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# Impact of Competition and Market Access Factors on the Performance of Secondary Livestock Markets in Turkana, Kenya

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**Abstract:** Globally, livestock farming is vital to the growth of economies. In the drylands of Africa, the scarcity of water and pasture significantly impacts livestock productivity and marketing, making local markets dominated by foreign stocks, products, and entrepreneurs. This study seeks to examine the effects of competition and market access factors on the performance of Turkana's secondary livestock markets. The strategic questions formulated to investigate the research problem were: what are the characteristics of livestock production and marketing in Turkana? what competition and market access challenges are outstanding in Turkana's livestock production and marketing context? and how does competitive rivalry affect the performance of livestock enterprises and market performance in Turkana? From a sampling frame of 180, 168 livestock traders (primary participants) were statistically sampled from Kakuma, Lokichar, and Kalemng'rok markets. In addition, 24 government and civil society livestock development experts were purposefully selected as secondary study participants. Study results show that competitive rivalry significantly affects livestock production and marketing in Turkana, making them unprogressive. Competition and market access are crucial aspects of livestock development, and identifying and managing their constituent features can aid in structuring, organizing, and commercializing livestock production. The influence of competition and market access factors on livestock development in Turkana is exacerbated by limited legislation and regulatory frameworks, limited research, the use of informal livestock marketing systems, inequalities in livestock production, insecurity, limited capital, rivalry in markets, the exploitation of low-capital traders, and climate change effects. Recommendations for application and future research emphasize the need for holistic programming of livestock developments in Turkana, with a focus on stakeholder capacity development, the use of systems-based approaches in programming, knowledge and technology transfer, legislation, and increasing competition and market access capabilities of local traders in the local and external markets.

**Keywords:** Livestock Production, Market Access, Pastoral Economy, Market Functionality, Competition, Livestock Policy

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## 1. Introduction

Livestock plays a significant role in the growth of state economies and sustainable food systems. The global market for livestock is projected to reach USD 20 billion by 2026, increasing at an average annual rate of 0.3% since 2017. Global livestock production is projected to reach over 2 billion

heads by 2026, increasing at an average annual rate of 0.5%. In Africa, the livestock sector accounts for between 30 and 80 percent of the agricultural gross domestic product (GDP), depending on the country. Despite the sector's advancements, it receives only 5 to 10 percent of agricultural investments,

indicating underperformance [6]. Globally, in Africa and even in the livestock-keeping regions of Eastern Africa, livestock is essential to fulfilling the 17 Sustainable Development Goals (SDGs) of the United Nations. Livestock and development programs directly contribute to the SDGs: No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-being (SDG 3), Gender Equality (SDG 5), Decent Work and Economic Growth (SDG 8), Climate Action (SDG 13), and Partnerships to Achieve the Goals (SDG 17). Key to achieving food, economic, and nutrition security, Kenya's livestock sector provides a substantial portion of the population with a means of subsistence. This sector generates around 12% of the national gross domestic product (GDP) and 42% of the agricultural GDP. Over 10 million pastoralists living in Arid and Semi-Arid Lands (ASALs), which are inhabited by over 36 percent of Kenya's population, produce 70 percent of the country's livestock output [13].

Turkana County has the highest livestock population in Kenya, yet it is also the poorest region in the country. 70 percent of the population of Turkana was nomadic or semi-nomadic 20 years ago, according to data from the year 2000. This number has decreased to approximately 60 percent due to the severe effects of climate change on the pastoral economy and way of life, with some pastoralists falling out of pastoralism due to livestock death, insecurity, and cattle rustling; the dominance of urbanization and land grabbing over pastoral lands; and rural-urban migration [18].

Kenya's Agricultural Sector Growth Strategy (ASGTS, 2019–2029) identifies dairy, beef, sheep, goats, poultry, and camel as high-potential, priority value chains. Insect farming is also incorporated for livelihood, income, and industrial raw materials. Livestock development initiatives can contribute to the sector's exponential expansion during the next three decades. Livestock production and marketing systems are crucial components of the growth of the livestock sector, as they facilitate the creation and communication of the value of livestock and livestock products to different market segments. Consequently, control of competition and market access variables will strengthen livestock development programming, allowing pastoral areas to sustain livestock production and marketing investments with greater flexibility [4].

## 2. Literature Review

### 2.1. The Role of the Livestock Sector in Development

Livestock farming and the livestock industry provide much more people with a means of subsistence. Governments, civil society organizations, and livestock farming entrepreneurs invest in livestock development with the goal of increasing production and productivity to grow rural incomes and support the rising number of people who depend on the livestock industry and provide the agro-processing requirements [20]. Over 50% of the world's agricultural output is supplied by livestock, with 30% coming from developing nations, where the rapid increase in demand for livestock

products (LPs) is referred to as a "food revolution." Consumption levels in underdeveloped nations are currently low but will rise as incomes rise. It is projected that the increased livestock productivity, competitiveness, and market access enablers would expand the economies of states and areas that practice livestock farming and aid rural development through the creation of jobs and the alleviation of poverty [5].

### 2.2. Importance of Livestock Markets in Dryland Economies

Marketing comprises the product channels, market actors, and commercial activities that facilitate the movement of goods and services from producers to consumers. Livestock commerce in dryland regions entails purchasing, selling, and slaughtering animals; processing and adding value to meat; and marketing and distributing livestock and products to the intended markets. Marketing is related to functions that add value to farm output in agriculture, and market access is a crucial aspect of pastoralists' market involvement and risk management, resulting in a greater proportion of the sale of animals and livestock products on moderately competitive marketplaces [9].

Marketing plays a significant role in adjusting herd sizes in the drylands during periods of drought. In pastoral areas, livestock is predominantly sold to support the financial needs of families for food, clothing, education, and medical care. However, the transportation of livestock and products to markets is a challenge to many livestock entrepreneurs, inhibiting the efficacy of livestock trade and economic returns from markets [1].

#### 2.2.1. Livestock Markets and Socioeconomic Factors

Socioeconomic issues such as culture, religious customs, beliefs, conflicts, poverty, and limited company start-ups hinder the performance of livestock entrepreneurs in different market segments. Population increase, urbanization and expanding urban centers, income levels in developing nations, foreign influences, and technical advancements are the key drivers of animal product consumption. A successful livestock marketing system has a considerable positive effect on livestock commercialization. Livestock marketing practices and procedures, as well as the role of non-livestock industries in pastoral areas, demonstrate that organizing livestock production and marketing interventions with strong market ties can enable local entrepreneurs to enter new markets and become more competitive [3].

Investing in policy formulation and execution modalities would enforce regulations governing livestock production, trading, and consumption of a range of products, thus improving the viability of livestock commerce among pastoral communities, governments, and civil society groups. So, the growth of domestic and export markets is required to alleviate poverty in dryland regions, increase income for livestock farmers and merchants, and maintain the favorable trend toward more market-oriented behavior [19].

### **2.2.2. Risks Associated with Livestock Markets in Drylands**

In numerous worldwide agricultural systems, livestock markets are common hotspots for disease transmission. For the development of focused and evidence-based livestock development programs, it is essential to raise knowledge of the risks connected with livestock trade systems and markets. Animal markets are good sites for collecting data and disseminating knowledge. Still, livestock-based stakeholders and policymakers do not know about animal markets and how they affect public health, the most important of which is the role of policy and research in achieving sustainable livestock development [10, 14].

Animal and public health concerns can be mitigated across the livestock supply chain by structuring the organization and management of livestock developments. Cross-border trade is the primary source of income for the majority of livestock-based entrepreneurs in the Horn of Africa region. Strengthening the cross-border livestock trade protocol, regional livestock development programs, and sustained stakeholder engagements will promote the development of the livestock sector and the economic viability of livestock farming and industry at various levels of the economy [7].

### **2.2.3. Institutional Market Frameworks and Development Solutions**

Sustainable market solutions are produced through regulatory, institutional, and policy reforms as well as stakeholder participation. Institutional and policy concerns influence the population of livestock and trade activities in nations and regions that engage in them. Protocols on the international market influence the effectiveness of cross-border trade enabled by the free movement of livestock and livestock products. Extreme competition due to a lack of formal marketing, systemic imbalances in supply and demand, ineffective management of non-market forces, and an increase in the dynamics of livestock production and marketing as a result of social, economic, and political instability in the market region have a negative impact on the performance and diversity of the livestock trade [15, 17].

Significant ways to improve the performance of local and regional markets include youth and women's participation in the livestock trade, the integration of adult literacy programs into pastoral production systems, the establishment of proactive livestock development directorates, and the grounding of livestock marketing in viable business models and strategies [11].

### **2.3. Supply and Demand of Livestock and Products in Markets**

An efficient production and marketing strategy for animal resources necessitates that farmers increase animal resource output and decrease transaction costs. If small-scale farmers are to be lifted out of poverty through market access, it is now more important than ever to train farmers on the right breeding stock and local breed improvement, to increase investment in livestock health management, to disseminate price information, and to improve livestock meat and milk quality.

Governments, community producer organizations, and other interested parties should work together to construct infrastructure for livestock production and marketing and conduct research to inform policies and strategies for maximizing livestock value chains [2].

### **2.4. Brokerage in Livestock Marketing and Trade**

Brokers are crucial market participants who mediate official and informal transactions within and between livestock markets, allowing the flow of goods and services within and across national borders. Brokers are significant figures in cross-border livestock trading in the borderlands of Kenya and Somalia, and analysis of brokerage provides essential insights into the informal economy of the African borderlands. Within cross-border livestock trading networks, vendors and purchasers are frequently separated by significant distances and may be headquartered in trade corridors with diverse institutional settings and risk exposures [12].

Brokers assist predominantly in interethnic commercial transactions. Additionally, brokers negotiate rates with other dealers and safeguard the safety of producers in border markets governed by informal norms. Brokers provide market information on distant marketplaces, and information asymmetry is an issue not only in livestock sales but also in industries globally, creating a gap or "structural hole" in trade networks that must be filled by brokerage [8, 13].

### **2.5. Livestock Marketing and Export Constraints**

The majority of African livestock production systems are based on subsistence farming, and productivity is low. Low animal productivity and the absence of market-oriented production systems are the primary constraints on livestock export production. There must be livestock transportation infrastructure, updated slaughterhouses, animal resting spaces, and storage and quarantine facilities for livestock trading to be efficient. Ethical systems of livestock trade can make livestock production and trading in pastoral, agro-pastoral, mixed farming, urban and peri-urban farming, and specialized intensive farming systems more economically feasible, productive, market-oriented, competitive, and sustainable [16, 20].

## **3. Methodology**

### **3.1. Sampling and Data Collection**

The study participants were livestock traders operating in the sampled three secondary markets in Turkana County, i.e., Kakuma, Lokichar, and Kalemng'orok markets, with a total population size of 180 registered traders. Statistical sampling involved a confidence level of 95% and a margin of error of 2%, leading to a sample size of 168 traders, representing 93% of the study population. Twenty-four (24) tertiary participants from government and civil society organizations were purposefully selected to participate in the study. The research instruments used were structured and semi-structured

questionnaires administered directly to each study participant. In addition, various participatory rural appraisal (PRA) techniques, i.e., visualization, ranking, and scoring, secondary

data and literature reviews, and triangulation processes as presented in the diagram below, were used to generate additional information and validate the study findings.

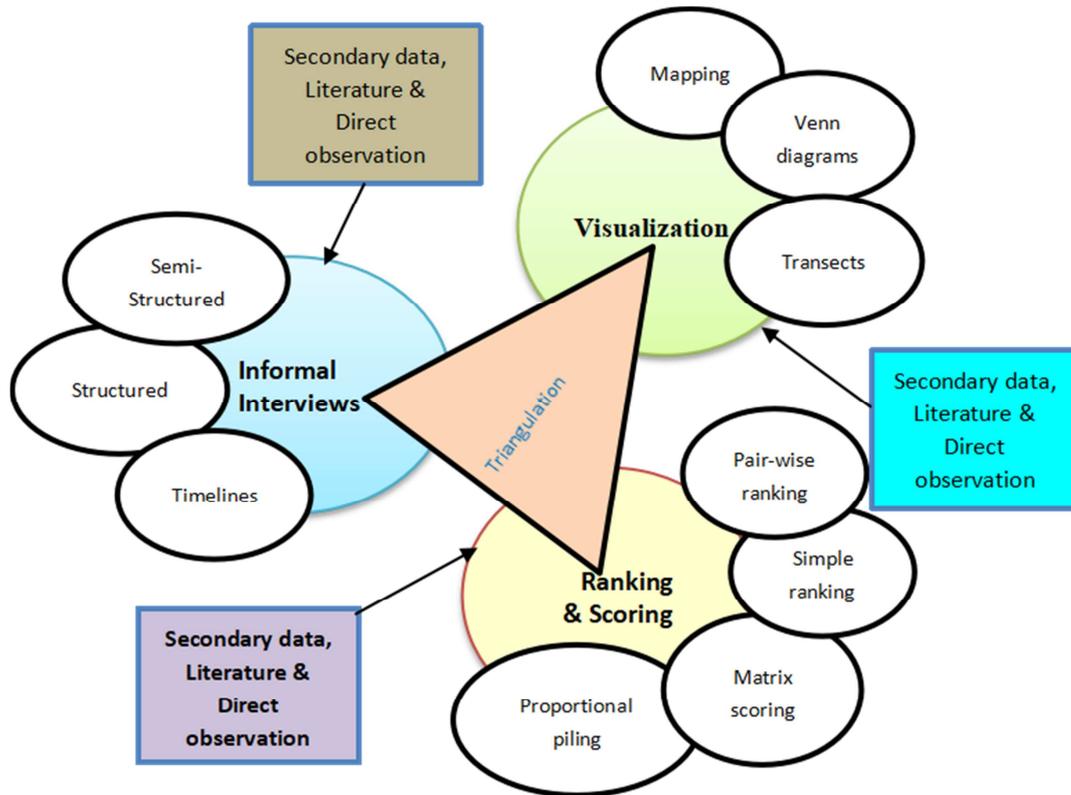


Figure 1. Participatory Rural Appraisal (PRA) tools (Source: Anno & Pjero, 2021).

### 3.2. Data Analysis and Presentation Techniques

Standard deviation was utilized for numerical variables, frequencies, and percentages in the quantitative data analysis. For testing significant differences between categorical variables, chi-square was applied. The Kruskal-Wallis test followed by post hoc pairwise comparisons using the Dunn-Bonferroni method was used to compare numeric variables between respondents in different markets, as the data did not pass the normality and homogeneity test of variance to permit the use of one-way analysis of variance (ANOVA). The level of significance was fixed at 0.05, and the Bonferroni correction was employed to account for multiple comparisons. Internal consistency was evaluated using Cronbach's alpha (statements).

A one-way ANOVA was used to establish the significance of the differences in the mean scores of the four themes across the three markets, while simple linear regression was employed to determine the relative importance of the variables being investigated. For qualitative data analysis, content, narrative, discourse, and framework analyses, grounded theory and the application of patterns, codes, and themes facilitated the categorization of data into meaningful titles and subtitles and the development of a logical and coherent flow of the narrative, thereby ensuring the transferability, credibility,

dependability, and confirmability of the study.

## 4. Results and Discussion

### 4.1. Quantitative Results

#### 4.1.1. Demographic Characteristics of Study Participants

The average age of the respondents in the three markets was similar, i.e., 37.10 years old with a standard deviation of 8.96 years and a range of 19 to 70 years. Most (85.1%) of the respondents were male. Overall, 75.0% of the respondents were non-literate, with only 4.8% of them having a certificate level of education. On average, respondents had 12.59 years of experience in livestock production, with a standard deviation of 6.16 years.

The Kruskal-Wallis test revealed that the mean number of years in livestock production was statistically different across the three markets. Respondents in the Kakuma livestock market had the highest mean in livestock marketing (13.67 years), with traders in the Lokichar livestock market having the lowest mean of 10.70 years. The difference in mean years in livestock marketing between these two markets was significant at a 5% level. Most (95.2%) of the respondents were livestock keepers, and the finding was similar across the three markets (Table 1).

*Table 1. Descriptive statistics of respondents' demographics.*

Market	Overall n=168	Kakuma livestock Market n=56	Kalemng'orok Livestock Market n=56	Lokichar Livestock Market n=56	Kruskal Wallis test	Chi-square
Age	37.10 (8.96)	38.75 (7.81)	36.88 (10.68)	35.68 (7.99)	4.615	
Male (%)	85.10	80.40	87.50	87.50		1.504
Female (%)	14.90	19.60	12.50%	12.50		
Education level (%)						
Adult Education	20.20	26.8	17.9	16.1		
Certificate	4.80	5.4	3.6	5.4		2.645
Non-literate	75.0	67.9	78.6	78.6		
Years in livestock marketing	12.59 (6.16)	13.67 (4.85)	13.41 (6.24)	10.70 (6.85)	7.085**	
Main occupation						
Business	4.80	5.40	3.60	5.40		0.263
Livestock keeping	95.20	94.60	96.40	94.60		

Note: Figures in the parentheses are the standard deviations associated with the means for the variables indicated.

\*\*P < 0.05 mean significant at 5% level.

Source: Survey data, 2022.

#### 4.1.2. Livestock Production and Market Access in Turkana

Most (29.8%) of the respondents were neutral about the statement that livestock production is real and progressive. Whereas 22.6% of the total respondents agreed with the statement, an additional 9.5% of them strongly agreed with it. Up to 22.6% and 15.5% of the respondents disagreed and strongly disagreed with the statement, respectively. Overall, 29.2% and 28.0% of the total respondents disagreed and strongly disagreed, respectively, with the statement that there are enormous livestock production factors (pasture, water). Whereas 25.6% of the respondents were neutral about the statement, 14.3% and 3% of the respondents agreed and strongly agreed with the statement, respectively.

Regarding the statement that livestock marketing is large in scope and size, 27.4% of respondents indicated a neutral opinion. Whereas 21.4% of the total respondents agreed with the statement, an additional 16.1% of the respondents strongly agreed with the statement. Up to 22.0% and 13.1% of the respondents disagreed and strongly disagreed with the statement, respectively. Overall, 32.1% of the respondents strongly agreed with the statement that livestock producers, traders, and

consumers were benefiting. While 20.8% of the respondents agreed with the statement, 23.2% of them were neutral about it. The remaining 14.9% and 8.9% of the respondents disagreed and strongly disagreed with the statement, respectively.

Most (75.6%) of the respondents strongly disagreed with the statement that value addition for livestock productivity was considered. An additional 8.9% of the respondents disagreed with the statement. Up to 12.5% of the respondents were neutral about the statement, while only 3.0% of the respondents agreed with the statement. There was, however, no respondent who strongly agreed with the statement. Up to 35.1% and 19.0% of the respondents strongly disagreed and totally disagreed, respectively, with the statement that livestock marketing systems are efficient, competitive, and sustainable. An additional 19% of the respondents disagreed with the statement. Up to 25.6%, 14.9%, and 5.4% of the respondents were neutral, agreed, and strongly agreed with the statement, respectively. Most (46.4%) of the respondents strongly disagreed with the statement that research and market surveys are regularized. An additional 23.8% of the respondents disagreed with the statement (Table 2).

*Table 2. Livestock Production and Market Access in Turkana.*

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Livestock production is real and progressive	15.5	22.6	29.8	22.6	9.5
Enormous livestock factors of production (pasture, water)	28.0	29.2	25.6	14.3	3.0
Livestock marketing is large in scope and size	13.1	22.0	27.4	21.4	16.1
Livestock producers, traders, and consumers benefitting	8.9	14.9	23.2	20.8	32.1
Value addition for livestock productivity considered	75.6	8.9	12.5	3.0	0.0
Livestock marketing systems are efficient, competitive, and sustainable	35.1	19.0	25.6	14.9	5.4
Research and market surveys are regularized	46.4	23.8	20.2	7.7	1.8

NB: Statements 1.3, 1.5 and 1.7 were excluded from the analysis

The sampled respondent's scores on the seven (7) statements retained on livestock production and market access are summarized in Table 3. The sampled respondents scored an overall mean of 2.51 (equivalent to a neutral opinion score) with a standard deviation of 0.61. The highest and lowest

scores were 3.86 and 1.14, respectively. The one-way analysis of variance revealed a significant difference between the respondent scores ( $F(2,165) = 34.253$ ;  $P\text{-value} = 0.000$ ). An analysis of the average mean score of livestock production and market access in the sampled livestock markets indicated that

the Kakuma livestock market had the highest mean of 2.89 (with a standard deviation of 0.50), while the Kalemng'orok market had the lowest mean of 2.09 (with a standard deviation

of 0.50). The Lokichar market had a mean of 2.54 (with a standard deviation of 0.54).

**Table 3.** Summary of Livestock Production and Market access scale.

Statements	N	Minimum	Maximum	Mean	Std. Deviation
Livestock production is real and progressive	168	1.00	5.00	2.88	1.20
Enormous livestock factors of production (pasture, water)	168	1.00	5.00	2.35	1.12
Livestock marketing is large in scope and size	168	1.00	5.00	3.05	1.27
Livestock producers, traders and consumers benefitting	168	1.00	5.00	3.52	1.32
Value addition for livestock productivity considered	168	1.00	4.00	1.43	0.82
Livestock marketing systems are efficient, competitive, and sustainable	168	1.00	5.00	2.36	1.25
Research and market surveys are regularized	168	1.00	5.00	1.95	1.07
Overall	168	1.14	3.86	2.51	0.61
1 Kakuma livestock market	56	1.57	3.86	2.89	0.50
2 Kalemng'orok livestock market	56	1.14	3.00	2.09	0.50
3 Lokichar livestock market	56	1.43	3.57	2.54	0.54

Calculated F (2,165) = 34.253; critical F (2,165) = 3.050; P-value = 0.000

A post hoc analysis for multiple comparisons using Tukey HSD indicated a significant difference in the mean score of livestock production and market access between all markets, that is, Kakuma and Kalemng'orok livestock markets, Kakuma and Lokichar livestock markets, as well as Kalemng'orok and Lokichar livestock markets, at the 5% level (Table 4).

**Table 4.** Post hoc multiple comparisons.

(I) Livestock Market	(J) Livestock Market	Mean Difference (I-J)	Std. Error	Sig.
1 Kakuma Market	2 Kalemng'orok Market	.80357*	.09731	.000
	3 Lokichar Market	.35459*	.09731	.001
2 Kalemng'orok Market	1 Kakuma Market	-.80357*	.09731	.000
	3 Lokichar Market	-.44898*	.09731	.000
3 Lokichar Market	1 Kakuma Market	-.35459*	.09731	.001
	2 Kalemng'orok Market	.44898*	.09731	.000

#### 4.1.3. Traders' Competition and Rivalry in Turkana

The majority of the respondents were neutral about the statement that livestock producers and traders relate well, as represented by 31.5% of the total responses. This was closely followed by respondents who agreed (29.2%) and strongly agreed (19.6%) with the statement. It was just 11.9% and 7.7% of the respondents who disagreed and strongly disagreed with the statement, respectively. Most (34.5%) of the respondents agreed with the statement that livestock traders relate well among themselves. An additional 23.2% of the respondents strongly agreed with the statement. Most (35.7%) of the respondents strongly disagreed with the statement that competition is beneficial to individuals and the livestock sector in Turkana. An additional 13.7% of the respondents disagreed with the statement. Up to 25.6% of the respondents were neutral about the statement. Overall, 24.4% of the respondents strongly agreed with the statement that competitive rivalry is evident in livestock markets. An additional 23.8% of the respondents agreed with the statement. Regarding the opinion of whether competitive rivalry affects market performance, most (37.5%) of the respondents strongly agreed with the statement. An additional 19.6% of the

respondents agreed with the statement, while 17.9% were neutral about it.

Most (38.7%) of the respondents strongly agreed with the statement that competitive rivalry is instigated by traders for their own benefit. An additional 25% of the respondents agreed with the statement, while 23.8% of the respondents were neutral about the statement. Up to 34.5% of the respondents strongly disagreed with the statement that a system is in place to regulate competition in markets. An additional 20.8% of the respondents disagreed with the statement, with 20.8% of the respondents having a neutral opinion about the statement. The majority of the respondents strongly disagreed with the statement that competition is strengthening markets, as represented by 26.2% of the total responses. An additional 19.6% of the respondents disagreed with the statement. About 20.8% of the respondents were neutral about the statement. The majority of the respondents strongly disagreed with the statement that competition is reducing livestock prices in markets, represented by 28% of the total responses. An additional 19% of the respondents disagreed with the statement. About 23.2% of the respondents were neutral about the statement (Figure 2).

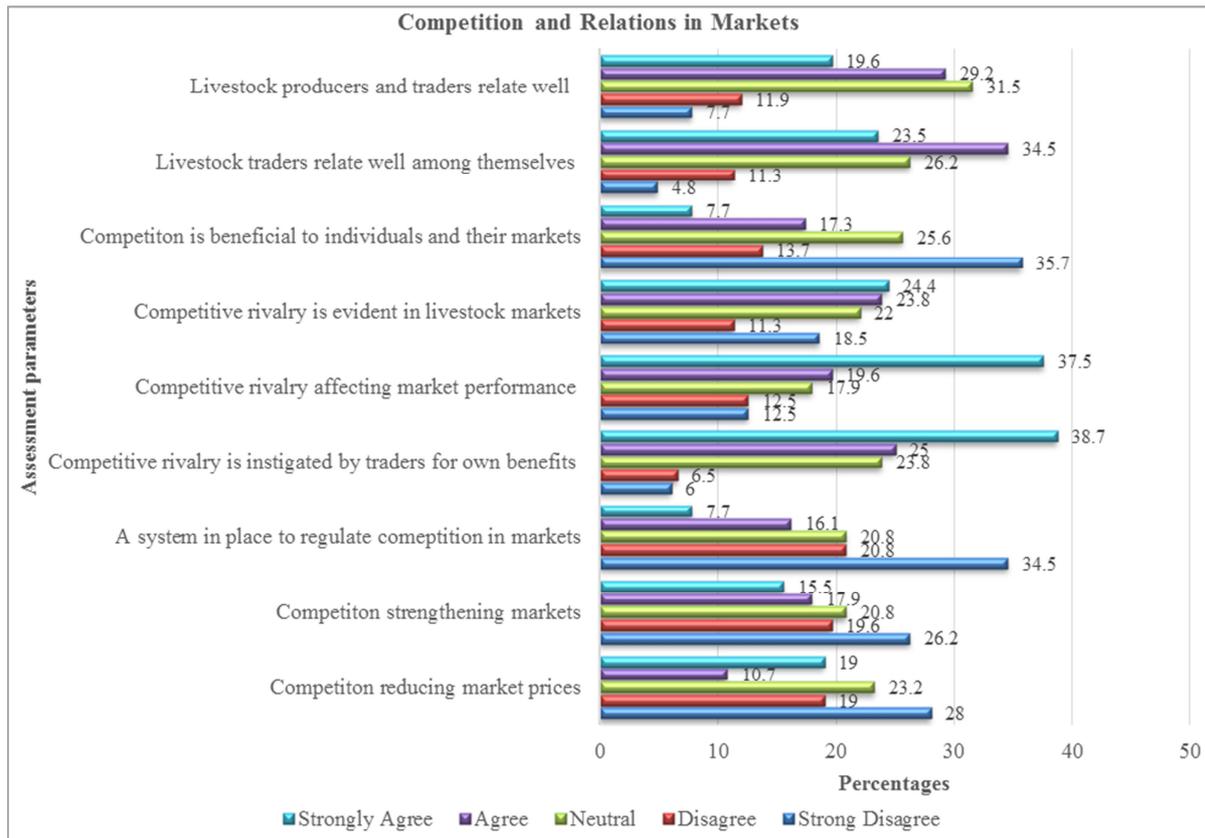


Figure 2. Traders Competition and Rivalry in Markets.

The sampled respondents’ scores on the nine (9) statements on traders’ competitive rivalry are summarized in Table 5. The sampled respondents scored a mean of 3.12 with a standard deviation of 0.63. The lowest and highest scores were 1.11 and 4.89. The one-way ANOVA was used to determine whether there was a significant difference in the mean score of traders’ competitive rivalry across the three markets. The one-way analysis of variance revealed a significant difference between the respondent scores ( $F(2,165) = 39.966$ ;  $P\text{-value} = 0.000$ ).

An analysis of the average mean score of the traders’ competitive rivalry in the sampled livestock markets indicated that respondents in the Kakuma livestock market had the highest mean of 3.62 (with a standard deviation of 0.49) while respondents in the Kalemng’orok livestock market had the lowest mean of 2.79 (with a standard deviation of 0.62). Kalemng’orok livestock market had a mean of 2.79 (with a standard deviation of 0.62).

Table 5. Summary of Traders’ competitive rivalry.

Statements	N	Minimum	Maximum	Mean	Std. Deviation
Livestock producers and traders relate well	168	1.00	5.00	3.41	1.16
Livestock traders relate well among themselves	168	1.00	5.00	3.60	1.11
Competition is beneficial to individuals and the sub-sector	168	1.00	5.00	2.48	1.34
Competitive rivalry is evident in livestock markets	168	1.00	5.00	3.24	1.42
Competitive rivalry affecting market performance	168	1.00	5.00	3.57	1.42
Competitive rivalry instigated by traders for their own benefit	168	1.00	5.00	3.84	1.19
A system in place to regulate competition in markets	168	1.00	5.00	2.42	1.32
Competition strengthening markets	168	1.00	5.00	2.77	1.41
Competition reducing livestock prices in markets	168	1.00	5.00	2.74	1.46
Overall	168	1.11	4.89	3.12	0.63
1 Kakuma Livestock Market	56	2.67	4.89	3.62	0.49
2 Kalemng’orok Livestock Market	56	1.11	3.89	2.79	0.62
3 Lokichar Livestock Market	56	2.11	4.33	2.94	0.44

Calculated  $F(2,165) = 39.966$ ; critical  $F(2,165) = 3.050$ ;  $P\text{-value} = 0.000$

A post hoc analysis for multiple comparisons using Tukey HSD indicated a significant difference in the mean score of respondents in the Kakuma and Kalemng’orok livestock markets, as well as the Kakuma and Lokichar livestock markets, at a 5% level. There was, however, no significant difference between Kalemng’orok and Lokichar livestock markets (Table 6).

**Table 6.** Multiple Comparisons of Traders' competitive rivalry.

(I) Livestock Market	(J) Livestock Market	Mean Difference (I-J)	Std. Error	Sig.
1 Kakuma Market	2 Kalemng'orok Market	.82738*	.09849	.000
	3 Lokichar Market	.67460*	.09849	.000
2 Kalemng'orok Market	1 Kakuma Market	-.82738*	.09849	.000
	3 Lokichar Market	-.15278	.09849	.270
3 Lokichar Market	1 Kakuma Market	-.67460*	.09849	.000
	2 Kalemng'orok Market	.15278	.09849	.270

#### 4.1.4. Effects of Traders' Competitive Rivalry on Livestock Production and Market Access

The results of simple linear regression on the effect of traders' competition and rivalry on market access and opportunities are presented in Table 7. The results reveal that traders' competition and rivalry had a significant effect on livestock production and market access in the livestock market in pastoral areas at a 5% level. The calculated F-ratio (1, 166) for the fitted model was 30.642, with a probability value of 0.000. The adjusted R<sup>2</sup> of 0.151 confirms that 15.1% of livestock production and market access are contributed to by traders' competitive rivalry, notwithstanding that there are other factors that also affect livestock production and market access. The coefficient of trader's competition and rivalry of 0.381 means that a one-unit increase in trader's competition and rivalry results in an increment of 0.381 in livestock production and market access. Based on these results, the null hypothesis was rejected. Thus, traders' competitive rivalry has no significant effect on livestock production and market access in the livestock market in pastoral areas.

**Table 7.** Competitive rivalry effects on livestock production and market access.

Variable	Coef.	Std. Err.	T	P>t
Constant	1.319	.219	6.028	.000
Trader's competition and rivalry	.381	.069	5.536	.000

F (1, 166) = 30.642, Prob> F = 0.000, R-squared = .156, Adj R-squared = .151

## 4.2. Quantitative Results

### 4.2.1. Livestock Production in Turkana County

Pastoralism is the predominant mode of production in Turkana, but its viability is threatened by livestock disease, drought, dwindling biodiversity and pasture supplies, insufficient water, and mobility restrictions. A weak cash economy hinders the ability of pastoralists to afford inputs for livestock farming, resulting in low levels of output and diminished household wealth and livelihoods. Other factors impeding the performance of livestock production systems in Turkana include the instability and unpredictability of border regions that contain sufficient pasture and water resources, rampant livestock raids and thefts within and across borders, and political and transboundary issues with neighboring countries. Increasing urbanization and investments diminish rangelands and grazing grounds in pastoral communities. Climate change has had a substantial effect on the pastoral production system and economy, as livestock output and productivity have been substantially impacted. Long distances

to markets, costly transportation, and a lack of knowledge continue to impede Turkana pastoralists' transition from subsistence to commercial livestock production.

### 4.2.2. The Scale of Livestock Marketing in Pastoral Areas

Turkana County traders and organizations have confidence in livestock marketing and trade, which is supported by the County Directorate of Livestock Production, the County Livestock Marketing Council (CLMC), and the Livestock Marketing Associations (LMAs) operating primary and secondary livestock markets. Tertiary livestock off-takers purchase animals at low rates from low-capital traders, resulting in exploitation, greed, and intense rivalry in the livestock trade, whereas formal cooperatives lack trader relationships, indicating restricted access to business capital resources. CLMC and the County Directorate of Livestock Production's delay in establishing contract farming in livestock production and marketing is responsible for the absence of contracts executed with prospective tertiary markets. The discrepancies in national and county legislation regarding livestock limit the entry of livestock resources to prospective markets.

### 4.2.3. Impact of Livestock Markets on the Turkana Economy

Livestock markets have enabled livestock producers to sell their animals and satisfy their financial needs, providing access to funds for food and clothing, education, medical bills, veterinary supplies, and business. Despite climatic, social, economic, and political difficulties, livestock traders have expanded their investment options and increased the flow of cash into rural areas and pastoralist households. The cash market for livestock has enabled consumer access to a variety of livestock products, but meat prices remain too expensive for many consumers. The county administration of Turkana defines livestock markets as the pivot point of livestock production investments, but the establishment of an organized livestock marketing system is not yet achieved.

The Livestock Subsector Policy and Bill and the Livestock Marketing Bill for Turkana are being drafted to provide policy and regulatory guidelines on the efficiency and effectiveness of livestock production and the organization of livestock marketing activity in the county. The proposed livestock legislative frameworks also seek to facilitate the cultivation of healthy and productive livestock resources, establish livestock markets and trader capacities, and install governance and administrative systems for operating livestock markets. However, the problem of inadequate capital availability remains unresolved, and inbreeding has weakened the local breeds, resulting in reduced market competition and economic returns.

#### **4.2.4. Traders' Competition and Rivalry in Turkana Livestock Markets**

Traders reported strong relationships with livestock producers; however, traders violated market chains to acquire and sell animals outside of agreed-upon market organization and structures, which was perceived as competition and an impediment to producer-trader interactions. Due to discrepancies in traders' capital resources, marketing techniques, purchases, and sales, and the market share held by individuals and groups, the currently used mode of competition is detrimental to the livestock sector. It is also illustrated by the duplication of livestock businesses, the specialization of dealers, and the LMA authorities' control over market operations. The closure of the Lomidat slaughterhouse in Lokichoggio has exacerbated the challenges in the livestock trade.

#### **4.3. Discussion of Study Results**

The study results depict that livestock production and marketing in Turkana are male-dominated. Women only participate in production without owning the livestock resources, products, or financial resources they generate. Many livestock producers and traders are illiterate, and the inability to read and write definitely limits opportunities for using the information to program production and marketing activities. Almost all livestock traders in Turkana secondary markets are livestock keepers, with a difference in the mean number of years spent in livestock trading. This depicts differences in marketing knowledge, experience, and capital resources, thus creating opportunities for unnecessary competition. Livestock production and marketing in Turkana are largely regarded as non-progressive and essential livestock production factors, i.e., forage and water remain scarce throughout the seasons, thus affecting animal nutrition, market weights, and the food and income security of livestock keepers. The study found that despite livestock production and marketing challenges decimating the benefits that livestock producers, traders, and consumers are getting, opportunities for maximizing livestock developments in Turkana remain enormous.

The value addition of livestock and livestock products is very limited due to the traditional practices still in use and the slow investments and adoption of production and marketing techniques. There is not yet a defined livestock marketing system in Turkana that is formal in design and that can enable local markets and entrepreneurs to compete effectively in a wider market arena. The currently used semi-formal Livestock Marketing Association (LMA) and co-management models exhibit areas of inefficiency and unsustainability. Livestock production and marketing research, surveys, and data collection and dissemination are irregular. This creates a huge gap in livestock development since homegrown knowledge and experiences that can influence the local context are very limited. Competition is viewed as not beneficial because of the rivalry and exploitation of low-capital traders. Competitive rivalry affects market performance because it is malpractice instigated by some "elite" traders for their own selfish gains.

There is no system in place to regulate competition in markets or for use in strengthening markets. Since competition is not defined, regulated, or managed, prices for livestock and livestock products remain high in Turkana. Ironically, prices are high in the Turkana town of Lodwar located at the heart of livestock production in the county.

## **5. Conclusion**

Production and marketing practices are essential components of livestock development, regardless of context. The contents and methods of each contribute to the production of high-quality animals and livestock products that can generate and maintain market demand and supply. To manage competition in livestock markets, the characteristics of livestock and livestock products produced in Turkana should be differentiated to provide a uniqueness that can assist local markets and entrepreneurs in maintaining market performance. Establishing livestock markets and product consumption outlets in strategic locations, providing market information, regulating the number of sellers in each market, and managing entry barriers will structure competition and competitiveness among local entrepreneurs and markets, thereby sustaining the performance of the county's primary and secondary livestock markets.

Market access is a crucial factor in determining the viability of local livestock markets and the ability of entrepreneurs to successfully conduct livestock trading throughout the seasons in domestic and international markets. The production and sale of livestock in arid regions need to be based on competitiveness and market access. Physical access to markets necessitates that livestock-producing zones are not too far from market yards, roads are in good shape, and reasonable transportation options are accessible. In addition, the structure of markets, including governance, taxation, and the cooperative organization of traders, plays a crucial role in market access planning. Structuring and improving the performance of livestock enterprises in the drylands through the capacity development of market stakeholders, the formulation of necessary policies and regulations governing the commercialization of livestock resources and trade protocol, the management of rivalry in markets, and the establishment of a level playing field for all livestock entrepreneurs will motivate livestock production and marketing activities.

Even though pastoralism is the predominant mode of livestock production in Turkana, climate change and instability, as well as cattle rustling along potential livestock production areas and trade routes, continue to be significant obstacles to livestock development. Capital is a significant obstacle for livestock enterprises owned by low-capital dealers, predisposing them to competitive rivalry and exploitation. Turkana does not practice contract farming in the livestock trade, and the inadequate rules and controls of livestock production and commerce leave the sector unstructured and disorderly.

## 6. Recommendations

### 6.1. Recommendations for Application

The primary socio-economic activity in Turkana is livestock farming. Most people keep livestock for subsistence and cultural purposes, with just a few investing in the livestock trade. To improve livestock production and marketing in the drylands, the following recommendations are prioritized for application:

- 1) Government and development partners should invest in youth and women empowerment programs to use livestock development opportunities to grow their economic potential and self-reliance.
- 2) To minimize illiteracy and ignorance in Turkana County, pastoralists should be encouraged to enroll their children in school in large numbers, and adults should take part in the adult literacy program. This will enable youth and adults to communicate and exchange knowledge, establish and maintain relationships with stakeholders, and use communication to participate in the marketplace.
- 3) Encourage non-pastoralist business owners to diversify into the livestock industry. This action will diversify the earnings of pastoralists, increase livestock commerce, and inject more capital into livestock enterprises.
- 4) The livestock trade is dominated by men. Women's participation in livestock-based businesses should be studied and included in livestock development policies and plans, including building their capabilities to successfully compete in markets.
- 5) Increase efforts to eradicate livestock diseases, resulting in livestock disease-free zones, enabling an increase in the commercialization of livestock, the diversification of livelihoods, and the competitiveness of strategic livestock value chain enterprises.
- 6) Invest in the production of forage and the formulation of improved feed in livestock production zones and around livestock market yards. Such a resource management plan will permit the year-round production and trading of healthy and productive livestock, giving local merchants a competitive edge on domestic and international markets.
- 7) Indigenous livestock breeds are weakened by continuous inbreeding and a lack of improved breeding services in pastoral settings. The organization of breeding systems and the introduction of superior breeds will aid in mitigating the production dilemma in Turkana. In pastoral regions, low livestock productivity generates challenges such as poor quality livestock and livestock products, reduced market weights, and low pricing that are detrimental to the market.
- 8) In collaboration with civil society and corporations, the Turkana County Government should prioritize the identification and mapping of livestock production areas to protect them from the encroachment of growing urbanization, where trading centers, villages, and non-pastoral business investments tend to increase.
- 9) To establish the severity of climate change's effects on pastoralists' livelihoods and environment, civil society groups and pastoral communities should perform a combined analysis of climate change phenomena. The capacity of pastoralists to withstand climate shocks and the effects of recurring drought on livestock resources should be evaluated empirically and from a policy perspective.
- 10) A transparent livestock marketing system with transferable livestock and value chain strategies is required to improve communication, pricing, and transportation, which are essential for the long-term performance of markets and where raising and selling livestock in the drylands will become easier, more profitable, and more competitive over time.
- 11) Transport costs hinder secondary livestock traders' ability to aggregate livestock purchases for tertiary or terminal markets. The scenario diminishes the competitiveness of local traders and undermines their operational capital and bargaining capacities. To resolve this issue, livestock stakeholders must learn about the significance of the cash economy and alternative means to store a portion of their income in cash rather than in the form of livestock.
- 12) It is vital to systematize marketplaces and marketing efforts and to cultivate relationships with stakeholders. Marketing systems for livestock should be devoid of corruption and unethical methods that benefit market participants disproportionately, hence creating cartels, mistrust, and market competitive rivalry.
- 13) Governments and civil society organizations can empower livestock traders and business owners to determine the scope and magnitude of the livestock trade in their own communities. Even though traders are aware that pastoral regions have a great deal of livestock, they cannot compare it to the current market need.
- 14) Comparing the livestock supply to the present local and international demand will permit the sale of surplus livestock in other markets. It will boost the marketing strategy for livestock's competitiveness in markets. Notable is the wealthy traders' monopoly over secondary livestock markets, who turn low-capital traders into their suppliers.
- 15) Institutions overseeing livestock production and marketing should promote the widespread application of feasible and competitive business models suited to particular market segments. This will allow market participants to control competitiveness and decrease rivalry within their jurisdictional markets.
- 16) In addition to the threat posed by alternative products, identifying and evaluating the threat posed by new entrants, suppliers, and buyers' negotiating power will enable each livestock market and its stakeholders to manage daily marketing activities and nurture healthy stakeholder relationships. The government and important market participants must ensure that farmers, traders, and consumers have access to information regarding the

prices of livestock and livestock-derived products.

- 17) Promoting healthy competition in markets by minimizing conflicts of interest and antagonism between stakeholders and ensuring that marketing strategies can effectively manage competition in livestock markets through improved pricing and sharing of information. To make livestock and livestock products inexpensive and equitable, it is essential to understand their production lines, sale, transportation, and taxation costs.

## 6.2. Recommendations for Future Research

The study's research findings are explicit on the gaps and opportunities for livestock production, marketing, and management of competition in Turkana. The suggested recommendations for future research aim to improve the vibrancy, competitiveness, profitability, and sustainability of livestock production and marketing in Kenya's drylands. Are as follows:

- 1) Assess the existing level of livestock production and husbandry practices in pastoral areas and make recommendations for enhancements.
- 2) Assess the viability of pastoral rangeland ecosystems and determine the potentiality of nature-based livelihoods for pastoralists. Propose livestock-based enterprises that can be successfully created and maximized by utilizing future and spot markets.
- 3) Evaluate the benefits that value addition will bring to livestock production and marketing in pastoral areas and transform subsistence livestock farming into a market-oriented livestock economy.
- 4) Measure the impact of market and non-market forces on the marketing of livestock in pastoral areas. Concentrate on supply and demand for internal market forces and government policy on livestock trading for non-market forces.
- 5) Determine if corporate theories and models are applicable to dryland livestock production and marketing. Determine the prospects for theory and practice to improve the components of the livestock sector.
- 6) Examine the factors driving cross-border livestock trade, the impediments, and the consequences of cross-border dimensions on livestock production and marketing in trade corridors and border regions of East Africa.
- 7) Determine the viability of transitioning existing Livestock Marketing Associations (LMA) into Livestock Marketing Cooperatives (LMC) in order to improve the operations and performance of local livestock markets.
- 8) Evaluate the effectiveness of the Turkana Lomidat Slaughterhouse Cooperative in addition to the socioeconomic and political circumstances that contributed to its non-functionality.
- 9) Examine the prevalent livestock diseases that have a substantial economic influence on animal production, marketing, trade, and product consumption in pastoral areas. Explore possible developments resulting in

disease-free zones in pastoral areas.

- 10) Investigate the role of women and youth in livestock production, trading, and opportunities to contribute to the development of the dryland livestock sector.
- 11) Determine the institutional dynamics that encourage the efficient and effective production and trading of livestock in Turkana, as well as the elements that inspire pastoralists to sell their animals when market conditions improve.

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