FACTORS INFLUENCING THE ECONOMIC EFFICIENCY OF GOAT PRODUCTION IN OGBOMOSO AGRICULTURAL ZONE, OYO STATE, NIGERIA

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ABSTACT

This study investigated factors influencing the economic efficiency of goat production in Ogbomoso agricultural zone of Oyo State. The study made use of cross-sectional data sampled from eighty goat farmers with the aid of structured questionnaire. It was observed from the findings that the factors affecting the economic efficiency of goat production were years of establishment, education, feeding and number of herds. The mean economic efficiency was 0.595.

Keywords: Years of establishment, Education, Feed, Herds**,** Economic efficiency, Goat production

INTRODUCTION

The goat was one of the first animals to be domesticated by humans, about 9,000 years ago. Today, there are some 200 different breeds of goats that produce a variety of products, including milk, meat, and fiber (mohair and cashmere). Worldwide, goat meat production is higher than meat production from cattle or hogs (Holcomb, 1994)

Goats are herbivorous animals which belong to a group of animal called ungulata and to family called capridae. Goats are ruminant animals which posses complex stomach (i.e. stomach with four compartments) due to its small body size it is referred to as small ruminant. Goat is an integral part of a traditional crop livestock production (Seyoum, 2002).

Raising goats can be a valuable part of a sustainable farm. Integrating livestock into a farm system can increase its economic and environmental health and diversity, thereby making important contributions to the farm's sustainability. Goats often fit well into the biological and economic niches on a farm that otherwise go untapped. Goats can be incorporated into existing grazing operations with sheep and cattle, and they can also be used to control weeds and brush to help make use of a pasture's diversity.

Goats have unique behaviors. They are intensely curious and will investigate anything that sparks their interest. Goat is referred to as poor man's cow because they provide milk in enough quantity for household consumption (Odunsi *et al.,* 2005). Goat milk is also more easily digested than cow's milk and is less allergic. Goat adapt easily to various environment as evident from socio–economic perspective, they are source of investment and as instrument against disaster. Goats are also used in ceremonial feasting and payment of social dues (Okunlola, 2000).

In extensive system of goat management, animal graze over large areas of unwanted or marginal lands which are unsuited for alternative agricultural use. A very low level of unpaid family labour represents the main input. Extensive management is probably the most popular system of goat production. Often unpaid family labour including children's help in herding the animal to graze way side or waste vegetation. Little management is practiced except letting them loose and shutting them at night, because of cheap family labour and higher returns from this system of management, the flock sizes tend to be relatively large compared to those in intensive method (Justen, 2002).

This management system is widely adopted in western parts of Nigeria because of

its numerous benefits among which are available near the farm and the household for example cassava root peeling and banana skins. Goat play a positive role in soil improvement through its urine and excretes that help to add some depleted nutrient from the soil .Goat is valued for other functions that are worthy of mentioning.

1. Goat production is an important means by which small size farmers can earn supplementary income.
2. Goat production contributes to local handcraft industries which its fiber and skins are used extensively.
3. It creates employment opportunity especially for landless peasant
4. It is particularly important in providing ready cash for children's school fees, taxes, marriage and funeral ceremonial expenses (Okunlola, 2000).

The taste of goat meat is similar to that of lamb. Goat meat is lower than mutton in fat and cholesterol and comparable to chicken. It also has more minerals than chicken and is lower in saturated fat than much other meat. Goat meat is often cooked slowly and at low temperatures. Other parts of goat including organs are also edible including brain and liver. The head and legs of the goat may be smoked and used to prepare spicy dishes and soup (Hirstik, 2008).

The term efficiency is often used synonymously with that of productivity, the most common measure of which relates output of some single input (Lund and Hill, 1979). The term efficiency refer to comparison between the real or observed values of input(s) and output(s) with the optimal values of input(s) and output(s) used in a particular production process (Lovell, 1993)

Efficiency is achieved by minimizing the resource required for producing a given output. Moreover, according to the minimal values, two types of efficiency can be distinguished technical efficiency and allocative efficiency. According to Njeru (2004), technical efficiency is the ability of a farm to maximize output for a given set of resource input while allocative (factor prize) efficiency reflects the ability of the farm to use inputs in optimal proportions given their respective prices and production technology. The combined effect of technical and allocative efficiency will give us economic efficiency.

Despite the prospects of goat production, some problems and constraints have been identified which automatically deprive goat production of rapid expansion. The per capita consumption of livestock products according to Upton (1998) was much lower in the humid east and west of Nigeria at about 6g and 8g per day respectively, than the north where it was about 60g per day. An increase in the production of goat in these low protein consuming areas, especially of reduced cost would be beneficial at increasing the rather low protein intake of humid zone. In view of the above there is the need to investigate the factor influencing the economic efficiency of goat production in Ogbomoso Agricultural Zone of Oyo State.

MATERIALS AND METHODS

The study was carried out in Ogbomoso Agricultural zone of Oyo state. Ogbomoso is situated in Northern part of Oyo state with a geographical location of latitude 8.1^0N and longitude 2.29^0E (Town Planning Authority Ogbomoso, 2002). The area under study comprises of five Local Government Areas namely Ogbomoso North, Ogbomoso South, Surulere, Orire and Ogo-Oluwa Local Government Area. The farming methods commonly used includes rotational and mixed farming.

Sampling procedure adopt was two stage random sampling technique. The first stage involves stratification of the study area into 5 zones. This was followed by random selection of 16 respondents (Goat farmers) from each zone with each zone well represented in equal proportion making a total of 80 respondents. The type of data that was used for the study was primary data which was collected with the aid of well –structured questionnaire and interview schedule.

Following the objectives of the study, descriptive statistics and stochastic frontier

production function were used to analyze the data.

Log Transformed Cobb-Douglas Production Frontier Function: $LnY_i = Ln\ A + \sum \beta_i\ Ln\ X_{i-4} + V- U$, where; Y = total revenue (₦), X_1 = family labour (man-days), X_2 = feed (₦), X_3 = disinfectant cost (₦), X_4 = vaccine cost (₦), A and B_i = are parameters to be estimated (i = 1, 2... 4), V_i = Is a two-sided, normally distributed random error, U_i = Is a one-sided efficiency component with a half-normal distribution where; U_i is defined by $U_i = \delta_0 + \sum \delta_i\ Z_i$. Where; Z_1 = years of establishment, Z_2 = the number of years of schooling completed by the farmer, Z_3 = feeding frequency, Z_4 = number of herd, δ_0 and δ_i are parameters to be estimated (i = 1, 2...4) together with the variance parameter. $\sigma^2_s = \sigma^2 + \sigma^2_{v,\sigma 2} = \sigma^2_{v+} \sigma^2_u$ and $\lambda = \sigma_u / \sigma_v$. The parameters of the stochastic frontier functions were estimated by the method of maximum likelihood, using the computer program FRONTIER version 4.1 (Coelli, 1994).

RESULTS AND DISCUSSION

Variables for the Production Frontier: The summary statistics of variables for the production frontier estimation revealed average total revenue of ₦25, 733.13k with a standard deviation of ₦11, 821.22k (Table 1). The large variability by the standard deviation implies that the farmers operated at different levels of herd which tends to affect their output levels. The mean family labour used was 127.12 man-days with a standard deviation of 40.34 man-days. This is an indication that goat production is laboured intensive considering the large variability recorded. The average cost of feed was ₦469.37k with a standard deviation of ₦131.67k indicating a large variability in the feed usage among the farmers. The average year of establishment was 9.71 years with a standard deviation of 4.30 years. This implies that years of establishment varied significantly among the farmers. The average years of education was 8.30 years with standard deviation of 4.80 years showing that the literacy level of the respondents was low. Similar finding have been reported by Lovell (1993) and Okunlola (2000).

Stochastic Production Frontier for Goat Framers: Presented in Table 2 are the estimated parameters for the production function. However, estimates of the parameters for the stochastic frontier production model for Goat farmers revealed that labour and feed are statistically significant a t the 1% level of significance. The positive coefficient of labour implies that as more labour are employed, gross margin increased. In essence, labour is a positive determinant of total revenue in goat production in the study area. The negative coefficient of feed shows that total revenue decreases with increase in the cost of feed used.

The results of the relationship between economic inefficiency and some selected socio-economic variables indicated that years of establishment, years of education, feeding, frequency and number of herds tends to have highly significant impacts on economic inefficiency (Table 2). The positive sign for years of establishment means that farmers tend to increase their economic inefficiencies as their years of establishment increases. The negative coefficient for years of schooling shows that farmers with higher levels of schooling tend to have smaller economic inefficiencies in goat production. In essence, economic efficiency increases with increase in years of schooling. The negative coefficient of numbers of herd implies that number of herd have a significant negative effect on economic inefficiency hence a positive effect on economic inefficiency. Okunlola (2000) had earlier reported years of establishment, years of education, feeding, frequency and number of herds to have significant impacts on economic inefficiency of sheep and goat production in Ekiti State, Nigeria.

The estimate of sigma square of 5.28 is significantly different from zero at 1% level of significance. This indicates a good fit and correctness of the specified distributional assumption of the composite error term. This suggests that conventional production function is not an adequate representation of the data.

Table 1: Variables for the production frontier estimation for goat production in Ogbomoso agricultural zone, Oyo State, Nigeria

Variable	Minimum	Maximum	Mean	Std. Deviation
Total revenue	7000	52800	25733.13	11821.22
Labour(man-day)	30	220	127.12	40.34
Feed(₦)	120	720	469.37	131.67
Disinfectant(₦)	200	1020	342.13	158.53
Vaccine (₦)	400	3700	1534.00	909.37
Establishment (yrs)	3	21	9.71	4.30
Education (yrs)	0	18	8.30	4.80
Feeding frequency	1	5	2.75	1.93
Number of herd	5	32	16.94	7.85

Table 2: Stochastic production frontier for goat farmers in Ogbomoso agricultural zone, Oyo State, Nigeria

Variable	Parameter	Coefficients	T-value
	General Model		
Constant	β_0	10.545	9.175
Labour (man-day)	β_1	1.468	4.731*
Feed (₦)	β_2	-0.993	-5.086*
Disinfectant (₦)	β_3	-0.001	-0.019
Vaccines (₦)	β_4	-0.044	-0.458
	Inefficiency model		
Constant	δ_0	5.075	2.441
Establishment	δ_1	0.242	2.300**
Education	δ_2	-0.304	2.058**
Feeding frequency	δ_3	-0.435	-2.993*
Number of herd	δ_4	-0.677	-3.242*
	Variance Parameter		
Sigma square	σ^2	5.281	5.246
Gamma	Υ	0.997	3.563
Log likelihood function		-58.88	

** Estimate is significant at 1%level of significance, ** Estimate is significant at 5% level of significance*

The estimated gamma parameter of 0.997 indicates that 99.7% of total variation in goat outputs was due to economic inefficiency.

Economic Efficiency Analysis: The predicted economic efficiencies (EE) range between 0.166 and 0.954 with a mean EE of 0.595 indicated that if the average farmer in the sample area were to reach the EE level of its most efficient counterpart, then the average farmer could experience a cost saving of 37.6 percent (i.e. 1-(0.595/0.954) x 100) (Table 3). The same computation for the most economically inefficient farmer suggests a gain in economic efficiency of 82.6 percent (i.e. 1-(0.166/0.954) x 100). Predicted economic efficiencies (EE) range between 0.166 and 0.954 had earlier been reported for sheep and goat production in Ekiti State, Nigeria (Okunlola, 2000).

The frequencies of occurrence of the predicted economic efficiencies, in deciles range indicate that the highest number of farmers have economic efficiencies between 0.80-0.89 and 0.99, representing about 15 percent each of the respondents while 45 percent of the respondents have EE of 0.70 and above which is an indication that farmers are fairly efficient.

Table 3: Predicted economic efficiencies (EE) range for goat production in Ogbomoso agricultural zone, Oyo State, Nigeria

Efficiency Level	Frequency	Percentage
0.10-0.19	3	3.8
0.20-0.29	7	8.8
0.30-0.39	9	11.3
0.40-0.49	11	13.9
0.50-0.59	8	10
0.60-0.69	10	12.5
0.70-0.79	8	10

That is, the farmers are fairly efficient in producing a pre-determined quantity of goat at a minimum cost for a given level of technology. The mean EE of 0.595 indicates that there is scope for increasing goat production by 40.5% with the present technology by adopting the techniques used by the best practiced farmer.

Conclusion: The study concluded that there exists s more potential that remained untapped in goat production in the study area. The determinants of inefficiency are years of establishment, education, feeding frequency and number of herds.

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