development, is working on genetic improvement of poultry species kept to enable them to endure current and emerging diseases and the adversity of weather conditions.

Research by Omondi (2022) on the poultry value chain development in the Thika and Kisumu areas of Kenya shows that effective regulatory frameworks, farmer participation, improved value chains, input acquisition, production and trade management, and sustained consumption are pertinent for season-long sustainability of

poultry industry performance. The study by Macharia et al. (2022) that looked at a decade-long trend of the performance of poultry farming shows a positive growth of all poultry species being produced. This positive trajectory

is attributed to the market approach that guides all components of the poultry production process, hence minimising risks and creating value appreciated by the market.

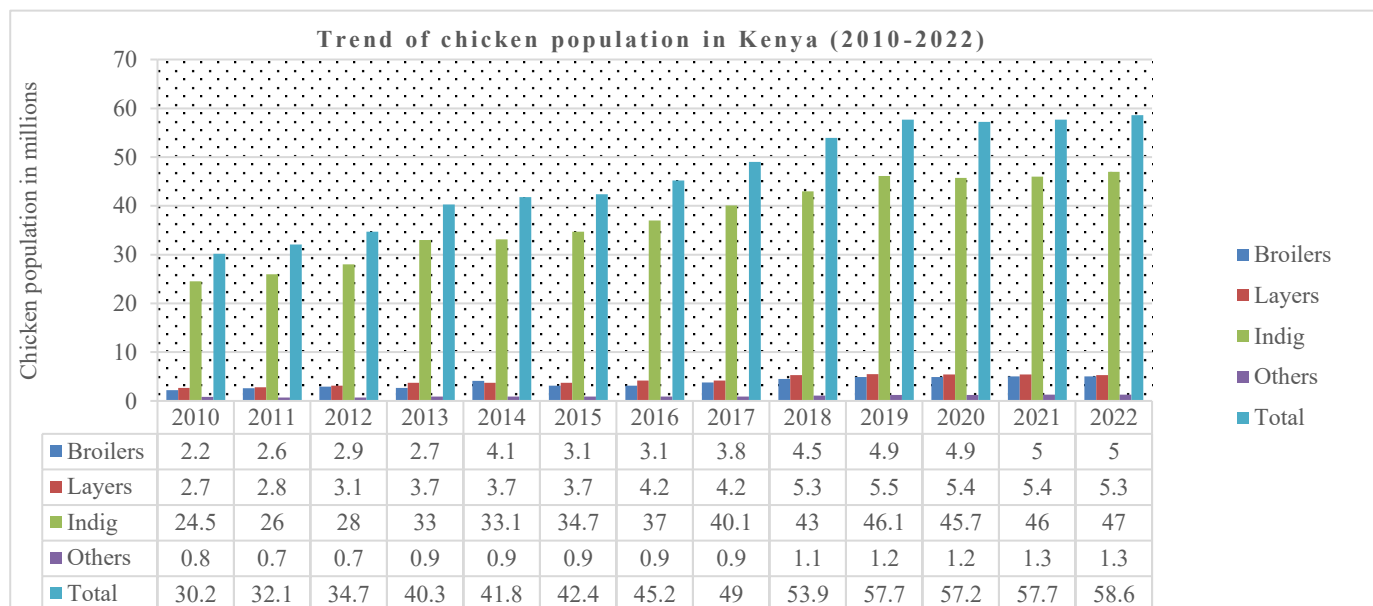


Figure 1: Poultry production trend in Kenya (2010-2022).

Adopted from Macharia et al. (2022)

2.2 Production and Socioeconomic Constraints

The most significant obstacle to the operation of successful indigenous poultry farming in Kenya is the presence of poultry diseases, where the most common ones include Newcastle, chicken typhoid, fowl pox, Gumboro, Marek's, and coccidiosis (Macharia et al., 2022; Omondi, 2018). According to Njagi et al. (2012), disease infection results in significant economic losses due to the increased mortality rate and decreased profit margins. The most dominant free-range poultry production system in rural areas suffers from irregular vaccination and treatment schedules, as well as poor adherence to biosecurity measures. It is presented in Olwande et al. (2015) that poor methods of animal husbandry, such as poor housing and limited feed and water, poultry theft, predators, and severe weather conditions, compound the losses that poultry producers incur.

Low levels of nutrition and the absence of appropriate breeding practices, limitations imposed by marketing and access to credit, poor marketing structures, and the fact that the majority of poultry goods are sold to middlemen and brokers with the intention of exploiting farmers by taking advantage of the unregulated market lead to low levels of production and profitability (Danda et al. (2008). Furthermore, according to Anno et al. (2024), the majority of farmers do not have access to information regarding poultry marketing, and the profitability of poultry farming is hindered by the unpredictability of market trends and the

low pricing of the market (Magothe et al., 2012; Ayieko et al., 2014).

The lack of knowledge, the high interest rates on loans, the absence of banking facilities in rural regions, and the low literacy rates among farmers are some of the obstacles that prevent farmers from acquiring credit (Wagacha, 2020). The nomadic lifestyle prevalent in pastoral communities makes raising chickens challenging (Ndathi et al., 2012). According to Kyule et al. (2015), other problems that have been noted include a lack of available land, the high cost of construction materials, and disagreements with residential neighbours.

2.3 Infrastructure Constraints

According to Ayieko et al. (2014), indigenous chicken producers, particularly those living in remote areas, do not have access to adequate roads, water supply, communication, and markets, which results in a reduction in productivity. There may also be some technical difficulties, as studies have shown that the majority of farmers have limited access to instruction on chicken farming techniques and there is a limited number of facilities available for marketing poultry goods and adding value to them. (Mwiti et al., 2021).

2.4 Opportunities for Poultry Development

According to Pius et al. (2021) and Gheyas et al. (2021), indigenous chickens are genetically resilient and can withstand difficult environmental conditions. These characteristics contribute to the widespread adoption of

indigenous chickens among farmers in tropical areas such as Kenya. According to the findings of numerous studies, commercialising indigenous chicken farming has the potential to enhance productivity. A study by Njuguna et al. (2018) alludes to the fact that indigenous poultry farming will become a lucrative enterprise if the number of flocks is increased, husbandry practices are improved, and production is orientated towards the market.

Chesoo et al. (2021) state that the utilisation of contemporary breeding biotechnologies will make a contribution to understanding the fundamental factors that underlie the genetic variety that exists in native chickens. Furthermore, according to Mutombo et al. (2015), the acceleration of commercialisation could be facilitated by expanding government assistance to farmers in the form of extension services and financial incentives. It is possible that the enhancement of indigenous poultry production might be significantly aided by the implementation of appropriate government regulation of the marketing system, essential infrastructure upgrades, and disease control.

2.5 Poultry Producer and Business Associations

In poultry farming, Ayieko et al. (2015) underscore the need to encourage farmers to create and operationalise

producer business groups, which will provide them with increased bargaining power, opportunities for training, and improved access to market information. Tanui et al. (2022) equally emphasise the need for farmers to join cooperative societies which provide embedded services such as training, access to production inputs, credit services and aggregation for competitive access to potential local and external markets. It is concluded in Macharia et al. (2022) that a lack of adequate technology and expertise in rural areas slows down the attainment of the cherished outcomes from poultry interventions by a multiplicity of actors.

It is advised in Bett et al. (2013) that ecolabelling and traceability of local chicken products be improved to strengthen the safety component of food security. In the Anno et al. (2024) study on the popularisation of poultry farming in the drylands, a business model canvas is proposed that outlines critical components of a chicken farming and marketing plan that could enhance both production and marketing. The poultry business model canvas below is reviewed to reflect critical elements of domesticating poultry farming in pastoralist livestock farming as a business and a livelihood.










Key Partners  Investors e.g., companies, researchers, farmer producer associations, technology developers, financial institutions	Key Activities  Fundraising, technology dissemination, farmer extension, partnerships development, market access services.	Value Proposition  Quality products, product accessibility. funding services, production equipment, and credible education.	Customer Relationship (CR)  Effective CR, relations, complaints management, after-sale services	Customer Segment  Farmers, companies, buyers, consumers, kitchen gardeners
	Key Resources  Fiscal, physical, intellectual, human, digital.		Channels  Awareness, evaluation, purchase, and delivery systems.	
Cost Structure  Cost-driven structure, maintenance costs, employee remunerations, effective marketing, research and technology development, utilities.			Revenue Stream  Product selling, transactional fees, extension and outreach, spot market deals, technological inventions, donor funding, and business grants.	

Figure 2: Business Model Canvas for poultry farming in pastoralist livelihoods.

Adapted from Anno et al. (2024)

3. RESEARCH METHODOLOGY

The research used a survey methodology to gather data on pastoralists' perceptions of poultry farming as a livelihood in Turkana. A total of 300 pastoralists, encompassing both nomadic and sedentary individuals, were randomly selected from a sampling frame of 1,000. The study sample

comprised 50 individuals from each of the six sub-counties of Turkana. In terms of gender inclusiveness, out of 300 study participants, 123 (41%) were women, and 108 (36%) were youth, defined as individuals under 35 years of age. To achieve a comprehensive understanding of poultry farming among pastoralist communities, qualitative data

were thoroughly collected and analysed using appropriate techniques and procedures. A validation workshop for each sub-county was held to validate and triangulate the study findings and associated recommendations.

4. RESULTS AND DISCUSSION

4.1 Poultry Industry Analysis in Pastoral Areas

4.1.1 Poultry Value Chain analysis

The study outlines three main value chains in Turkana's poultry industry: eggs, meat, and chicks. It highlights the use of both indigenous and improved chickens for egg and meat production, as well as chick production for flock replenishment. Research demonstrates that poultry manure boosts crop yields and local feed production lowers costs. Essential veterinary and extension services support disease management and improve production and marketing. Collaboration with governments and civil organisations is vital to enhancing efficiency and addressing food scarcity in humanitarian contexts. Additionally, stakeholders must monitor demand and supply and integrate market variables to optimise poultry interventions, ensuring strategies are policy-based, sustainable, and cost-effective.

4.1.2 Market analysis and risk management

Study findings indicate that Turkana's poultry sector faces several hardships, and the struggle to achieve better production and marketing comes with a huge cost. Poultry business development by various actors is anchored on production diversification, market segmentation, and the strengthening of promotion, sales, and distribution aspects. The risks being tackled by poultry actors include breed volatility, consumer behaviour, limited production inputs, disease, and financial insecurity. To mitigate market risk, enhancing competition and product distinctiveness, acquisition of skills, fostering knowledge sharing to boost performance, and operational cost management are regarded as strategic for the delivery of competitive and successful poultry business ventures in pastoral settings.

4.1.3 Market planning strategies are crucial

Poultry marketing activities in Turkana are limited, as the popularity of poultry products is still low among the locals. The marketing plan parameters assessment indicates that effective management of the marketing mix through focusing on product availability, timing, location, and pricing is essential for the success of poultry value chains. Protecting the market system is also important, as it can enhance poultry consumption by regulating demand, supply, competition, and pricing. Additionally, understanding consumers' behaviour and preferences is crucial for improving customer satisfaction and brand loyalty in diverse markets.

4.2 Strategic Poultry Production and Marketing Initiatives

4.2.1 Household poultry farming

The study reveals that over 60 percent of households in Turkana engage in poultry farming, mainly raising chickens in small quantities. Women's and youth groups are working to enhance chicken production for market sales. However, productivity is hindered by high costs, lack of resources like quality feed and breeds, adverse weather, limited land access, especially for urban and displacement-setting households, weak household economies, undefined markets, security issues, and limited water availability. Given the substantial economic advantages of poultry farming, a coordinated development programme is essential to improve production and marketing, addressing both internal and external factors, including management practices.

4.2.2 Production plans and targets

The study reveals that the Turkana County Government hasn't developed a comprehensive plan for poultry farming in the county. This means poultry farming is undertaken without a robust market-based plan. To achieve this outcome, sensitisation for public and private sector actors in poultry production planning will strengthen efforts aimed at market access and making poultry farming in pastoral areas a viable enterprise that is marketable, profitable, sustainable and delightful to consumer clientele. The study also emphasises the nutritional value of chicken products, which fosters brand loyalty and competitiveness in the industry in local and external markets.

4.2.3 Financial planning and management

To achieve financial success in poultry endeavours, the study underpins the assessment of financial needs and the identification of appropriate funding sources, such as donor projects, business grants, and loans from the private sector, based on poultry production contexts. A strong funding base is essential for capital access and stability. The study emphasises the necessity of fiscal management in Turkana's poultry sector to enhance financial security and success in return on investments (ROI). It advocates for strengthening donor-supported business groups for resource optimisation and urges strategic financial decisions focused on cost-effectiveness, aligning market demands with investments for viability. Supply of chicken to vulnerable households should not be routine but rather be regarded as seed capital, and business models should be applied to build enterprises from such donations.

4.2.4 Application of principles of service

The study found that integrating principles of service in poultry farming empowers poultry producers and feed

formulators to consider nutrition, productivity, and economic returns in poultry feed formulation formulae. By strengthening transportation and communication systems, vendors can improve market connectivity along the chicken value chain. Also, consumer behaviour analysis aids poultry businesses in addressing consumer needs, while coordinated stakeholder actions enhance business efficiency. Key elements like resource mobilisation, investment assessment, and quality control will ensure poultry enterprises are impactful for producer groups and households, and through them, they can realise sustained income and livelihoods.



Figure 3: Large scale poultry producer in Turkana

4.3 Poultry Industry Development Enablers

4.3.1 Production and financial enablers

Market research is essential for evaluating the feasibility of poultry farming; it guides production decisions by analysing costs, benefits, and market demand. It addresses the nutritional and water supply needs of poultry interventions, hygiene, housing, and regional market costs. The study pinpoints the significance of breed improvement, product quality, access to credit, and biosecurity as factors for enhancing consumer confidence on poultry products. Effective management of flock size, energy supply, lighting, heating, and stocking rates are crucial for enhancing the efficiency of poultry production.

Working capital is important for poultry production, ensuring liquidity through asset-liability management, debt finance, and financial planning. Enhancement methods include growth funding, grants, and business credit. The study establishes that focusing on positive revenue streams and improving financial management supports better investment decisions. Owner's capital and strategic expense control help achieve business goals, while tax planning optimises resources. It is also worth noting that historical financial data and market trends inform future predictions

and facilitate corporate mergers for improved poultry production and competition management.

4.3.2 Market system enablers

Government policies and market strategies informed by customer needs play a crucial role in shaping poultry business approaches. Market socioeconomic enablers include social attitudes and market analytics, which aid in data tracking and forecasting. The study results depict that a competitive poultry market can enhance production, improve entrepreneur access, and boost customer satisfaction. Effective marketing strategies and stakeholder involvement are key for transforming potential consumers into buyers, and poultry businesses should focus on marketing budgets, value chain promotion, strategic market goals, and strong customer-focused value propositions to enhance market access and profitability.

4.3.3 Operations and human capital enablers

The study highlights three key enablers for poultry operations: operations management, competitive analysis, and competitive strategies mapping. These elements influence access convenience, cost management, and business clustering. Branding, market scope, and customer loyalty all play a role in emotional engagement, which in turn affects trust and willingness to pay. Improving business processes can aid in tracking performance indicators such as operating margins and customer acquisition costs, while also considering external factors and safeguarding innovations, crucial for effective operational strategies. A comprehensive approach to production and marketing involves process accuracy, empathy for vulnerable populations, team support, and ongoing engagement. Emphasis on accountability and performance improvement aims to add customer value, with transparency and active listening being crucial. Customer relationship management (CRM) plays a significant role in achieving business objectives and ensuring customer satisfaction.

4.3.4 Innovation and human relational enablers

Innovations in agricultural skills, technology, and marketing aim to enhance poultry production for households and producer groups. Key strategies include promoting poultry farming for gender and social inclusion, implementing capacity-building programmes, and adopting climate-smart practices to bolster resilience against climate challenges. An analysis of supply chain logistics addresses transportation and distribution issues while considering legal and ethical aspects like land use rights and animal welfare. Community engagement is crucial, highlighted by empirical research and success stories that emphasise employment, women's empowerment, and community cohesion. This initiative seeks to promote resilience and

self-reliance through financial growth and enhanced poultry interventions.



Figure 4: Household poultry farmers in Turkana

5. CONCLUSION

It is concluded that poultry farming in pastoral areas is significant for the diversification of livelihoods, as well as for the provision of food, income, and nutrition security. On the other hand, there are considerable production and market constraints. Although poultry products are becoming increasingly popular in the consumer market, the adoption of poultry farming by households and producer groups is slow. This slowdown is due to a number of factors, including the risks and uncertainties that are present in the industry, the limited access to capital and funding sources, and the undeveloped competitiveness of the enterprise. Poultry is a viable enterprise for rural and displaced populations due to the immediate benefits it offers.

The potentiality of poultry as an enterprise may be increased through strategic planning, finance, and the effective implementation of poultry programmes that utilise market-based approaches. This will result in increased benefits for the players involved. Apart from concentrating on improving the production, marketing, and consumption aspects of the poultry value chain, the determination of market systems and the management of operations and human capital, as well as the factors of innovation and human relations, are essential enablers for the competitiveness, profitability, and sustainability of poultry endeavours. A focus on livelihoods in pastoral, rural, and peri-urban areas will make it easier to be objective when it comes to making poultry farming count on the wellness of the people.

6. RECOMMENDATIONS FOR APPLICATION

- To manage the multiplicity of challenges that the poultry sector in pastoral areas faces, a comprehensive business model with detailed

elements for the production, marketing, and consumption of poultry value chains needs to be developed and integrated into public-private sector service delivery.

- Addressing costs, benefits, competitiveness, profitability, and sustainability of poultry farming in pastoral areas will provide guidelines in which different actors can engage in the industry. This action will facilitate faster market access and help sustain a competitive advantage in local markets.
- Implementing certified local feed production to tackle feed challenges, ensuring affordability and quality throughout the year. Also, poultry actors prioritise water management and adhere to animal husbandry standards in poultry units.
- Financial constraints heavily affect poultry production and commercialisation; increased investments and training for farmers are crucial. To realise substantial return on investments, poultry marketing strategy should focus on aggregating production and direct purchases, emphasising product quality for profitability.
- The diversification of production and marketing relies on optimising farm and market factors, strategic financial planning, and technological innovation.
- Enhancing poultry breeds through research and introducing diverse species could improve livelihoods and nutrition. Also, industrial analysis is vital for identifying opportunities and strategic interventions, that link producers to markets.

7. AREAS FOR FUTURE RESEARCH

The following areas of research are critical for facilitating the integration of poultry farming into pastoralists' livelihoods:

- Linking the sedentary nature of poultry livelihoods to the nomadic lifestyle of pastoralist communities. The objective of the study is to find the dynamics in the pastoralists' lifestyles that can accommodate poultry farming.
- The study aims to assess the production, marketing, and consumption challenges and develop strategic solutions that can stimulate poultry farming in pastoral, rural, and peri-urban settings.

References

- Anno, E. F., Khavetsa, C. F., Etabo, L. S. (2023). Evaluating Myopia in Livestock Marketing Initiatives in Turkana, Kenya: A Transformative Approach to Livestock Commercialisation, Value Co-Creation, Sustainability, and Entrepreneurship Orientations. *International Research Journal of Economics and Management Studies*. Volume 2, Issue 3, July 2023 / Pg. No: 49-60. DOI: 10.56472/25835238/IRJEMS-V2I3P109
- Anno, E. F., Cheruiyot, V. K., Etapar, S. E., Nakeno, D. L., & Lopem, E. C. (2024). Investing in Agriculture for Long-Term Food, Income, and Nutrition Security: An Economic Analysis of Crop Production and Marketing in the Refugee and Hosting Community Settings in Turkana. *International Research Journal of Economics and Management Studies*. Volume 3, Issue 5, May 2024 / Pg. No: 282-293. DOI: 10.56472/25835238/IRJEMS-V3I5P134
- Ayieko, D. M., Bett, E. K., & Kabuage, L. W. (2014). An analysis of the efficiency of indigenous chicken marketing channels in Makueni County, Kenya. *Journal of Agricultural Economics and Development*, 3:2, 26-34. <http://academeresearchjournals.org/journal/jaed>
- Ayieko, M.O.D., Bett, E.K., & Kabuage, L.W. (2015). Analysis of Indigenous Chicken Marketing Participation Decisions: The Case of Producers from Makueni County, Kenya, East African Agricultural and Forestry Journal, 81:1, 12-17.
- Bett, H. K., Peters, K. J., Nwankwo, U. M., Bokelmann, W. (2013). Estimating consumer preferences and willingness to pay for the underutilised indigenous chicken products, *Food Policy*, 41:20, 218-225, ISSN 0306-9192. <https://doi.org/10.1016/j.foodpol.2013.05.012>.
- Chesoo, B. K., Nandwa, A., & Wanga, J. O. (2021). Evaluation of Growth and Feeding Characteristics of Indigenous Chicken Ecotypes of Kenya. *African Journal of Education, Science, and Technology*, May 2021, Vol. 6, No. 3.
- Danda, M. K., Mwamachi, D. M., Lewal, K., & Jefa, F. (2008). Characterisation of the indigenous chicken sub-sector in the coastal lowlands of Kenya. In: *Proceedings of the 12th Kenya Agricultural Research Institute Biennial Scientific Conference*, Nairobi, Kenya, pp. 898-905.
- Gheyas, A. A., Vallejo-Trujillo, A., Kebede, A., Lozano-Jaramillo, M., Dessie, T., Smith, J., & Hanotte, O. (2021). Integrated environmental and genomic analysis reveals the drivers of local adaptation in African indigenous chickens. *Molecular biology and evolution*, 38:10, 4268-4285. <http://dx.doi.org/10.1093/molbev/msab156>.
- Kamau, C. N., Kabuege, L. W., & Bett, E. K. (2018). Impact of improved indigenous chicken breeds on productivity. The case of smallholder farmers in Makueni and Kakamega counties, Kenya, *Cogent Food & Agriculture*, 4:1, 1477232, DOI: 10.1080/23311932.2018.1477231, <https://doi.org/10.1080/23311932.2018.1477231>.
- Kenya Institute for Public Policy Research and Analysis (KIPPRA) published this report in 2016. Kenya Economic Report 4.2, 48.
- Kgosikoma, K., & Malope, P. (2016). Determinants of market participation and the institutional constraints: a case study of Kweneng West, Botswana. *Journal of Agricultural Extension and Rural Development*. Vol. 8 (9), pp. 178-186, September 2016. DOI: 10.5897/JAERD2016.0780. Article Number: D80D19F60007. ISSN 2141-2170.
- Kyule, N. M., Mwangi, J. G., & Nkurumwa, O. A. (2014). Indigenous chicken marketing channels among small-scale farmers in the Mau-Narok division of Nakuru County, Kenya. *International Journal of Social Sciences and Entrepreneurship*, 1(9), pp.55-65.
- Macharia, J. K., Ogoah, E. O., & Munyaneza, J. P. (2022). Indigenous Chicken Farming in Kenya: A Mini Review of Genetic Resources, Production Systems, Constraints, and Opportunities. *Journal of Animal Breeding and Genetics*. 6(4):183-193. <https://doi.org/10.12972/jabng.20220020>
- Magothe, T. M., Muhuyi, W. B., & Kahi, A. K. (2010). Influence of major genes for crested-head, frizzle-feather, and naked-neck on body weights and growth patterns of indigenous chickens reared intensively in Kenya. *Tropical Animal Health and Production*, 42:2, 173-183. <http://dx.doi.org/10.1007/s11250-009-9403-y>
- Magothe, T. M., Okeno, T. O., Muhuyi, W. B., Kahi, A. K. (2012). Small-scale family poultry production of indigenous chicken in Kenya: I. Current status. *World's Poult. Sci. J.*, 68, 119-132. <http://dx.doi.org/10.1017/S0043933912000128>
- Mutombo, P. K., Orenge, C., Kanui, T. I., & Wambua, S. (2015). An assessment of natural and socio-economic impacts on village chicken production: a case study of Katangi and Ikombe Divisions of Yatta Sub-County. *Int. J. Educ. Res.*, 3:8, 53-62.
- Mwiti, E. M., Njiru, S. N., & Chege, S. M. (2021). Production of indigenous poultry among smallholder farmers in Tigania West, Meru County, Kenya. *African Journal of Agricultural Research*, 17:5, 705-713. <http://www.academicjournals.org/AJAR>
- Ndathi, A. J. N., Muthiani, E. N., Kirwa, E. C., Kibet, P. F. K., & Cheruiyot, H. K. (2012). Constraints and opportunities in indigenous chicken production and marketing in the Mashuru and Loitoktok divisions of Kajiado district. KARI,

19. Njagi, L. W., Nyaga, P. N., Bebora, L. C., Mbuthia, P. G., & Minga, U. M. (2012). Effect of Immunosuppression on Newcastle Disease Virus Persistence in Ducks with Different Immune Status, *ISRN Veterinary Science*, Volume 2012, Article ID 253809, 6 pages, DOI: 10.5402/2012/253809, http://www.isrn.com/journals/vs/2012/253809_date 24/01/2012.
20. Njuguna, C. K., Kabuage, L. W., & Bett, E. K. (2017). Economic analysis of indigenous chicken production: The case of smallholder farmers in Makueni and Kakamega Counties, Kenya. *International Journal of Agricultural Extension and Rural Development*, 5(5), 564-570. <http://dx.doi.org/10.33687/ijae.007.01.2809>
21. Olwande, P., Okuthe, S. O., Ogara, W. O., & Bebora, L. C. (2016). Participatory epidemiological assessment of factors that limit indigenous chicken productivity under the free-range system in southwestern Kenya. *Liv. Res. Rur. Dev.*, 28 (2016), 183-188. <https://repository.maseno.ac.ke/handle/123456789/3383>
22. Omondi, S. O. (2019). Small-scale poultry enterprises in Kenyan medium-sized cities. *Journal of Agribusiness in Developing and Emerging Economies*. <https://doi.org/10.1108/JADEE-06-2018-0067>
23. Omondi, S. O. (2022). Poultry Value Chain in Two Medium-Sized Cities in Kenya: Insights from Cluster Theory. *Front. Vet. Sci.* 9:601299. doi: 10.3389/fvets.2022.601299.
24. Onono, J. O., Pablo, A., Maurice, K., Patrick, M., James, M. A., Carron, M., Eric, M. F., Barbara, H., & Jonathan, R. (2017). Identification of production challenges and benefits using value chain mapping of egg food systems in Nairobi, Kenya, *Agricultural Systems*, 159, 1-8. <https://doi.org/10.1016/j.agsy.2017.10.001>
25. Pius, L. O., Strausz, P., & Kusza, S. (2021). Overview of Poultry Management as a Key Factor for Solving Food and Nutritional Security with a Special Focus on Chicken Breeding in East African Countries. *Biology*, 10:8, 810. <https://doi.org/10.3390/biology10080810>
26. Tanui, G., Wamae, P. (2022). Utilisation of Agricultural Information by Poultry Farmers in Enhancing Productivity: The Case of Menengai West, Nakuru County, Kenya. *International Journal of Current Aspects*, 6:1, 99-110. <http://dx.doi.org/10.35942/ijcab.v6i1.247>
27. Wagacha, W. P., Cephas, O. (2020). Access to and use of information on credit facilities by farmers in Kiambu County. *Saudi Journal of Humanities and*