

Market Performance of Small Ruminant in Kumasi and Tamale of Ghana

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Abstract We present the performance of urban small ruminants markets in Kumasi and Tamale of Ghana. Two hundred and eighty four sheep and goats traders were selected using the multistage sampling technique. Primary data was collected using structural questionnaire. The result revealed that (95%) of live small ruminant traders were dominated by men and were between the ages of (31) and (50) years. Purchasing cost for live animal constituted (84.68%) of the total marketing costs while (15.32%) accounted for transaction cost. The finding also indicates that sheep and goats marketing are profitable ventures in the study areas and, the average goat net marketing margin (24.85%) and was significantly higher than the average sheep net margin (17.73%). The results also show that every (Ghana Cedi (GH¢) 1.00) invested in sheep and goats results in (GH¢ 0.18) and (GH¢ 0.25) return on capital, respectively. Comparing this result with return on saving (22%) charged by the Central Bank of Ghana in 2015, goats trading was better off than saving.

Keywords Market, Performance, Small Ruminant, Traders

1. Introduction

Small ruminants are economically significant in the agricultural sector of most developing nations, including Ghana. According to Wubie et al. [1], most sheep and goats are reared by household members and require; low maintenance costs, low start-up capital, faster growth rates, and increase herd size within the shortest period compared to large ruminants. Small ruminants also serve as sources of income, provide protein (meat and milk), manure, wool, and security against crop failure [2]. It serves as collateral for acquiring the loan, saving, and risk distribution mechanism for smallholder farmers in different farming systems and agro-ecologies in Ghana [3&4].

Furthermore, small ruminant farming is superior to direct saving money in financial institutions because their net annual returns are much higher than the interest realized from banks' savings [5]. Similarly, small ruminants contribute immensely to household income and offer employment to the majority to enhance the sustainability of livelihoods and food security among poor rural households [2&3].

In Ghana, 60%) of the population are directly employed in the agricultural sector and accounted for (34.5%) of the country's Gross Domestic Product (GDP) [6]. The livestock in the sub-sector contributes (17.4%) of the total agricultural GDP (MOFA, 2010). Ghana is rich in indigenous livestock production facilities, precisely small ruminants that are principal components of pastoral farming. Adzitey [7] estimated the total domestic population of live sheep and goats between 2001 and 2010 were (3,269,460) and (2,958,568) each. Sheep and goats form an integral part of livestock production in most urban and Peri-urban house-holds in Ghana. Oppong-Anane [8] reported that small ruminants are produced less by urban dwellers and constitute (25%) of the 13.3 million population. Most small ruminants are reared in the northern region of Ghana, while Tema, Kumasi, and Accra are the major consumption cities.

In enhancing productivity, small ruminant producers need to consider the market as a principal aspect of production. The marketing system must provide information flows from the consumer back to the producer [9]. Livestock marketing encompasses the sale, purchase, or exchange of live animals and their products (milk, meat, skins, wool, and hides) for income or other commodities. Marketing as an economic activity bridges the gap between production and consumption and creates linkages between sellers and buyers [10]. The rural/village and roadside markets operate periodically, where sellers of livestock meet to offer animal

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trade with collectors, aggregators, and negotiators with other buyers. Butchers or negotiators who convey animals to towns/cities or abattoirs are the principal buyers from farmers. The market structure includes producers, traders, retailers, food service providers, and consumers. Public, privates, inputs, service providers, and regulatory institutions that involve; taxation, licensing, and warranties, are part of the structures [11&12].

Small ruminants demand is driven by; the high population growth rate, rapid urbanization, increased income, health consciousness and a shift in consumption pattern [13]. While Budisatria et al. [14] observed that major religious holidays have a market effect on supply, demand, and prices of small ruminants. In Ghana, most small ruminant flow from low-income surplus areas in the drier savannas to high-income and populous deficit areas via long-distance trade. The demand for sheep and goat meat currently outnumbers the supply in Ghana. Producers cannot simply catch up as demand has doubled the domestic production leaving a wide potential avenue for employment and income generation [15]. However socioeconomic factors such as age, experience, educational level and initial capital influence market performance. For instance, [16] found that experience, age, and educational level has positive impact on market performance. On the contrary [4] traders with higher educational level does not necessarily impact market performance.

Despite these opportunities, several marketing issues hinder the performance effectiveness of small ruminant markets. These issues must be solved when developing a successful small ruminant production and marketing systems. Marketing of small ruminant in urban long-distance destination markets in Ghana consists of few square meters of open space where they keep sheep and goats for sale [16,17]. The livestock market structure is characteristically lengthy (about 3 to 5 stages between producers and consumers) without significant value addition [18,7]. The agricultural market performance of developing countries, observed by policymakers as a critical component to enhance development. The market performance depends on the output of the firm's accomplishment. Williams et al. [19] measured perfect information as an assumption of perfect competition where all traders in each market are acquainted with the market situation.

Conversely, the marketing of sheep and goats is at a rudimentary level as indigenous management practices that are not market-oriented. Poor infrastructures, high transaction costs, limited financial facilities, road harassment, regulatory burden paperwork, unnecessary time wastage, and proliferation of brokers are principal factors that impede the performance of the small ruminant market [12]. According to Gebremedhin et al. [12] brokers charge too high unfixed commissions from buyers, sellers, and transporters, engage in price misinformation and hindrance of transactions. Another issue that hinders the performance of livestock markets is a spatial disconnection between

production zone and high consumption zones [10].

A malfunctioning market revealed by its structure and conducts having the potential of bringing up higher transaction costs and inequities in income distribution, among others. Thus, ex-communicated smallholder ruminant producers from market participation put the potential of the livestock sub-sector in jeopardy. This study aimed at analyzing the performance of the small ruminants market and identifying possible improvement options to enhance benefits to small-scale traders. Also, foster a better understanding of the challenges facing livestock traders and help to bridge the information gap identified in the livestock market. Therefore, this study sought to answer the following research questions: What are the costs and returns of sheep and goats marketing? What are the factor that influenced the performance?

2. Materials and Method

2.1. Description of Study Areas

Based on the predominant and consumption of small ruminants, we conducted this study in two urban cities (Kumasi and Tamale) in Ghana. Another reason for choosing these urban towns is the numerous sheep and goats markets found in different locations in these metropolis.

Kumasi is the second-largest city in Ghana, situated at the transitional forest zone and is about 270 Km north of Accra. Kumasi municipality is the most populous district in the Ashanti region and has a population of (2,396,458) with an annual growth rate of (4.8%) [20] Tamale is the capital of Northern Region of Ghana and has a population of (371,351) [21]. Tamale is the third-largest settlement in Ghana and the second fastest growing city after Kumasi [21]. Most Tamale residents are moderate followers of Islam, as reflected in the multitude of mosques in Tamale [21].

2.2. Sampling Procedure and Sample Size

We employed a multi-stage sampling method for this research. Again, we purposively selected two urban cities due to distribution patterns of sheep and goats in the country. Furthermore, the selection of the study areas was due to the geographical disjoint in production and consumption of small ruminants. A pilot survey was conducted in Kumasi and Tamale cities to identify the existing markets and develop the sample frame. Data collected from key informants (market heads and experienced traders in the various markets. Based on the appreciable number of small ruminant traders, we chose ten (10) main markets in Kumasi and Tamale. We used a disproportionate stratified sampling technique to meet the sample of marketers in each stratum representing (market) the proportion of the chosen sample size. Finally, we randomly selected (284) small-ruminants traders consist of (149) traders in Kumasi and (135) traders in Tamale.

2.3. Data Collection

We used a pre-tested semi-structured questionnaire to collect primary data on small ruminant traders. The questionnaire was developed and pre-tested before commencing the actual survey. Some information captured in the questionnaire was the trader's demographic characteristics, transaction cost, trading variables, and constraints of urban small ruminants markets. Focus group discussion and key informant interviews were also applicable in the primary data collection. We grouped sheep and goats into three categories in the data collection: small, medium, and large size classes based on their prices. We took weights of ten (10) goats and ten sheep in each size class to compute the average weight in each class sampled market. We show the weighted average of the different size classes in Table 1.

Table 1. Weights of Sheep and Goat in their Size Classes

Size Class	Goat Weight (Kg)	Sheep Weight (Kg)
Small	26.58	41.28
Medium	37.42	62.28
Large	57.54	75.28
Average	40.51	59.83

Source: Field survey Data

2.4. Data Analysis

The descriptive statistics used are; frequency distribution tables, arithmetic means, standard deviation, and percentage to analyze the socio-economic characteristics and marketing performance. Also, we used regression analysis to describe the relative performance of small ruminates trade. The model was used to measure the degree, cause, and effect relationship between the variables. For analysis, we processed the data in Statistical Package for Social Scientists version 21 (SPSS 21).

2.4.1. Market Performance

We assessed the performance by estimating marketing costs, marketing margins, and profitability. Gross margin measures the returns on own labor and capital can be a good indicator of business performance, and variable costs are influenced by assets and trading practices. Hence, we considered both variable cost and gross margin as indicators of measuring performance.

2.4.2. Estimation of Marketing Costs

There are different marketing costs related to the latest transaction of sheep and goat traders and recorded marketing costs to the last month of business for each trader. The weighted average method was used to obtain the average marketing costs for each respondent (trader), hence average marketing costs was computed as:

$$AMC = \frac{X_i Q_i}{Q_i} \quad (1)$$

Where; AMC = Average marketing cost of quantity sheep and goat traded in an average batch, Q_i = quantity handled during the latest transaction for each trader; used as a weighing coefficient and X_i = Different types of marketing costs of the latest transaction incurred by each trader.

2.4.3. Estimation of Marketing Margins

According to Maikasuwa and Jabo [4], marketing margin is almost to profit margin that shows the relationship between the amount a firm pays for a product and the amount its customers pay. Maikasuwa and Jabo [4] defined market margin as the difference between the cost of the seller and the consumer. The marketing margin gives a close approximation of the market performance. Firms use marketing margin as a way of figuring profitability. A high marketing margin signifies a higher level of profitability and a higher level of business stability [4]. The marketing margin can be expressed either in nominal terms or in percentages. We adopted the formula from [4] for estimating market margin that revealed the margin of a specific actor within the market channel.

$$MM = \frac{\text{Selling price} - \text{Supply price}}{\text{Selling price}} * 100 \quad (2)$$

Where MM is market margin of actor.

Net market margin is expressed as

$$NMM = \frac{GMM - AMC}{CP} * 100 \quad (3)$$

Where: NMM is net marketing margin of actors, GMM is gross marketing margin, AMC is average marketing cost and CP is consumer price.

Net marketing margin of actor.

2.4.4. Regression Analysis

A linear multiple regression analysis was employed to determine the factors that influence the performance of small ruminant's market. The linear regression model can be expressed as:

$$P = \alpha + \beta_i X_i + \varepsilon_i \quad (4)$$

Where: α is constant; β is the slope; X_i is the explanatory variables and ε_i is the error term.

The empirical model use to determine factors that influence the performance of small ruminant market can be expressed as:

$$P = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \varepsilon_i \quad (5)$$

Where; P is Net marketing margin, α is the constant, $\beta_1 - \beta_{11}$ estimated regression coefficients, $x_1 - x_{11}$ are the explanatory variables and ε is the stochastic term.

X_1 = Trader's age, X_2 = Year of Experience, X_3 = Educational level, X_4 = Initial capital, X_5 = Access to credit, X_6 = Cost of animals, X_7 = Transaction cost, X_8 = Regulatory cost, X_9 = Total animal traded, X_{10} = Number of trips made per year and X_{11} = Gross revenue.

3. Results and Discussion

3.1. Socioeconomic Profile of SG Traders and Enterprises

The result in Table 2 shows the socio-economic characteristic of small ruminant's traders in Kumasi, Tamale, and the Pooled. A total of 284 small ruminants traders comprising (52.46%) in Kumasi and (47.53%) in Tamale were involved in the live sheep and goat trade. It was found

that small ruminant trade in both cities is dominated by men (95%). This result is in line with [22] who reported a similar pattern in Ethiopia where (90.8%) of traders engaged in live sheep and goats' trade were men. Nonetheless, 14 (4.9%) of the respondent were females found actively participating in the mobilization, transportation, and trade of live sheep and goats in Kumasi and Tamale. About (80%) of all traders were between the ages of (31) and (50) years, the majority of whom were married, (75%) in Kumasi and (96%) in Tamale. Regarding the level of education of traders, the survey results show that nearly (32.4%) of all respondents attained primary level. The majority of trader (34.2%) in Kumasi were illiterate while (34.1%) attained primary level in Tamale. Only a few trades in both cities Kumasi (4.7%) and (3.7%) had a maximum of tertiary school education.

Table 2. Frequency Distribution of some Demographic Attributes of Traders

Variables		Kumasi		Tamale		Pooled	
		Freq.	%	Freq.	%	Friq.	%
Gender	Male	137	91.9	133	98.5	270	95.1
	Female	12	8.1	2	1.5	14	4.9
	Total	149	100	135	100	284	100
Marital status	Single	29	19.5	3	2.2	32	11.3
	Married	111	74.5	130	96.3	241	84.9
	Divorced	7	4.7	2	1.5	9	3.2
	Widow	2	1.3	-	-	2	0.7
	Total	149	100	135	100	284	100
Age	<=30 years	15	10.1	5	3.7	20	7
	31-40 years	69	46.3	52	38.5	121	42.6
	41-50 years	58	38.9	49	36.3	107	37.7
	51-60 years	4	2.7	23	17	27	9.5
	>60	3	2	6	4.4	9	3.2
	Total	149	100	135	100	284	100
Level of Education	None	51	34.2	34	25.2	85	29.9
	Primary	46	30.9	46	34.1	92	32.4
	JHS	27	18.1	32	23.7	59	20.8
	SHS	18	12.1	18	13.3	36	12.7
	Tertiary	7	4.7	5	3.7	12	4.2
	Total	149	100	135	100	284	100

Source: Survey data

Table 3. Descriptive Statistics of Demographic Characteristics of Traders

Variables	Kumasi			Tamale			Pooled			Test of means	
	Freq.	M	SD	Freq.	M	SD	Freq.	M	SD	F	p
Age of respondent	149	41.1	9.73	135	43.06	8.66	284	42.03	9.27	3.19	0.08
Year of schooling	126	8	3.24	76	6.74	3.26	202	7.52	3.3	7.18	0.01
Experience in SG trade	149	15.1	8.81	135	14.81	9.72	284	14.96	9.24	0.07	0.98
Years away from SG trading	32	2.59	1.6	26	4.65	4.04	58	3.52	3.1	6.99	0.01

Source: Field survey 2015 Note. M = Mean of variable, (SD) = Standard Deviation, F = F-statistics and P = P-value

The comparative descriptive statistics in Table 3 reveals a significant difference in average ages of traders (p-value of 0.08). It implies that Tamale traders were older (average age of 43 years) compared to those in Kumasi (41 years). While Kumasi trader spent more years of schooling (8 years) than that of Tamale traders which is highly significant at 1%. The number of year's traders have shifted away from sheep and goats' trade for other activities was also significant (p-value 0.01). It was found that more traders in Kumasi (32 relative to 26 traders) shifted to other economic activities, but for relatively shorter periods (3 relative to 5 years) relative to those in Tamale. This situation is consistent with the economic differences between the two towns. It is the case that Kumasi for that matter is a more commercially oriented location and thus offers more options of commercial engagements. Experience was measured in term of number of years spent in the business the result reveal most of the traders in the pooled have been in a live small ruminant trade for (15 years).

3.2. Enterprise Characteristics

Table 4 indicates the average quantities of animal purchase and the number of trips made per month. The finding in the Pooled data shows an average of (24) goats, (17) sheep and three (3) trips are done per month. Test of means shows that the average number of sheep and goats handled in an average batch, and number of trips made during a month were significantly higher in Kumasi than that of Tamale. About (29) goats and (18) sheep and three trips per month were made in Kumasi while in Tamale, (17) goats and (15) sheep and two trips were made per month. This is due to the high demand for small ruminants in Kumasi which is linked with change in eating style, low production of livestock, high-income level of inhabitants and preference of high value food animal protein and consumers depend holistic the market for animal protein.

Table 5 shows descriptive statistics of buying and selling prices disaggregated at the city level. It may be inferred from the table that the cost price of goats but not sheep are significantly different between traders in Tamale and those in Kumasi. The former reports lower prices for goats and higher prices for sheep. Relative to size categories, small and medium goats cost Kumasi traders about (GH¢ 5.00) more, whereas large goats cost about (15.00) compared to Tamale. Sheep prices however are not significantly different between traders in the two cities as mean prices are (GH¢ 1.41, GH¢ 4.21 and GH¢ 12.63) higher among Tamale traders for the respective size classes.

The selling price of medium weighted sheep is statistically significant between Tamale and Kumasi at (5%) Significance level. For goat however, the selling price is (GH¢ 15.00, GHC 20.00 and GH¢25.00) higher in Kumasi for small medium and large sheep respectively at (1%) significance level. A typical goat offered in Tamale is sold for a mean price of (GH¢ 140), whereas a similar goat in Kumasi goes for (GH¢ 190.00).

Purchase and selling prices of goats and sheep differ significantly relative to the location of the traders. For sheep, however, cost prices and selling prices are less likely to differ significantly among the traders in the two cities. Among other reasons, sheep consumption peaks with Muslim ceremonies and festivities, and goats with Christian festivities. Since there are more Muslims in Tamale than Kumasi, this is likely to be the case that the demand and hence prices of goats in Kumasi is higher relative to Tamale. High goat prices in Kumasi is buttressed by the relatively higher local demand for meat products. For sheep, high consumption may be in Tamale but proximity to sources of production and hence lower transaction costs relative to Kumasi, may absorb any likely growth in price resulting from higher demand. As a consequence, the price levels in the two cities vary only slightly.

Table 4. Average Sheep and Goats Traded per Trip and Number of Trips per Month and Year

Animal Quantity	Kumasi			Tamale			Pooled			Test of mean	
	Freq.	M	SD	Freq.	M	SD	Freq.	M	SD	T	P
Small Goat	107	9.24	7.15	95	5.26	3.58	202	7.37	6.07	13.38	0.00
Medium Goat	127	11.2	10.32	104	7.13	4.95	231	9.37	8.56	12.25	0.00
Large Goat	140	12.74	8.60	108	6.95	6.26	248	10.22	8.17	17.54	0.00
Total Goat	145	28.93	19.99	118	16.87	11.84	263	23.52	17.84	17.24	0.00
Small Sheep	65	12.82	61.58	89	5.67	3.83	154	8.69	40.09	8.46	0.10
Medium Sheep	89	7.60	10.79	111	7.20	5.06	200	7.38	8.11	7.31	0.73
Large Sheep	93	8.94	9.79	99	7.05	6.11	192	7.96	8.14	11.30	0.11
Total Sheep	102	18.15	20.58	128	15.27	11.82	230	16.55	16.32	10.82	0.19
Total SG traded	148	41.01	31.57	135	29.24	19.16	283	35.4	26.99	17.15	0.00
Trips										T	P
Trips per month	149	3.01	0.82	135	2.18	0.77	284	2.62	0.90	2.44	0.02
Trips per year	149	39	9.5	135	33.09	28.15	284	36.21	20.77	2.42	0.02

Source: Survey data Note. M = Mean of variable, (SD) = Standard Deviation, T = T-statistics and P = P-value Source

Table 5. Purchase and Selling Prices of SG among Traders in Kumasi and Tamale

PRICES	Kumasi			Tamale			Pooled			Test of means	
	N	Mean	SD	N	Mean	SD	N	Mean	SD	F-stat	p-value
Purchase price Goat (GH¢)											
Small	105	49.45	20.36	94	42.3	27.24	199	45.67	24.06	4.457	0.036
Medium	127	94.43	30.09	104	88.68	22.58	231	91.84	27.07	2.591	0.109
Large	140	148.66	27.28	108	133.09	22.25	248	141.88	26.33	23.25	0.000
Average	145	103.80	26.62	118	95.60	22.95	263	100.12	25.33	6.973	0.009
Purchase price for Sheep (GH¢)											
Small	69	108.22	29.49	90	109.63	25.48	159	109.02	27.21	0.105	0.746
Medium	97	162.76	40.3	110	166.97	43.96	207	165.00	42.24	0.511	0.476
Large	104	230.92	57.54	98	243.55	50.81	202	237.05	54.61	2.721	0.101
Average	117	174.47	38.12	127	177.04	45.63	244	175.81	42.13	0.226	0.635
Selling price for goat (GH¢)											
Small	106	128.1	18.2	94	95.7	26.6	200	112.9	27.7	103.38	0.000
Medium	128	179.3	31.3	105	136.5	20.6	233	160.00	34.4	38.717	0.000
Large	140	233.6	41.6	108	175.9	31.1	248	208.5	47.1	83.967	0.000
Average	145	189.87	32.87	118	140.19	24.15	263	167.58	38.30	187.24	0.000
Selling price for sheep (GH¢)											
Small	70	185.9	44.4	93	154.00	45.1	163	167.7	47.40	3.081	0.080
Medium	101	238.3	55.6	112	237.4	60.8	213	237.8	58.2	6.885	0.009
Large Sheep	104	338.5	70.4	102	317.8	68.5	206	328.3	70.00	0.042	0.839
Average	118	264.82	58.50	129	242.32	63.98	247	253.07	62.33	8.272	0.004

Source: survey data Note. M = Mean of variable, (SD) = Standard Deviation, F = F-statistics and P = P-value GH¢= Ghana Cedi

Table 6. Sheep and Goat Trading Cost

Cost	Kumasi			Tamale			Pooled			Test of mean	
	N	Mean	SD	N	Mean	SD	N	Mean	SD	F- Stat	Sig.
Animal	148	5390.61	5139.44	135	4056.41	2765.97	283	4754.15	4224.92	7.195	0.00
Transaction	149	804.75	653.89	135	316.01	262.61	284	572.43	562.18	65.786	0.00
Regulatory	149	134.85	78.48	135	86.28	130.67	284	111.76	109.07	14.727	0.00
Total cost	149	6294.03	5738.28	135	4458.70	2955.04	284	5421.60	4711.47	11.133	0.00

Source: Survey Data

3.3. Margins in the Trade of Small Ruminants

Margins as defined by the net return per animal estimated through cost, revenue and size of operations (number of animals in a usual batch traded). Three (3) groups of cost items characterised the sheep and goat trade in the two Ghanaian towns. They include animal (stock), transaction and regulatory costs. Table 6 above depicts that animal (stock) cost constitutes the largest cost profile in magnitude, being about (GH¢ 4754.00) per batch traded followed by transaction costs. The latter reached an average amount of (GH¢ 562.00) per batch. Regulatory cost is the smallest amounting to (GH¢ 112.00) per batch. Kumasi traders report significantly larger costs in terms of all these categories as the f-statistics shows.

A disaggregated view of costs is presented in Table 7 showing a profile of costs in sheep and goats trade. When total cost is expressed as the sum of average costs from the

pooled sample (see Table 7), the major cost items emerging included transportation costs (7.2%), payments to brokers (1.66%), unofficial payment during transit (1.13), and labour payments (2.29%). Other relatively significant costs identified were medication cost (0.84%), gathering (0.54%) and feeding (0.5%) costs. The cost profile of sheep and goat trade is dominated by animal cost, which averages (GH¢ 4754.00) on the whole and accounts for (85%) of total trade costs. Between Tamale and Kumasi, all cost categories except for veterinary costs are significantly different at (1%) payments to commission agents is significant only at (10%) alpha level. Whereas the Kumasi based traders reported higher costs on most key trade cost items, the local Tamale trader exceeded in feeding (GH¢ 35.00 relative to GH¢ 20.00), medication (GH¢ 10.00 relative to GH¢ 7.00), veterinary inspections (GH¢ 50.00 relative to GH¢ 42.00) and annual licensing (GH¢ 5.50 relative to GH¢ 3.80) costs.

Table 7. Cost Items of Sheep and Goat Trade

Cost item	Average cost GH¢	% of total batch cost
Gathering	30.2	0.54
Transportation	404.47	7.20
Feeding	27.33	0.49
Medication	8.36	0.15
Housing/ Security	16.28	0.29
Sale ground	19.6	0.35
Commission	14.52	0.26
Brokers	93.42	1.66
Labour	128.36	2.29
Total transaction	742.54	13.23
Unofficial payment	63.48	1.13
Veterinary	45.78	0.82
Regulatory	4.32	0.08
Licensing	4.23	0.08
Total Regulation	117.81	2.10
Animal cost	4754.15	84.68
Total cost	5614.5	100.00

Source: Survey Data

Variation of market margins with trader and enterprise features

The accompanying revenue per batch of all transactions are evaluated at size-class level with results displayed in Table 8. Average revenue from the sheep transactions alone is about (GH¢ 300) more than the goat trade. The latter averages (GH¢ 4094.00) across the two urban centres. Whereas most of the goat revenue emanates from medium size animals with a mean class revenue of (GH¢ 2462.00), most of sheep revenues is raked-in by large-sized sheep (class mean revenue of (GH¢ 2667.00). Total trade revenue per enterprise per batch averages (GH¢ 7598.23). Differences between Tamale and Kumasi in terms of all revenue parameters for goats were statistically significant at (1%) significance levels. For sheep however, only revenue from large sheep and the total revenue for sheep differs

significantly between the towns at (10%) significance levels. While the average for sheep is (GH¢ 4945.00) in Kumasi and (GH¢ 3779) in Tamale. For goats, however, the revenue reported from Kumasi traders (GH¢ 5592.00) is more than double that reported in Tamale (GH¢ 2318.00). The pattern of contribution of each size-class to revenue in the pooled sample is maintained between Tamale and Kumasi.

Again, costs have been elaborated above, Appendix 1 displays net profits and trade margins per animal traded after exclusion of outliers and unrealistic data points. The Total cost then averaged (GH¢ 6420.00) for Kumasi, (GH¢ 4419.00) for Tamale and (GH¢5449.00) over the survey having been summed from costs of the various animal size classes. Only small differences in total cost per size-class of sheep ranging from (GH¢100-200) were recorded between Tamale and Kumasi, but statistically not significant. Total costs among Kumasi trades for size classes of goats were very different and hence statistically significant.

Consequently, small goat dealers made about (GH¢ 563) per batch in Kumasi, whereas their counterparts in Tamale made (GH¢179.00). Large goat dealers in Kumasi also made about (GH¢570) on a batch more than traders of similar animals in Tamale. Net profit differences between Tamale and Kumasi for medium goats and sheep were not statistically significant. Also, mean net profits for small and medium goats differed significantly at 1% significance level, only the difference for the large category of sheep is significant at (5%) level of significance.

On the whole, Kumasi traders made significantly higher net profits in both the goat (GH¢ 706.00) and sheep (GH¢ 542.00) trade relative to Tamale traders (GH¢ 323.00) for goat and (GH¢245.00) for sheep. At the enterprise level, traders across both towns make very variable profits as can be judged from the large value of the standard deviation. Regardless of trader location (Pooled), net profits of enterprise operations average (GH¢ 399.00). Enterprise specific net profit per batch again is in favour of Kumasi traders with (GH¢ 535.00) and (GH¢ 256.00).

Table 8. Descriptive Statistics for Revenues in Sheep and Goat Trade

Revenue (GH¢)	Kumasi			Tamale			Pooled			Test of means	
	N	Mean	SD	N	Mean	SD	N	Mean	SD	f-stat	sig
Small goat	138	878.04	986.42	130	349.54	391.41	268	621.68	802.07	32.49	0.00
Medium goat	116	3142.75	2790.71	99	1665.32	1207.63	215	2462.45	2323.32	23.91	0.00
Large goat	129	2904.26	2099.60	104	1141.25	1037.10	233	2117.34	1918.62	61.24	0.00
Goat	134	5591.97	3949.88	113	2318.13	1734.99	247	4094.22	3532.20	66.74	0.00
Small sheep	61	1771.97	6342.34	86	827.14	573.21	147	1219.21	4115.88	1.89	0.17
Medium sheep	85	1788.32	2493.56	106	1639.72	1220.61	191	1705.85	1891.50	0.29	0.59
Large sheep	88	3078.39	3552.65	96	2289.06	2189.45	184	2666.57	2940.26	3.35	0.07
Sheep	111	4945.14	7070.75	124	3778.58	3038.96	235	4329.60	5356.98	2.80	0.10
Gross trade revenue	137	9476.17	8730.70	130	5619.18	3703.57	267	7598.23	7025.29	21.67	0.00

Source: Survey Data

Table 9. Net Market Margin of Sheep and Goats

Sizes	Kumasi			Tamale			Pooled		
	Selling prices (GH¢)	Net profit (GH¢)	Net margin (%)	Selling prices (GH¢)	Net profit (GH¢)	Net margin (%)	selling prices (GH¢)	Net profit (GH¢)	Net margin (%)
Small Goat	128.1	61.41	47.94	95.7	31.66	3.08	112.9	47.16	41.77
Medium Goat	179.3	44.1	24.60	136.5	66.63	48.81	160.0	54.42	34.01
Large Goat	233.6	59.45	25.45	175.9	24.86	14.13	208.5	44.01	21.11
Average Goat	189.87	46.93	24.72	140.19	35.39	25.24	167.58	41.65	24.85
Small Sheep	185.9	51.6	27.76	154	29.68	19.27	167.7	38.77	23.12
Medium Sheep	238.3	56.94	23.89	237.4	54.43	22.93	237.8	55.54	23.36
Large Sheep	338.5	83.9	24.79	317.8	60.27	18.96	328.3	71.57	21.80
Average sheep	264.82	53.37	20.15	242.32	38.23	15.78	253.07	44.87	17.73

Source: Survey Data

Table 10. Factors that Influence the Performance of Small Ruminant Market

Variables	Coefficients (β)	Std. Error	t-Values
(Constant)	115.026	23.21	4.956***
Age	-0.599	0.531	-1.129
Experience	0.067	0.709	0.095
Education	18.457	13.496	1.368
Initial capital	-0.009	0.011	-0.842
Total cost and animal traded per batch/ trip			
Credit facility	19.219	10.339	1.859**
Cost of animals	-0.024	0.002	-11.113***
Transaction cost	-0.096	0.014	-6.691***
Regulatory cost	0.015	0.042	0.354
Total animal traded	1.803	0.417	4.325***
Number of trip made per year	-0.412	0.219	-1.877*
Gross revenue	0.027	0.001	46.011***
R- Square	0.899		
Adjusted R-square	0.894		
F-statistic	218.335***		

Source: Survey Data * 10% significance level, **5% significance level, ***1% significance level

The dominance of Kumasi over Tamale in terms of returns to trade is explained in part by the higher volumes traded. It may also be explained by the relatively higher urbanisation and income levels in Kumasi, which are natural drivers of demand for meat products, thereby increasing demand and purchase. Whereas net profits in Kumasi are almost twice the levels found in Tamale, an evaluation of the return per animal traded, margin, reveals rather interesting facts. For instance, net profits in Kumasi (GH¢ 42.00) per animal differ from those of Tamale (GH¢ 33.00) only by (GH¢ 9.00) per animal for a typical sheep and goat trade enterprise under the survey. At the species level, net profits were higher for sheep relative to goats in Kumasi, averaging (GH¢ 53.00) for sheep and GH¢ about (GH¢47.00). In Tamale, however, the difference is not significant. The Relative contribution of the various size

classes may be seen in the lower portion of Appendix 1. The finding of this study is in line with [24] who reported that profit is positively correlated with the volume of start-up outlay investment for sheep marketing.

Although the net profit per sheep was significantly higher than goat of all size classes, it was not found in the net marketing margin. The result in Table 9 revealed that an average goat (40.5kg) had a net marketing margin of (24.85%), and the average sheep (59.8kg) was (17.73%). This means that for everyone Ghana Cedi invested in goats and sheep the return on capital was (GH¢ 0.25) and (0.18), respectively. Results across the region highlighted that the net marketing margin for goats was almost the same for return on capital; but in the case of sheep, Kumasi traders made a higher net margin (20.15%) relative to Tamale traders' margin per sheep (15.78%). Since the goat net margin was higher than the sheep margin, this implies that goat marketing is more stable and possesses more capacity to respond to competition in the enterprise by reducing prices.

Results from the multiple regression analysis for small ruminants' performance in Kumasi and Tamale is shown in Table 10. The overall regression model was statistically significant when all the independent variables used table 10 in predicting the dependent variable. That is the F-ratio test was $F(11, 217) = 218.335, P < 0.001$. This means that the exogenous variables have adequately described the dependent variable included in the model and the regression model is a good fit for the data. The adjusted R-squares value of 0.898 implies that (89.8%) of variance in dependent variable is explained by the explanatory variables. The results revealed that access to credit facilities in the study area has positive and significant effect on the performance of small ruminants' market ($p < 0.05$). This implies that a one unit increase in credit facility leads to a 19.219 increase in the performance of the small ruminant market in the two cities. Purchasing prices of sheep and goats had a negative and significant impact on the performance of the trade -0.024 ($p < 0.001$). This means that a (GH¢ 1) increase in the cost of animals leads to (0.024) decrease in the performance of the

tread in the study area. Similarly, transaction cost also had a negative and significant effect on the performance -0.096 ($p < 0.001$), showing that a (GH¢ 1) increase in transaction cost will decrease the performance of small ruminant market by (0.096) in the study area. Furthermore, number of animal held per batch/trip has a positive and significant effect on the performance 1.803 ($p < 0.001$), implies that an increase of one animal in urban small ruminant trade will lead to (1.803) performance of the trade. Finally, gross revenue shows a positive and significant on the performance of 0.027 ($p < 0.001$). This means that an increase of (GH¢ 1) in gross revenue will lead to GH¢0.027 in the net market margin. This result is in line with; [24].

4. Conclusions

This study sought to analyze urban small ruminant markets, focusing on the cost performance of the enterprise. The study provided an accurate analysis of the sheep and goats trade in urban centres of Ghana. From the results, most of the traders sell both sheep and goats. The number of animals traded in an average batch was (35) animals. The performance of small ruminants' sheep and goats' markets was assessed by considering trading costs and margins. Also, animal costs accounted for the highest cost (85%), whereas transaction and regulatory costs for (15%) of the trading costs per batch. The study also revealed that sheep and goats marketing is profitable ventures in the study areas. However, goat marketers tend to acquire more profits given their high

capital outlays as compared to sheep. The results also show that every (GH¢ 1.00) invested in sheep and goats results in (GH¢ 0.18) and (GH¢ 0.25) return on capital, respectively. Comparing this result with the return on saving (22%) charged by the Central Bank of Ghana in 2015, goats trading was better off than saving. Although the net margin for sheep was positive but lower than the returns on savings, the goat net margin was higher than the return on savings. So, sheep and goat traders should place more emphasis on goat trading rather than sheep. Transaction cost, number of animals per batch, gross revenue, and access to credit were principal factors influencing the performance of small ruminant trade. Based on the findings, policymakers and other stakeholders should improve the existing infrastructural facilities and provide loan facilities at a low-interest rate to the trader that will boost the performance of small ruminant markets.

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Appendix 1

Appendix 1. Net profits in SG Trade in Ghana Cedis

Name of Region	Kumasi			Tamale			Total			Test of means	
	N	Mean	SD	N	Mean	SD	N	Mean	SD	F	Sig.
Cost											
Small goat	138	473.89	599.62	130	223.98	250.35	268	352.67	480.02	19.39	0.000
Medium goat	138	1709.96	1551.72	130	716.79	795.41	268	1228.20	1337.33	42.68	0.000
Large goat	138	1995.48	1532.30	130	755.13	802.15	268	1393.82	1378.89	67.70	0.000
Small sheep	138	325.46	686.91	130	443.13	502.06	268	382.54	606.10	2.54	0.112
Medium sheep	138	852.31	1756.60	130	1055.19	1015.41	268	950.72	1446.29	1.32	0.252
Large sheep	138	1539.37	2634.29	130	1380.72	1723.96	268	1462.41	2236.73	0.34	0.563
Total cost	138	6420.12	5896.39	130	4418.70	2919.71	268	5449.28	4791.91	12.17	0.001
Net profit of goat and sheep per sizes											
Small goat	99	563.37	505.14	91	179.36	231.98	190	379.45	441.51	44.04	0.000
Medium goat	116	1108.48	2380.55	98	739.84	1124.85	214	939.67	1915.66	1.98	0.161
Large goat	129	769.57	897.09	104	197.34	347.58	233	514.15	760.87	37.72	0.000
Net goat	134	705.55	864.31	113	322.57	388.22	247	530.34	713.48	18.95	0.000
Small sheep	61	1035.67	6385.23	86	157.29	312.40	147	521.79	4123.19	1.63	0.204
Medium sheep	85	404.57	738.10	106	345.62	467.10	191	371.86	601.91	0.45	0.503
Large sheep	88	664.38	875.61	96	419.34	588.06	184	536.53	747.72	5.04	0.026
Sheep	96	541.77	1747.70	123	245.04	299.77	219	375.11	1184.54	3.42	0.066
Goat and sheep	137	534.87	865.71	130	256.11	235.68	267	399.15	655.44	17.13	0.000

Name of Region	Kumasi			Tamale			Total			Test of means	
Net profit of sheep and goat Per animal											
Small goat	99	61.41	22.11	91	31.66	25.13	190	47.16	27.86	75.34	0.000
Margin goat	116	44.10	142.61	98	66.63	138.56	214	54.42	140.89	1.36	0.245
Large goat	129	59.45	46.43	104	24.86	37.63	233	44.01	45.99	37.74	0.000
Goat	134	46.93	47.40	113	35.39	49.20	247	41.65	48.48	12.59	0.000
Small sheep	61	51.60	52.39	86	29.68	44.00	147	38.77	48.71	7.55	0.007
Medium sheep	85	56.94	53.23	106	54.43	53.80	191	55.54	53.42	0.10	0.747
Large sheep	88	83.90	55.60	96	60.27	51.39	184	71.57	54.60	8.98	0.003
Sheep	96	53.37	35.42	123	38.23	33.70	219	44.87	35.20	10.41	0.001
Sheep and goat	137	41.65	31.21	130	33.47	28.99	267	37.66	30.37	4.92	0.270

REFERENCES

- [1] R. S. Wubie, G. T. Kassie, A. Haile, J. Wamata and B. Rischkowsky, 2018 "Business Models for Selected Interventions for the Development of Small Ruminant Value Chains in Ethiopia." International Center for Agricultural Research in the Dry Areas.
- [2] H. D. Wodajo, B. A. Gemedo, W. Kinati, A. A Mulem, A. van Eerdewijk and B. Wieland, 2020 "Contribution of small ruminants to food security for Ethiopian smallholder farmers". Journal of Small Ruminant Research 184 (2020).
- [3] F. Adams, K. Ohene-Yankyera, R. Aidoo and C. A. Wongnaa, 2021 "Economic benefits of livestock management in Ghana." Journal of Agricultural and Food Economics, 9(17).
- [4] M. A. Maikasuwa and M. S. Jabo, 2014 "Analysis of sheep and goats marketing in sokoto Metropolis, Sokoto State, Nigeria". International Journal of Agricultural Science and Veterinary Medicine, 2(1).
- [5] A. A. Hatab, M. E. R. Cavinato and C. J. Lagerkvist, 2019 "Urbanisation, livestock systems and food security in developing countries: A systematic review of literature." Food Security 11:279-299.
- [6] F. Adams and K. Ohene-Yankyera, 2014 "Socio-economic Characteristics of Subsistent Small Ruminant Farmers in Three Regions of Northern Ghana". Asian Journal of Applied Science and Engineering, 3(3).
- [7] F. Adzitey, 2013 "Animal and Meat Production in Ghana-An Overview." Journal of World's Poultry Research, 3(1).
- [8] K. Oppong-Ananne, 2011 "Ghana livestock sector review report". A report submitted to the Food and Agriculture Organization of the United Nations."
- [9] D. Gambelli, F. Solfanelli, S. Orsini and R. Zanoli, 2021 "Measuring the Economic Performance of Small Ruminant Farms Using Balanced Scorecard and Importance-Performance Analysis: A European Case Study." Sustainability, (13) 3321.
- [10] A. A. Girei, B. Dire, and B. H. Bello, 2013 "Assessment of cost and returns of cattle marketing in central zone of Adamawa state, Nigeria". British Journal of Marketing Studies, 1(4).
- [11] E. R. Martey, R. M. Al-Hassan and J. K. M. Kuwomu, 2012. "Commerciaization of Small Holder Agriculture in Ghana: A Tobit Regression Aanalysis". African journal of agricultural research 7(14).
- [12] F. S. Kassoh, J. Abdulai, O. Nabay and R. Bockarie, 2017 "Determinants of Inlet Choices of Sheep and Goats Traders in Ghana: A Case Study of Kumasi and Tamale." Journal of Agricultural Science 9(7).
- [13] B. Armson, A. B. Ekiri, R. Alafiatayo and A. J. Cook, 2021 "Small Ruminant Production in Tanzania, Uganda, and Ethiopia: A Systematic Review of Constraints and Potential Solutions." Veterinary Science, 8 (5).
- [14] I. Budisatria, S. Gede M. J. U. Henk A. J. van der Zijpp, E. Baliarti, and T. W. Murti, 2008 "Religious festivities and marketing of small ruminants in Central Java-Indonesia." Asian Journal of Agriculture and Development 5, (1362-2016-107701).
- [15] D. O. Yawson, B. J. Mulholland, T. Ball, M. O. Adu, S. Mohan and P. J. White 2017. "Effect of climate and agricultural land use changes on UK feed barley production and food security to the 2050s." Land, 6(4), 74.
- [16] F. S. Kassoh, J. Abdulai, K. Ohene-Yankyera, 2017 "Assessing the Structural Arrangement of Small Ruminant Markets in Kumasi and Tamale, Ghana." International Journal of Science and Research, 319-7064.
- [17] K. Amankwah, L. Klerkx, S. Oosting, O. Sakyi-Dawson and A. V. Zijpp, 2013. "Diagnosing constraints to market participation of small ruminant producers in northern Ghana: an innovation systems analysis". NJAS Wageningen Journal of Live Sciences.
- [18] Y. Aklilu, P. D. Little, H. Mahmoud and J. McPeak, 2013 "Market access and trade issues affecting the drylands in the Horn of Africa. Kenya, Kenya: International Livestock Research Institute (ILRI)".
- [19] T. O. Williams, B. Spycher and I. Okike, 2003 "Improving Livestock Marketing and Intra-Regional Trade in West Africa: Determining Appropriate Economic Incentives and Policy Framework". International Livestock Research Institute (ILRI). Nairobi, Kenya.
- [20] Ghana Statistical Service (GSS), 2010. Ghana Living Standards Survey Round 5 (GLSS5). GSS, Accra, Ghana". Retrieved from http://www.statsghana.gov.gh/docfiles/glss6/GLSS6_Main%20Report.pdf.

- [21] I. Fuseini, J. A. Yaro and G. A. Yiran., 2017. City profile: Tamale, Ghana. *Cities*, 60, 64-74.
- [22] K. Zewdie, 2014 “Assessment of the Performance of the Goat Marketing System in Afar Region, Ethiopia (Doctoral Thesis, Mekelle University).
- [23] J. A. Afolabi, J.A., 2007. Evaluation of Poultry Egg Marketing in South-Western Nigeria. *International Journal of Poultry Science*, 6(5).
- [24] A. Saleh, Y. Adamu. I. Mohammed, K. Hamidu, S. Yau and M. Hussaini Sani, 2019 “Analysis of Market Performance of Small Ruminants in Gombe State Nigeria”. *Journal of Agricultural Science and Engineering*, 5(1).

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