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Original Research Article

Market Analysis of Smallholder Goat Enterprise under Tropical Conditions

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Abstract

Though smallholder goat enterprise has been a major source of livelihood in most African communities for ages, yet little efforts exist to explore its full potential through commercialization. While much has been done to improve agricultural production in the small-scale sector, little is known and documented about the current state of goat production and marketing in most parts of Nigeria. Using proportionate sampling, data were collected from 160 smallholder goat producers and 220 consumers making a total of 380 respondents for the study. The data were analysed using descriptive statistics, budgetary analyses, multiple regression and Likert Scale Technique. The study showed that smallholder goat enterprise was female-dominated with majority aged between 51–60 years. The average cost, average revenue and gross margin per production season were ₦12,471.78, ₦16,755.51 and ₦4,904.61, respectively. The farmers realized ₦430.20, ₦450.80, ₦252.00 and ₦363.50 on a kilogram of buck, doe, male and female kids, respectively. Smallholder goat enterprise was profitable in the study area because the Benefit-Cost Ratio (BCR) showed that every ₦100 invested per goat yielded ₦34.00 more and above the money invested. The multiple regression model analysis showed that management practice ($P < 0.01$), gender ($P < 0.1$), age of cost of medication ($P < 0.01$) and flock size ($P < 0.05$) significantly influence the profitability of smallholder goat production in the study area. The result of Likert's scale indicated that 66.8% of the consumers preferred goat meat to other meats because of its availability (56.8 %) and taste (22.3 %). Therefore, it is recommended that efforts should be put into commercializing goat enterprise in the tropics using the intensive system.

Keywords: *Capra aegagrus hircus*; profitability; economy; livestock; goat meat; Likert scale; multiple regression; Nigeria

INTRODUCTION

Goats (*Capra aegagrus hircus*) are small ruminants that play an important role in the livestock economy in most developing countries. According to FAO there were about 1,050 million goats worldwide in 2014 with about 300 species known to exist (Hirst, 2017). Africa accounts for about 33.1% and Nigeria with 49 117 654 heads represents about 4.7 percent of the world output (FAOSTAT, 2014). Goats have the ability to withstand harsh climatic conditions and contrary to sheep that are grazers, goats are browsers that feed mostly on shrubs and tree leaves in adverse environments with low fertility lands usually unfit for growing crops. This makes goat keeping a good strategy for valorizing marginal resources (IFAD, 2012). In Nigeria, goats are reared mostly for meat. It is an important source of protein for both the rich and poor and a food delicacy highly appreciated during ceremonies and festivals, most especially in the southwestern zone of the country. Goats are kept by smallholder farmers as pets and serve as means of savings and income, especially among the economically vulnerable groups like women. It was reported that majority of Nigerians prefer to eat more of goat meat than beef (Nnaemeka, 2013) and demand always exceeds supply (Okewu and Iheanacho, 2015).

Worldwide, goats have been domesticated for their meat, skin, milk and hair. Major breeds of domestic goat reared in Nigeria include West African dwarfs, Bornu red, Kano brown and Bauchi type. The West African dwarf reared for its meat is found in the eastern and south southern part of the country, whereas the others reared for milk and meat are found in the northern part. Also for meat the West African dwarfs gives a better taste than all others (FAO, 2008).

Goat production has several advantages over other small ruminants in the sense that the cost of rearing is very low as no much finance is involved in feeding and housing. According to GOAT INDIA (undated) goat rearing can be mixed with other family, community and social endeavors as it does not require much attention; for areas that are prone to drought the risk of rearing goat is also very low and goats are ideal for mixed species grazing and can thrive well on wide variety of thorny bushes, weeds, crop residues, and agricultural by-products unsuitable for human consumption. The meat has low cholesterol and is suitable for people on low energy diet. Compared to sheep, goats are more

economical and strive better on free range grazing under semi-arid conditions with lesser environmental damage (Singh, 2008). Goats achieve sexual maturity at the age of 10–12 months; gestation period is short (150 days) and milk production starts at the age of 16–17 months, and twinning is very common. Besides meat or animal protein supply, goat production is a source of employment in the rural areas. Though there is a growing tendency for establishing cottage industries based on goat meat and milk products and other value additions on skin and fibre.

Traditionally, goats have served as means of ready cash and a reserve against economic hardship (Hamito, 2008). As in the case of temperate zones, Okunlola et al. (2010) reported that in tropical Africa majority of small ruminants were owned by individuals or families in rural areas, though in small numbers. Though Enwelu et al. (2015) reported an average of seven (7) goats kept by household in Anambra State of Nigeria; three (3) in Sudan (Musa et al. 2013) whereas fifty four (54) goats per farm was reported in the US (Qushim et al., 2016). The important contribution of small ruminants to the meat industry in Nigeria was highlighted by Ochepo and Momoh (2010). Furthermore, the small ruminants' skins serve as major source of raw materials for the traditional leather industry, and goatskin production was estimated at some 23,000 tonnes of fresh skins in 2004 (Aregheore, 2009).

The role of the West African Dwarf (WAD) goat in the economy of the smallholder arable farmers in the sub humid zone of Nigeria is vital to the local economy. The income generated plays an important role in the welfare of the smallholder farming households and the sale of goats contributes to the welfare of farmers, particularly women, most of who are entrusted with the care of small ruminants (Ikwuegbu et al. 1994).

In recent times, there has been a growing trend among rural households to diversify their source of income from crop by raising small ruminants and other micro-livestock (Musa et al., 2013). The increased demand both domestic and international has established goats as an important source of revenue as well as foreign currency in Nigeria, being also an avenue for improved food security and poverty alleviation among rural dwellers. In view of the high demand and preference for goat and the available potentials there is urgent need for promoting intensive management techniques among farmers and the provision of adequate policy support (Aina, 2012).

Statement of Research Problem

Generally it was observed that animal protein intake is low in low income countries Nigeria inclusive. The FAO recommends about 70 g of protein per caput, out of which 35 g is expected from an animal source. However, the average animal protein intake daily among Nigerians is only 10 g, making a daily shortage of about 25 g per day per caput (Abu et al., 2008). This shows the urgent need to increase supply so as to close the gap between protein requirement and the actual intake; more so that people are generally not sufficiently supplied from vegetal source (Ogunniyi et al., 2015).

Productivity of the livestock sector in Nigeria is low, as it is in parts of southern Africa. Poor infrastructure, underdeveloped markets, insufficient information and lack of adoption of new technologies are among the factors contributing to poor performance in the sector; though the livestock sector has great potential to generate income and guarantee food security, especially for the rural poor as noted by Homann et al. (2007) in the case of Zimbabwe.

As important as goat enterprise is to the Nigerian rural economy, little attention has been given to its commercialization. This may be due to shortage of proper documentation on the market potentials, production and profitability. In order to design policies and institutions so as to address these problems, current knowledge of the sector is essential. The study therefore intends to examine: (1) the socio-economic characteristics of the smallholder goat farmers (2) cost and returns on the goat enterprise per season (3) the determinants of profitability of smallholder goat enterprise in the tropical condition (4) consumers' preference for goat meat in the study area.

MATERIALS AND METHODS

Study Area and Sampling Technique

Osun State is found in south-west Nigeria and goat production is carried out throughout the area at subsistence level. The State is geographically divided into rainforest and savannah region. Ede South and Ayedaade local government areas (LGAs) were purposively selected due to heavy presence of goat producers. Ede south local government is located in the western part, which falls in the savannah area of the state. Because of its location, it favours the growth of pastures for ruminants and hence, high probability of high population of goats in the area. It lies in the coordinates 7°42′N 4°27′E with an area of 219 km^2 and a population of 75,489 at the 2006 Census (NPC, 2006). Ayedaade local government is also located in the savannah region of the state. It lies within 7°28′00″N 4°21′00″E. It has an area of 1,113 km^2 and a population of 149,569 at the 2006 census. The location of these local government areas supports the production of small ruminants, goats inclusive.

A multi-stage sampling technique was used. The first stage involved the division of each of the local government areas into rural and urban wards. The second stage involved the selection of 2 rural and 2 urban wards using proportionate sampling. The third stage involved the selection of two largest villages

from each of the selected wards. The fourth stage was the selection of 20 smallholder goat marketers and 28 consumers in each of the selected villages but 24 consumers in the 8th village due to its proportional size. A total of 380 respondents (160 producers and 220 consumers) were thus included in the study.

Data Collection

Primary data were obtained from the goat producers and consumers using a structured and semi-structured questionnaire. The types of data obtained from the goat producers included information on gender, marital status, literacy, management system, cost incurred, inputs used, activities carried out, mode of operation, output, and revenue obtained. The information obtained from the consumers included preference for goat meat, reason for the preference and so on.

Data Analysis

Market Structure analysis was carried out by describing the brief history of the goat market, the socio-economic characteristics of the respondents using descriptive statistics (means, modes and percentages), and using Budgetary and Ratio analyses to evaluate the cost and returns and profitability of the enterprises, respectively.

Cost Benefit Analysis

Cost benefit was used to analyse farm net revenue for goat production. Theoretically, Net Revenue (NR) is the total revenue (TR) less the total cost (TC).

$$NR = TR - TC$$

Total cost is the addition of the entire variable cost (VC) and fixed cost (FC) items;

$$TC = VC + FC$$

Total Revenue is the total amount of money that a farmer received from the sale of stock; $TR = \Sigma P_n Q_n$.

In order to know the performance or economic worth of the farmers, the profitability ratios were computed from the above specifications;

$$\text{Benefit cost ratio; } BCR = TR/TC$$

$$\text{Rate of Returns; } RRR = NR/TC$$

Factors that Influence Profit among Goat Producers

This analysis was carried out using ordinary least square techniques, which measures the relationship between the independent variables, and a dependent variable. The dependent variable was the profitability/profit in goat production on small-scale level in Naira, while the independent variables were; Management Practice, Sex, Age, Years of experience, Cost of Labor, Cost of Feed, Cost of parent stock, Cost of Medication, Herd size and Mortality Rate.

The model Specification

On-field study data were fitted to three functional forms, Linear, Semi-logarithm and Cobb-Douglas with the best functional form selected based on statistical and economic criteria. The Semi-logarithm model was chosen in order to specify the underlying relationship between the profit and its explanatory variables, and it is specified as follows.

$$Y = LnX_1 + Ln\,X_2 + Ln\,X_3 + Ln\,X_4 + \ldots\ldots + LnX_n + \mu;$$
$$n = 1,\ldots.10$$

Where
Y = Profit (in naira)
X_1 = Management Practice (extensive was 0, intensive and semi-intensive was 1)
X_2 = Sex (0 for female, 1 for male)
X_3 = Age (in years)
X_4 = Years of Experience (in years)
X_5 = Cost of labor (in Naira)
X_6 = Cost of Feed (Naira)
X_7 = Cost of parent stock (Naira)
X_8 = Cost of Medication (Naira)
X_9 = Herd size (kg)
X_{10} = Mortality Rate
μ = Random error

Consumer's Preference for Goat Meat

Based on the belief that socio-economic characteristics of the consumers affect the consumption of commodities, descriptive Statistics tools were used to describe data on selected socio-economic characteristics of the consumers like Sex, Age, Marital Status, Educational level, Family Size, Income and a 5-point Likert Rating Scale (LRS) was used to know the consumer's preference for goat meat.

RESULTS AND DISCUSSION

Socio-economic characteristics of smallholder goat enterprise

From Table 1 it follows that smallholder goat enterprise in the study area was female-dominated (94.4%) with a mean age of 51 years. This indicated that most of the respondents were within the economically active population who constitute a great labour force for goat enterprise. These findings agree with the study of Ogunniyi et al. (2014) carried out in Oyo State, Nigeria. Their results showed that a greater percentage of the smallholder goat enterprise had a mean age of 52.7 years with a bias towards the female gender who represented 70% of the goat farmers in the state. This result is also a confirmation of Dossa et al. (2008) in southern Benin Republic where goat ownership is

much of women business. It is interesting to note that 80.6% of the farmers were married with 68.7% having formal education. This implies that the enterprise is essential in meeting the family responsibility of the farmers as reported by Baruwa (2013). The result also confirms Yesufu et al. (2014) whose findings showed that farmers with formal education have high tendency of adopting new innovation in expanding their business enterprise than those that are not.

Table 1. Socio economic characteristics of respondents

Characteristics	Frequency	Percentage (%)
Gender		
Male	09	5.6
Female	151	94.4
Total	**160**	**100.0**
Age (years)		
<30	07	4.4
31–40	22	13.8
41–50	38	23.7
51–60	64	40.0
>60	29	18.1
Total	**160**	**100.0**
Marital Status		
Married	129	80.6
Single	03	01.7
Widow/Widower	02	01.3
Divorced/Separated	26	16.3
Total	**160**	**100.0**
Educational Status		
No Formal Education	50	31.3
Primary Education	31	19.4
Secondary Education	71	44.4
Tertiary Education	08	05.0
Total	**160**	**100.0**
Goat Farming Experience		
<5	57	35.6
5–15	87	54.4
16–20	09	05.6
>20	07	04.4
Total	**160**	**100**
Management Practice		
Intensive system	05	3.1
Semi-intensive system	19	11.9
Extensive system	136	85.0
Total	**160**	**100**
Reasons for rearing goat		
Consumption	29	18.1
Cash/sales	67	41.9
Emergencies/savings	27	16.9
Family tradition	24	15.0
Pets	13	08.1
Total	**160**	**100.0**
Sources of parent stocks		
Gift	84	52.5
Purchase	57	35.6
Caretaking	19	11.9
Total	**160**	**100.0**
Sources of replacement stock		
Parent stock	146	91.2
Gift	03	01.9
Purchase	04	02.5
Caretaking	07	04.4
Total	**160**	**100.0**
Reasons for flock size		
Capital fund	106	66.3
Farmer's choice	41	25.6
Community law/Regulation	13	08.1
Total	**160**	**100.0**
Willingness to expand		
Yes	141	88.1
No	19	11.9
Total	**160**	**100.0**

Source: Data Analysis, 2013

Our findings indicate that most of the respondents in the study area have average experience in smallholder goat enterprise; since the majority (82.5%) had between 1–10 years of experience and most of them (63.1%) have trading as their primary occupation. This implies that smallholder goat enterprise is used as means of managing risk in their trading activities. Moreover, the enterprise can also be categorised as being in the early stage of maturity because a very large proportion of its participants were new entrants in the study area and just learning. However, experience according to (Ogunniyi 2010; Awotide et al. 2012) in farm business would enable the farmer to set realistic goals and time targets, allocate and utilize resources efficiently, and identify production risk.

Management system

This is discussed in relation to the type of management practices used by the farmers; reasons for rearing goat, sources of parent and replacement stocks, reason for flock size and willingness to expand. The study revealed that most of the goat farmers used extensive management system (85%) with the main purpose of cash sales (41.9%), consumption (18.1%) and meeting the family emergencies (16.9%). This implies that though smallholder goat enterprise is used to averse business risk, it is an important source of livelihood in meeting financial, nutrient and social

needs of the farmers. However, Enwelu et al. (2015) found more of intensive (72%) and semi-intensive (27.8%) systems among households in Anambra State than the extensive ones. The study further showed that the farmers usually start their enterprise with the parent/breeding stocks obtained through gifts (52.5%) and purchase (35.6%) while they replaced them from offspring obtained from the parent stocks. This implies that there is high productivity and survival rate of goat in the study area. The study also revealed that community laws and regulations had least effects on the flock size in each farm but start-up capita (66.3%) and the farmers' choice (25.6%) hindered them though the majority (88.1%) wants to expand their farm if they have the opportunity. This implies that smallholder goat enterprise in Nigeria is still underdeveloped and lacks tangible support for expansion. This is also an indication that adequate attention has not been given to livestock industry in Nigeria despites its immense contribution to the rural economy.

Budgetary Analysis

Table 2. Budgetary Analysis of Smallholder Goat Production per production season (8 months)

	Item	Average Amount (₦) Percentage (%)
	REVENUE	
	Revenue from Buck	788,460
	Revenue from Doe	849,667.8
	Revenue from male kids	623,528.2
	Revenue from female kids	419,224.8
A	**TOTAL REVENUE**	**2,680,880.8**
	VARIABLE COSTS:	
	Cost of feed	1,001,464 50.2
	Cost of drugs	459,560 23.0
	Cost of labour	435,120 21.8
B	**TOTAL VARIABLE COSTS**	**1,896,144**
	FIXED COSTS:	
	Broom	7,565.36
	Packer	16,198
	Feeding tray	41,574.96
	Water bowl	21,786.56
	Housing	12,216.24
C	**TOTAL FIXED COSTS**	**99,341.2**
D	**TOTAL COSTS (B+C)**	**1,995,485.1**
E	**GROSS MARGIN (A-B)**	**784,736.8**
F	**NET INCOME (A-D)** **NET INCOME/ FARMER**	**685,395.7** **4, 284**
G	**BENEFIT COST RATIO (A/D)**	**1.34**

1 US Dollar = ₦156.50 (NSE, 2012)
Source: Data Analysis, 2013

In Table 2, the performance of the market was measured using the revenue and ratio analyses of the respondents. Feeding was the highest (50.2%) of the total cost of production followed by the cost of drugs (23.0%) and labour cost (21.8%). This supports the findings of Yesufu et al. (2014). The highest revenue (₦849,667.8) was realized from doe followed by buck (₦788,460), male kids (₦623,528.2) and female kids (₦419,224.8), respectively. The mean gross margin and net income was found to be ₦4,904.6 and ₦4,284.0, respectively. Though the ratio of the fixed cost to variable cost (0.05) reveals flexibility of the enterprise, it also suggests the lack of funds for some required assets on the farm. The average benefit to cost ratio (1.34) depicts that smallholder goat enterprise is profitable, meaning that with the investment of ₦1.0, the business returns ₦1.34, meaning a profit of ₦0.34. The findings of Baruwa (2013) agreed with the profitability of smallholder goat enterprise, who found a rate of returns of ₦0.3 gained from every ₦1.00 invested. But this result is in contrast with (Qushim et al. 2016) who found negative profitability in the highly intensive US goat meat production system.

Factors influencing profit in goat enterprise

Table 3. Multiple Regression Estimates of the factors influencing profitability of goat production

Variables	Constant	Standard error	t-statistic
Constant	2482.670	4397.765	0.56
Management practice	–4965.163	1834.340	–2.706***
Sex	–7142.635	3948.669	1.80*
Age	–4215.852	5479.954	–0.77
Years of experience	2181.976	1507.213	1.447
Cost of labor	41.197	2594.349	0.016
Cost of feed	1193.546	1597.892	0.746
Cost of parent stock	–1123.462	4636.887	0.242
Cost of Medication	7990.441	2258.176	3.53***
Herd size	6500.440	1220.635	5.32***
Mortality	2678.452	2071.830	1.29

Adjusted R^2= .539 F=8.239***
***; **;*: coefficient significant at 1%, 5% and 10% level respectively
Source: Data Analysis, 2013

The result of the multiple regression analyses in Table 3 indicates a significant estimation as shown by the significant F-statistic (F=8.23***). The significant coefficient of determination (Adj.R^2 = 0.54***) indicates also that 54 percent of variability in profit was explained by the selected explanatory variables. Of these variables, only management practice ($P < 0.01$), farmers' gender ($P < 0.10$), cost of medication ($P < 0.01$) and herd size ($P < 0.01$) significantly influence the profitability of smallholder goat enterprise in the study area.

Extensive management practice rather than the intensive or semi-intensive system significantly improves profitability. This would be a justification for the widespread use of the extensive system, also naturally less costly, but with environmental implication. More research on the intensive on the intensive and semi-intensive systems would therefore be needed so as to make these more profitable. Result also indicates that female goat keepers performed better than the male ones. Females should therefore be more encouraged and supported in any policy intending at improving the goat business. The cost of medication significantly improves profitability. Meaning more health care against goat diseases, especially skin disease in the area is a strong factor favourable for goat business profitability. In the same vein, herd size with a significant positive coefficient also impacted favourably profitability. The larger the flock size, the higher the profit is. The implication is that large-scale goat production should be encouraged, but in view of the current extensive system which is not environmental friendly, this is more reason to promote the intensive system with strong research support.

Consumers' preference for goat meat

Table 4. Ranking of the Consumer Preference for goat meat

Scales	Frequency	Percentage
Highly Preferred (1)	31	14.1
Preferred (2)	116	52.7
Indifferent (3)	49	22.3
Not Preferred (4)	10	4.5
Highly not preferred (5)	14	6.4
Total	**220**	**100.0**

Source: Data Analysis, 2013

Table 5. Reasons for Consumer preference of Goat meat

Reasons	Frequency	Percentage
Cost	17	7.7
Taste	50	22.3
Tradition	18	5.0
Religion	10	8.2
Availability	125	56.8
Total	**220**	**100.0**

Source: Data Analysis, 2013

The result of Likert scale in Table 4 revealed that most of the respondents (66.8%) preferred good meat to other meats because of its availability (56.8%) and taste (22.3%), respectively, as shown in Table 5. The implication of this is that there is potential market for goat enterprise that have the tendency to flourish if well harness. Hence, commercialization of goat enterprise in the study area is realisable. It is therefore recommended that efforts should be put into commercializing goat enterprise in Nigeria and other similar tropical countries.

CONCLUSION AND RECOMMENDATION

Majority of people rearing goats are within bracket age of 40 and above, mostly women and married, predominantly using extensive system of management, with willingness to expand their current production. Goat production is profitable and factors influencing profit include management practice, gender, costs of medication and flock size. Goat meat was preferred by most consumers and the main reason for preference is ready availability. It is recommended that attention be paid to goat management practices towards more intensive system, so as to encourage production and ensure more availability of goat meat to consumers.

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