

Determinants of Inlet Choices of Sheep and Goats Traders in Ghana: A Case Study of Kumasi and Tamale

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Abstract

The consumption of Small ruminants' meat (sheep and goat) form an integral component of an average Ghanaian's diet due to the country's emergence to a middle income earning status and awareness of the outstanding benefits of a nutritious diet. However, periodic shocks in market availability of products severely impacts access and in most cases cause price hike hence affecting dietary patterns especially of urban dwellers that are mostly habitual in recurrent consumption of these products. Against such insight, this study investigates the factors that influence the inlet choice of sheep and goats traders in two urban towns of Ghana (Kumasi and Tamale) using Multinomial logit model. The selection of Kumasi and Tamale markets were based on the progressive marketing and consumption of sheep (S) and goats (G). A multi stage sampling technique was used in this study. A reconnaissance survey was carried out in Kumasi and Tamale metropolis in order to identify the existing markets and to generate the sample frame. Ten markets were purposively selected based on the proximity of the markets to the urban centres. A total of 284 traders were randomly sampled from the sampling frame. A structured questionnaire was used to collect relevant data, and analyzed using descriptive statistics and inferential statistics. The results of the study showed that majority of the traders were male with most (43%) falling within the age range of 31 to 40 years. International market (Burkina Faso) was identified as the major source of sheep and goats with 37% of total respondents sourcing from there. The major factors found to be influencing the inlet choice of sheep and goats by sampled traders in the study areas were prices, licenses, quantity of animals handled, transportation cost, education, experience and age of the traders. Based on the findings of the study, the following recommendations were suggested to improve the SG trade in urban centres of Ghana: Credit provision to traders who desire it to establish and expand their investment; reduction of license cost; and general reduction of fuel price so as to ease economic mobility of products.

Keywords: determinants, inlet choice, small ruminant trading

1. Introduction

Sheep and goats are economically important in agricultural sector of most developing countries including Ghana. Small ruminants are mostly managed by household members and require low start-up capital, low maintenance costs, minimal land area and can increase in flock size within a short period (Winrock, 1983). Ghana is well-endowed with indigenous livestock, particularly small ruminants, which are a major component of the pastoral population's household economy. The average domestic population of live sheep and goats in Ghana between 2001 and 2010 is estimated to be 3,269,460 and 2,958,568 respectively (Adzitey, 2013). Small ruminants are an integral part of livestock keeping in most urban and peri-urban households in Ghana. About 25 percent of 13.3 million small ruminants are produced in urban and peri-urban dwellings (Oppong-Anane, 2011). The northern regions are the major production centres of small ruminants in Ghana. Kumasi, Accra and Tamale metropolis are the highest consumption areas.

An improved and integrated market mechanism particularly those of Ghanaian urban markets where rising demand for protein needs have been reported due to high population growth rates, rapid and increasing

urbanization, growing incomes and changing eating habits (Keyzer, Merbis, Pavel, & Wesenbeek, 2005). An efficient and good performing market is critical in inspiring producers to increase production, creating appropriate incentives for traders and meeting consumers' needs more adequately in terms of type, quality and quantity of supply (Hailemariam et al., 2008). In addition, such effective and efficient market mechanism has a positive impact on the income of the producers, traders and other market actors in urban centers and subsequently the improvement of the Ghanaian economy in general in terms of GDP contribution.

Marketing of small ruminants in urban towns is low due to many impeding factors such as long distance destination markets in Ghana, which consist of few square metres open space where the goats and sheep are kept for sale (Asafu-Adjei & Dantankwa, 2001; Amankwah, Klerkx, Oosting, Sakyi-Dawson, & Zijpp, 2013). The market value chain of cattle, sheep and goat is characteristically lengthy (about 3 to 5 stages between producers and abattoirs) without significant value addition (Aklilu, Little, Mahmoud, & McPeak, 2013; Gebremedhin, Hoekstra, & Jemaneh, 2007). Another important feature of livestock markets is the spatial disconnection between production zone and high consumption zones especially urban centre (Girei, Dire, & Bello, 2013).

Despite the aforementioned issues, the small ruminant market is also affected with a number of problems which go a long way to hinder the effective performance of these markets. Issues such as long distance to product centres, poor road networks, high cost of transportation, and limited market information are some of the additional hindrances in realizing the optimal performance of small ruminants industry in Ghana. However, in order to develop good policy recommendations for live small ruminant marketing in Ghana and to further enhance its efficiency, there is a need to unravel the key factors that influence the inlet choices of these products by traders in the country such a study has been neglected in related literature of this industry and hence helping to bridge such existing gap in knowledge in sheep and goat marketing in Ghana.

Sheep and goats are traded via several marketing channels from farmer to final consumers in both the internal and international markets, which are said to be lengthy, without significant value-added activities (Negassa, Rashid, & Gebremedhin, 2011). Market channels are considered to be long or short depending on the source, nature and quality of the product marketed (Islam, Miah, & Haque, 2001). From farmer to ultimate consumers, livestock products may pass through or be sold to wholesalers, retailers, processors, marketer/grower groups and storage operators among others (Rae, 1981; Negassa et al., 2011).

The literature is replete with studies dwelling on factors affecting producer choice of market channels or outlet especially for cattle markets, but much is not reported of traders' choice of source(s) of supply. These factors are unlikely to be different among buyers but the preferred statuses may be different. The similarity of the markets however, suggests only minor differences may exist in the details. Rae (1981) suggests that financial standing and marketing objective of the producing enterprise, accessibility to channel, potential of buyers relative to managing the nature of product are significant determinants of the choice of a marketing channel. Angula (2010) used a double hurdle model to identify the determinants of coffee growers' choice of marketing channel and found that sales volume decisions, labour availability, size of farm, and crop sales revenue are important determinants of coffee growers' choice of marketing channel. Sujarwo, Kopp, Nurmalina, Asmarantaka, and Brummer (2014), used a multinomial logistic regression model to identify factors that influence the choice of marketing channel by small rubber traders in Indonesia. This study reported that location of the market, access to credit, access to market information and trader characteristic were factors that significantly influence the choice of outlet markets.

2. Material and Methods

2.1 Materials Studied

This paper studied two major small ruminants markets (sheep and goats) in both Kumasi and Tamale in Ghana basically due to an appreciable consumption of these animal products in the two cities. Further reason for considering these areas is the numerous sheep and goats markets found in different locations of these two cities. This gives a glimpse of possibility of traders sourcing from different inlets so as to maintain product stock levels in the markets and to further off-set periodic shock in market availability of products to consumers.

2.2 Description of Study Areas

Kumasi metropolis is among the 30 districts in Ashanti Region and considered as the second largest city in Ghana. Kumasi metropolitan is located in the transitional forest zone and is about 270 km north of the capital Accra. It lies between latitude 6°.350-6°.400 and longitude 1°.300-1°.350 with an area of 256 square kilometres. Largely, it shares boundaries with the Kwabre District to the north, Atwima Kwanwoma and Atwima Nwabiagya District to the west, Ejisu-Juaben Municipal to the east and Bosomtwe to the south. Kumasi municipality is the

most populous district in the Ashanti Region and has a population of 2,035,064 with an annual growth rate of 4.8% (GSS, 2010). The unique position of the metropolis formed the hub in the country and making it an ideal place for business activities. Kumasi is like any other urban centre with little agricultural activities in which the agricultural sector contributes about 10% of the metropolis' GDP (Aidoo et al., 2011). However, Kumasi metropolis is purely engaged in livestock consumption with little production, in which most of the livestock flows from the North into the southern region where demand is so high (Amankwah et al., 2013).

Tamale's metropolis is located in the central part of the Northern Region and shares boundaries with five other districts, Savelugu-Nanton to the north, Yendi Municipal Assembly to the east, Tolon-Kumbungu to the west, Central Gonja to the south west and East Ganja to the south. The metropolis has a total estimated land size of 550 square kilometers. It has a 2013 projected population of 562,919 (Ghana Statistical Service, 2010), making it the third largest settlement in Ghana and the fastest growing city in West Africa (Ghana Statistical Service, 2010). Most of Tamale's residents are followers of Islam, as reflected by the multitude of mosques in Tamale (Ghana Statistical Service, 2010).

2.3 Research Methodology

2.3.1 Sampling Method

A multi-stage sampling technique was adopted for the study. Two urban centres were purposively selected based on the production and distribution patterns of sheep and goats in the country. In addition, the selection of the study areas was based on the geographical disjoint in production and consumption of livestock. A reconnaissance survey was carried out in Kumasi and Tamale metropolis in order to identify the existing markets and to generate the sample frame. Informal interviews were conducted using key informants such as heads, and experienced traders. Based on the result of the reconnaissance survey, five major markets, namely: Mayanka, Suame kotoko, Akwatia line, Sofoline/Kwadaso and Abenchi in Kumasi; and five major markets, namely: Aboabo, Sakasaka, Sheshegu, Katinga and Sagnariga in Tamale were selected for the study based on the appreciable number of small ruminant traders in the named markets. A disproportionate stratified sampling technique was adopted to obtain a sample of traders in each market representing the proportion of the chosen sample size. Finally, a sample size of 284 small ruminant traders was generated from a population of 510 using the sample size calculator from Survey systems. Table 1 shows the distribution of traders in the selected markets

Table 1. Sample size selection from estimated trader population in the various markets

Name of markets	Population	Sample size selection
Abechi	29	16
Mayakan	92	51
Suame kotoko	68	38
Sofoline/Kwadaso	27	15
Akortaline	52	29
Aboabo	48	27
Sakasaka	41	23
Sheshegu abattoir	61	34
Sagnariga	45	25
Katinga	47	26
Total	510	284

Source: Field survey, 2015.

Primary and secondary data were utilized in this study. The primary data on small ruminant markets were sourced from SG traders using a pre-tested semi-structured questionnaire. In addition to the questionnaire, focus group discussions (FGD) and key informant interviews were used in data collection. For the FGD two markets and ten respondents in each region were purposively sampled based on the number of traders, and serve as the major livestock markets in the study areas. The secondary data was sourced from relevant journals, textbooks, internet and other related research projects, which includes extensive review of relevant literature on small ruminant markets, and livestock production estimates.

2.3.2 Data Analysis Techniques

Descriptive statistics such as frequency distribution tables, arithmetic means, standard deviation, and percentages were used to analyse the characteristics and attributes of respondents and source market. The data collected were entered in Statistical Package for Social Scientists version 21 (SPSS v21) for analysis, while the factors influencing traders' inlet choices of small ruminants was analysed using multinomial logit model through the use of Stata 12 software.

Within the Structure Conduct Performance (SCP) model, transaction costs dictate pricing behaviour among traders and performance. Transaction costs, however, relies on the product source and market channels. Since product sources are diverse, multinomial logistic regression (MNL) model was used to assess choice of product sources among traders. The MNL model is employed to quantify the determinants of inlet choice of small ruminant (sheep and goats) traders in the study areas. The model is used to analyze the probability of occurrence of a certain category in comparison to the chosen reference category. According to Wooldridge (2008), MNL model is one of the standard methods used for estimating unordered, multi category dependent variables and it is also assumed independence across the choices. The MNL is widely used in studies involving multiple choices and is easier to compute than its alternatives, the multinomial probit (Karki & Bauer, 2004; Hassan & Nhemachena, 2008).

Since the sources of small ruminants are diverse, respondents' decision of choice of inlet channel depends on the utility gained from the channel. To overcome these problems, traders were grouped into four different categories based on the location of the sources. The choice of supply channel was considered as the dependent variable. The inlet markets included domestic local market (DLM), domestic distance market (DDM), international market (Burkina Faso) and the multiple-source market (MSMs). The domestic local market had been set as the reference point based on its proximity as inlet market. Therefore, with the assumption that the error term is identical and independently distributed, probability, (P_{ij}) , of i^{th} trader choosing the j^{th} product source is estimated as seen below:

$$P_{ij} = P(U_{ij} > U_{ik}) \forall j \neq k = \frac{\exp(V_{ij})}{\sum_{k=PS} \exp(V_{ik})} \quad (1)$$

$$\text{Prob}(Y_j = i) = P_{ji}(\beta_0 + \beta_1\chi_1 + \dots + \beta_k\chi_k) = P_{ji}(\beta_0 + \chi\beta) \quad (2)$$

Where, P_{ij} = Probability with which a small ruminant trader j chooses source i , $\text{Pr}(P_j = i)$.

Sources i : 0 = Domestic local market, = (base), 1 = Domestic distant market, 2 = International market and 3 = Multiple Source market.

Greene (2010) asserts that multinomial regression coefficients indicate direction but not magnitude of change or impacts on probabilities. Marginal effects are rather used in this regard, measuring expected change in expected probability of using a supply source for a unit change in explanatory terms at the mean.

3. Results and Discussions

3.1 Socio-Economic Profile of SG Traders and Enterprises

Table 2 shows the socio-economic profile of sheep and goat traders in Kumasi and Tamale including the Pooled respectively. A total of 284 small ruminant traders comprising (52.46%) in Kumasi and (47.53%) in Tamale were engaged in live sheep and goat trade. It was found that sheep and goats trade in both cities are an exclusive preserve of males as indicated by 95% of respondents. The dominance of men in SGs trade is attributed to the huge labour demand of the business. The controlling and conveyance of small ruminants over long distances from sourced regions to the main markets involved arduous trekking that few females can hardly endure. This result is consistent with Zewdie (2014) who reported similar pattern in Ethiopia where 90.8% of respondents were male in live goat trade. Notwithstanding, (4.9%) females were found actively participating in the mobilisation, transportation and trade of live SG in Kumasi and Tamale. This imply that participation of Ghanaian women in live SGs trade is relatively low as alternative opportunities were considered instead, they were mainly active in small scale trade which include selling of tomatoes, food snacks etc.

Table 2. Demographic characteristics of traders (categorical variables)

Categorical Variables	Kumasi	Tamale	Pooled
	N(%)	N(%)	N(%)
<i>Sex/Gender</i>			
Male	137(91.90)	133(98.50)	270(95.10)
Female	12(8.10)	2(1.50)	14(4.90)
<i>Marital Status</i>			
Single	29(19.50)	3(2.20)	32(11.30)
Married	111(74.50)	130(96.30)	241(84.90)
Divorced	7(4.70)	2(1.50)	9(3.20)
Widow	2(1.30)	-(-)	2(0.70)
<i>Religion</i>			
Muslim	83(55.70)	132(97.80)	215(75.70)
Christians	57(38.30)	3(2.20)	60(21.10)
Traditional	9(6.00)	-(-)	9.00(3.20)
<i>Ethnicity</i>			
Northerner	130(87.20)	135(100)	265(93.30)
Akan	18(12.10)	-(-)	18(6.30)
Ewe	1(0.70)	-(-)	1(0.40)
<i>Education Level</i>			
None	51(34.20)	34(25.20)	85(29.90)
Primary	46(30.90)	46(34.10)	92(32.40)
JHS	27(18.10)	32(23.70)	59(20.80)
SHS	18(12.10)	18(13.30)	36(12.70)
Tertiary	7(4.70)	5(3.70)	12(4.20)
<i>Age</i>			
<= 30 years	15(10.10)	5(3.70)	20(7.00)
31-40 years	69(46.30)	52(38.50)	121(42.60)
41-50 years	58(38.90)	49(36.30)	107(37.70)
51-60 years	4(2.70)	23(17.00)	27(9.50)
> 60	3(2.00)	6(4.40)	9(3.20)

Note. N = frequency of respondents, (%) = percentage of respondents.

Source: Field survey, 2015.

About 80% of all traders were between the ages of 31 and 50 years, and majority of whom (about 75% in Kumasi and 96% in Tamale) were married. In both cities, live SG trade were mainly dominated by Muslims (76%). The results further showed that most (32.40%) of the respondents in the study areas have only attained primary school level of education with only 4.20% attaining the tertiary level of education. The comparative demographic statistics in Table 3 indicates that there are significant differences in the means of some key variables of traders in the study areas. The test of means show that there are significant differences in the ages of traders, years of formal education, and number of years away from SG trade with p-values of 0.08, 0.01, and 0.01 respectively. It was also observed that traders based in Tamale were older with mean age of 43 years compared to those in Kumasi with mean age of 41 years. However, those in Tamale are less educated with mean year of 7 in schooling relative to 8 years for those in Kumasi but were all found to be equally experienced in SG trade with 15 years of experience each on the average. Because Kumasi is a more commercially-oriented location than Tamale, It was found that traders in Kumasi normally shift to other socio-economic activities for a relatively shorter period of 3 years relative to 5 years for those in Tamale.

Table 3. Demographic characteristics of traders (continuous variables)

Variables	Kumasi	Tamale	Pooled	Test of means
	M(SD)	M(SD)	M(SD)	F(P)
Age of respondent	41.10(9.73)	43.06(8.66)	42.03(9.27)	3.19(0.08)
Year of schooling	8.00(3.24)	6.74(3.26)	7.52(3.30)	7.18(0.01)
Experience in SG trade	15.10(8.81)	14.81(9.72)	14.96(9.24)	0.07(0.98)
Years away from SG trading	2.59(1.60)	4.65(4.04)	3.52(3.10)	6.99(0.01)

Note. M = Mean of variable, (SD) = Standard Deviation, F = F-statistics and (P) = P-value.

Source: Field survey, 2015.

3.2 Descriptive Statistics of Some Key Explanatory Variables in SG Trade

The results in Table 4 exhibit the descriptive statistics of some key variables in SG trade in Ghana relative to the source of the product. The results revealed that transportation cost was significantly higher in international market (GH¢ 13.70) relative to multiple sources (GH¢ 9.40), Domestic distant (GH¢ 11.10) and Domestic local markets (GH¢ 9.50) with F-statistic value of 5.04 at 1% significant level attributable to longer distance. The result also shows that the average buying price of sheep was significantly lower in International market (Burkina Faso) (GH¢ 160.00) while trader sourcing from domestic local market incurred higher purchasing price of the same size sheep (GH¢ 205.00). In terms of year of schooling of traders, it was observed that the number of years spent in schooling was significantly different with respect to the sources with an F value of 3.163 at 5% significant level. It means that traders sourcing from domestic local market spent about seven years in schooling compared to six for those that sourced from the international market, and five years each for traders who source from either of the multiple or domestic distance markets. Age of traders and years in sheep and goat trade was also significant at 1% with respect to sources of products. This means that traders sourcing from multiple sources have nineteen years of experience in sheep and goat trading compared to the other sources.

Additionally, the results also indicated that about 69.0% of the respondents who sourced from the international market use licenses whereas only 2.0% traders used licensing in domestic local market in the 2014 trading season. Therefore, license is a major requirement for traders sourcing from international market. It was also observed that pre-arrangement with their suppliers was not a major consideration. About 21% of sheep and goat traders sourcing from international market have pre-arrangement with their suppliers and 17% respondents sourcing from multiple sources contact their suppliers whereas 10% and 7% from domestic distant and domestic local respectively have pre-arrangement with their suppliers.

Table 4. Attributes of respondents relative to source markets of SG

Variables	Domestic Local market	Domestic Distant market	International market	Multiple sources	F(P)
<i>Continuous</i>	M(SD)	M(SD)	M(SD)	M(SD)	
Unit Transport GH¢	9.50(6.50)	11.10(5.00)	13.70(6.50)	9.40(6.60)	5.04(0.00)
Experience (yrs)	10.60(8.30)	11.00(7.90)	14.20(5.60)	19.30(11.40)	14.61(0.00)
Trader age (yrs)	39.50(8.30)	39.00(8.80)	39.90(6.90)	46.60(10.30)	13.90(0.00)
Schooling (yrs)	6.50(4.30)	5.00(5.10)	6.00(4.20)	4.40(4.20)	3.16(0.03)
Sheep price GH¢	205.00(41.00)	197.00(31.00)	160.00(24.20)	174.00(51.00)	14.86(0.00)
<i>Categorical</i>	No(Yes)	No(Yes)	No(Yes)	No(Yes)	
Pre-arrange	32.00(7.00)	32.00(10.00)	84.00(21.00)	80.00(17.00)	0.81(0.85)
Licenses	37.00(2.00)	22.00(20.00)	36.00(69.00)	84.00(14.00)	77.88(0.00)

Note. M = Mean of variable, (SD) = Standard Deviation, F = F-statistics and (P) = P-value.

Source: Field survey, 2015.

Table 5 shows sources of small ruminants for live sheep and goat traders in urban Ghana (Kumasi and Tamale). Over all, Burkina Faso is reported as the chief source of small ruminants by about 37% of all traders. The next in succession is the multiple source option (35%) where traders source sheep and goat from a variety of sources in order to smooth out shocks in periodic supply levels and maintain optimum supply levels. Generally, the rate of

use or popularity of domestic local and domestic distant markets is largely indistinguishable, with respective prevalence rates of about 14% and 15%. This order is maintained among traders operating in Kumasi. Among traders domiciled in Tamale, however, the rate of participation in the different markets is relatively different. Whereas the sole domestic local market is used by only few traders (3%), multiple sources are the most commonly used source of produce with about 53% traders participating.

Table 5. Sources of sheep and goats by traders in the study areas

Sources	Kumasi	Tamale	Pooled
	N(%)	N(%)	N(%)
Domestic local only	4.00(2.70)	35.00(25.90)	39.00(13.70)
Domestic distant only	38.00(25.50)	4.00(3.00)	42.00(14.80)
International only	81.00(54.40)	24.00(17.80)	105.00(37.00)
Multiple source only	26.00(17.40)	72.00(53.30)	98.00(34.50)

Note. N = frequency of respondents, (%) = percentage of respondents.

Source: Field survey, 2015.

Tamale traders are open to more inlet channels than Kumasi traders. This is rightly so, as evidence of relatively higher domestic production levels (supply volumes), lower animal prices and proximity to Ghana's northern neighbours are all in favour of the Tamale SG traders. With profiteering motives, these and other factors ultimately determine traders' choice of a procurement point.

3.3 Determinants of Choice of Sources of Small Ruminants (Sheep and Goats) by Traders

Effective market exchanges have wide implications for diverse actors on the product line. Fixed or variable transactions costs of market exchange are integral part of the marketing process. Transaction costs comprise market information cost, monitoring cost and contract/negotiation costs. Transaction costs aid in understanding of the shapers of market channel structure (Maina, Lagat, & Mutai, 2015). These transaction costs are related to limited market produce, contracts, access to supply sources in remote areas, middlemen and regulatory issues. In agricultural marketing in Africa, poor rural roads amidst physical infrastructural deficits have contributed to high transport costs and reduce small agro-enterprise competitiveness. Source of produce is thus determined by transaction costs and ultimate performance of small enterprises. A variety of supply channels with different transaction costs exist for SG and factors that influence traders to select a channel is assessed in this study using a multinomial logit model.

Table 6 presents estimates and marginal effects of a multinomial logit model with the domestic local market as the base category. The test for the independence of irrelevant alternative (IIA) assumptions though less important practically, but for statistical disambiguation have been conducted and found to be sustained using the Small-Halsio test. On the whole, eight out of fourteen variables were significant in explaining choices of the four supply sources under consideration. The model converged at a log likelihood of -116.00, showing that the model fits with the included explanatory variables. The likelihood ratio test of the log likelihood with an LR-chi-square value and probability of 500.92 and 0.000 respectively indicates that at 0.000 alpha levels, the model components are jointly strong in explaining the likelihood of choosing SG supply sources. The pseudo-R square, though not an equivalent to the R-square of OLSs indicates that about 68% of the variation in likelihood of choosing a supply source is accounted for by the explanatory terms in this model.

Table 6. Multinomial logit results and marginal effects of determinants of choice of SG inlet source

Variables	Model Coefficients (β) [†]			Marginal effects		
	DDM	IM	MSs	DDM	IM	MSs
<i>Transactions</i>						
Unofficial payment (100s of GH¢)	4.75 (-1.47)	7.12** (-2.17)	5.65* (-1.85)	-0.25 (-1.12)	0.13 (-1.25)	0.12 (-0.47)
Possession of trade License	1.86 (-1.26)	2.47 (-1.58)	0.75 (-0.53)	0.20 (-1.58)	0.10 (-1.40)	-0.30** (-2.17)
Frequent stoppages	2.14* (-1.89)	3.59*** (-2.80)	2.55*** (-2.60)	-0.12 (-0.94)	0.08 (-1.37)	0.04 (-0.29)
Average number of animals traded (10s)	4.14* (-1.77)	2.79 (-1.09)	5.76*** (-2.69)	-0.30 (-1.39)	-0.16 (-1.35)	0.46* (-1.95)
Ability to pre-arrange	-2.56** (-2.07)	-2.22 (-1.45)	-1.40 (-1.43)	-0.22* (-1.68)	-0.03 (-0.47)	0.25 (-1.55)
Assembly Time	-0.15 (-0.49)	-0.91** (-2.36)	-0.24 (-0.98)	0.04 (-0.90)	-0.05 (-1.58)	0.008 (-0.16)
Transportation cost per animal (GH¢)	1.05*** (-4.56)	1.40*** (-5.50)	0.58*** (-2.78)	0.09*** (-3.49)	0.04** (-2.31)	-0.13*** (-5.01)
<i>Enterprise specific factors</i>						
Additional workers	0.75** (-2.19)	0.17 (-0.41)	0.58* (-1.95)	0.05 (-1.34)	-0.03 (-1.35)	-0.02 (-0.41)
Experience (10s of years)	1.77** (-2.19)	2.63*** (-2.91)	2.57*** (-3.59)	-0.19** (-1.96)	0.03 (-0.75)	0.16 (-1.52)
Trading other livestock	-0.2 (-0.91)	-0.12 (-0.09)	-1.96** (-2.36)	0.15 (-0.96)	0.12 (-1.02)	-0.28 (-1.51)
Trader's Age (10s of years)	-0.5 (-0.64)	-0.94 (-1.08)	-1.33** (-2.04)	0.18* (-1.79)	0.004 (-0.11)	-0.19 (-1.61)
Education (years of schooling)	-0.12 (-0.88)	-0.32 (-0.21)	-0.31** (-2.45)	0.03** (-2.13)	0.01* (-1.69)	-0.05*** (-2.70)
<i>Price signals from source</i>						
Average goat price (100s of GH¢)	-1.30 (-1.01)	-2.12 (-1.47)	-2.07** (-2.11)	0.18 (-0.96)	-0.03 (-0.37)	-0.16 (-0.73)
Average sheep price (100s of GH¢)	-2.05*** (-2.84)	-2.48*** (-3.02)	-1.51** (-2.37)	-0.01 (-1.28)	-0.05 (-1.41)	0.15* (-1.72)
_cons	-4.53 (-1.17)	-8.69* (-1.91)	3.96 (-1.26)			
N	283	283	283	283	283	283
Pseudo R2	0.68					
Prob > chi2	0.000					
Log likelihood	-116					
LR chi2(42)	500.92					

Note. * 10% significance level, **5% significance level, ***1% significance level; Figures in the parentheses are standard scores (z-statistics); [†] Coefficients relate to Domestic Local Market as base category.

Source: Field survey, 2015.

Possession of a trading license was statistically significant in determining the choice of an inlet channel at 5% significant level. The result in the marginal effect column revealed that a 10% increase in the cost of a license for traders sourcing from multiple sources results in a 3.0% decline in the expected probability of choosing the multiple sources relative to the domestic local market. This implies that, as the license cost increases, the requirements for a license in sheep and goat trading in the multiple sources, traders will shift from the use of multiple sources to domestic local markets. However, a similar impact will lead to traders using domestic distant markets and the international market, although their effects are not significant.

The average quantity of animals handled in an average batch was another factor that influences the choice of inlet channel. The average quantity of animals increases the probability in choosing multiples sources by 0.46% relative to the domestic local market. This means that a 1% increase in average number of animals traded will lead to 0.46% of traders using multiple sources market. At a 1% significant level, the marginal effect shows that an increase in transportation costs per animal sourced in the domestic distant market by GH¢ 1.00, results in a 0.09% increase in the expected probability of choosing the domestic distant market relative to the domestic local market. The marginal effect of a GH¢ 1.00 rise in mean transportation costs on the predicted probability of usage of the international market relative to the domestic local market is a 0.04% increase at the 1% significance level. On the other hand, a GH¢ 1.00 increase in transportation costs in multiple sources reduces its expected probability of usage by 0.13% at 1% significance level with respect to domestic local markets but not the other sources. SG traders with the ability to enter contractual agreements with live animal assemblers at source have a higher probability of participation in the domestic distance market relative to the domestic local market, 0.22 lower than the average predicted probability of participation.

The use of the domestic distant market relative to the domestic local market alone is significantly affected by experience in trade, age of trader, and length of time in formal education. Age of SG trader is significantly associated with a higher probability of choosing domestic distant market. The probability of choosing DD market relative to DL market increases by 18% for every additional increase in the trader's age. It is believed that older traders which are assumed to have more operating capital are less likely to source stocks from DL market due to the high prices of the animals and unavailability of the SG. The result is inconsistent with Knowler and Bradshaw (2007), who established a negative relationship between age and longer distance choice of marketing channel.

A unit increase in the year of investment in sheep and goats by traders, results in decrease in the probability of using the domestic distance market by 0.19% relative to domestic local market. Intuitively, experienced traders have more knowledge in sheep and goats trade compared to less experienced traders. Therefore, they are more judicious in decision making than inexperienced traders. Moreover, in periods of price arbitrage in the various markets, especially when product prices are lower in domestic local market than in domestic distance markets, experienced traders will prefer domestic local markets since it can yield more returns than purchasing in the domestic distant market. Older and more educated traders are more likely to source from the domestic distant market relative to domestic local. These attributes increase the average expected probability of opting for domestic distant by 0.18 and 0.03 at 10% and 5% significant levels respectively.

The impact of a rise in price of an average sized sheep at point of purchase is found to be significant only in the use of the multiple source market relative to the domestic local market. It is expected that an increase in price in the domestic local market will push traders to source sheep and goats from other available alternatives. At 10% significant levels however, the expected probability of using the multiple market sources increases by 15% for a GH¢ 100.00 increase in average cost prices of sheep. Seasonal variation of prices suggests high positive correlations in integrated markets. The evidence provided by this study may be explained by exercise of caution occasioned by uncertainty in other transaction parameters, which could exacerbate an already challenging point in the SG business cycle. Thus, multiple market sources may be chosen even with high prices as cost of transport, mobilization and transportation time as well as regulatory and middleman issues may even be more costly temporarily.

4. Conclusion and Recommendation

The study used 14 variables out of which 8 were significant in explaining choices of the four supply sources under consideration. The study revealed that licensing, quantity of animals traded, ability to pre-arrange, transportation costs, experience, age, education and price were significant in explaining the choice of inlet markets. Since the use of licenses was significant and negative due to the cost associated in possessing it, this signified a negative impediment in the SG trade. This study is therefore recommending that for an optimal performance in the sheep and goats industry in Ghana, the government should intervene by reducing licenses cost for actors in this sector. Transportation costs have been found to be significant and therefore to link the spatial disconnection between small ruminants' production and consumption centres, the government should focus and improve on the following areas; reduced fuel costs through subsidy to dealers, construction of feeder roads and general road infrastructures in the country.

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