

## Empirical Analysis of Costs and Returns to Goat Production under Tropical Conditions

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**Abstract:** Goat is the most frequently consumed meat in the world. Meat goat production is growing because of goats' economic value as efficient converters of low-quality forages into quality meat, milk and hides products for many speciality type markets. A lot of research works have been done on indigenous small ruminant in tropical areas of Africa but limited information is available on the profitability of small-scale goat production in Nigeria. This study thus examined the costs and returns to goat production and analyse constraints associated with the enterprise. The study used a structural questionnaire administered on 60 goat farmers selected during 2010 production season using a three stage multistage sampling procedure. The data collected were analysed using descriptive statistics and budgetary technique. Budgetary analysis revealed that the gross margin was ₦324,668 and net profit was ₦315,818 (₦, Nigerian Currency, ₦160 = 1\$US) indicating that goat production was profitable. Major production constraints were lack of access to credit facilities, disease outbreak, mortality and poor foundation stock. These constraints if addressed would improve productivity and profitability of goat production under tropical conditions.

**Key words:** Constraints, goat enterprise, gross margin, profitability, stock

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### INTRODUCTION

Goats were among the first farm animals to be domesticated. As indicated by the archaeological evidence they have been associated with man in a symbiotic relationship for up to 10,000 years (Ensminger and Parker, 1986). Goats disseminated all over the world because of their great adaptability to varying environmental conditions and the different nutritional regimes under which they were evolved and subsequently maintained. They proved useful to man throughout the ages due to their productivity small size and non-competiveness with him for food. In Nigeria, goats make a very valuable contribution, especially to the poor in the rural areas. Goat undeniably plays a vital role in the rural economy of many developing countries in Africa. Goats are very important in the protein diets of the people as well as a good, stable source of livelihood especially for the poor in the rural areas. Goat production is mostly carried out by smallholders where the animals are kept in small flocks at an average of 5-10 head/family. It requires low initial capital and guarantees a high return on investment in as fast as 2 years hence it is an attractive undertaking among rural households. Goats are hardy and well-adapted to harsh climates. Due to their grazing habits and physiological characteristics they are able to browse on plants that would normally not be eaten by other livestock species. Thus, the presence of goats in mixed

species grazing systems can lead to a more efficient use of the natural resource base and add flexibility to the management of livestock. This last characteristic is especially desirable in fragile environments.

Goats provide their owners with a broad range of products and socio-economic services and have played an important role in the social life of many people being used as gifts, dowry in religious rituals and rites of passage (Peacock, 1996). Goats can play a vital role in ensuring the food security of a household, often being the only asset possessed by a poor family. In time of trouble such as crop failure or family illness, goats can be sold and food or medicine purchased. This is critical to safeguarding the security of family members. Goats, especially dairy ones are ideal species for poverty reduction and economic development in developing countries. Many people cannot drink cow milk as they are allergic to it. Several studies indicated that people with cow's milk allergy could tolerate goat's milk (Restani, 2004). Goats play an important socio-economic role in rural areas and women who are among the most resource poor farmers in Africa. They are prolific and require low inputs for a moderate level of production, reach maturity early and are profitable to keep (Devendra and Burns, 1980). Farmers and pastoralists are increasingly relying on goats as means of survival and a way of boosting their income (Peacock, 2005). Goats can withstand heat stress and can endure prolonged water

Table 1: Numbers of goats in the top ten countries and their percentages from the total number in the world

Continent	Number (million)	Percentage of world total (%)
China	149.4	17.3
India	125.7	14.6
Pakistan	56.7	6.6
Bangladesh	56.4	6.5
Nigeria	53.8	6.2
Sudan	43.1	5.0
Iran	25.3	2.9
Ethiopia	21.8	2.5
Mongolia	20.0	2.3
Indonesia	15.8	1.8
World	861.9	

Table 2: The amount of goat meat produced in the top ten countries numbers of animals slaughtered and the average amount of meat produced per animal

Country	Total meat (million MT)	No. of animals slaughtered (million)	Average meat produced per animal (kg)
China	1.8	133.3	13.7
India	0.5	47.8	10.0
Nigeria	0.3	21.3	12.7
Pakistan	0.3	15.4	17.0
Bangladesh	0.2	30.0	7.0
Sudan	0.2	14.5	13.0
Iran	0.1	7.6	14.0
Indonesia	0.1	6.6	10.0
Ethiopia	0.1	7.6	8.5
Niger	0.1	4.4	12.0

deprivation. They have additionally great adaptability to adverse climatic and geophysical conditions where cattle and sheep cannot survive. The increasing frequency of droughts with long-term environmental degradation is causing pastoralists to change from cattle or sheep to camels or goats. They can efficiently utilize poor quality forage and cover long distances looking for food. Their peculiar feeding habits make it easier to choose diets to meet their requirements. The role of goats in supplying food to humans has been well stated by many researchers (Devendra, 1985). Accurate statistics are required to determine the future outlook of the goat populations and their productivity. The world total numbers of goats was 861.9 million. The total numbers of goats in the top ten countries are presented in Table 1.

The ten countries have approximately 65.7% of the world total number. Nigeria is in the fifth position with 53.8 million and 6.2% of the world total number. The largest number of goats in the world is in China, followed by India, Pakistan and Bangladesh, all of them are in Asia. Nigeria is in the fifth position with 53.8 million and 6.2% of the world total number. Goat meat is widely consumed in the developing countries. According to Faostat, total meat inventory is about 280 million MT. Goat meat represents only 2% of this total. The total amount of goat meat produced in 2008 was 4.9 million MT. The developing countries produced approximately 97% of this amount, reflecting the great importance of goat meat to feed millions of people in these countries. The top ten countries producing goat meat are presented in Table 2.

China leads the world in producing goat meat, accounting for 38% of the world total goat meat produced. Nigeria came third accounting for 7.0%. The top ten countries producing goat meat are all from Asia and Africa, indicating the importance of goat meat to the people living in these areas. The major part of this amount is not traded as other major meats. It is usually produced and consumed locally among the poor in the developing countries.

Although, there is now a considerable body of published research on indigenous small ruminants in tropical areas of Africa there is only limited information available on small-scale goat production in Nigeria. The contributions of goats to the people and economies of Nigeria is well underestimated basically because their production is considered as small in scale and goat products seldom enter a formal marketing system. For these reasons, goats are accorded a low status and given a low priority in national development in most African countries. Much of the research published has the disadvantage of having been carried out under controlled conditions at research stations and the results may not reflect the actual situation of small scale production systems prevailing in rural areas.

Thus, it is necessary to study the performance and limitations of these indigenous goats in order to recommend strategies for their improvement. Therefore, the general objective of the study is to determine the economics of indigenous goat production in Osun State, the specific objectives are to identify the socio-economic characteristics of goat farmers and determine the costs and return to goat farming enterprise with a view to determining profitability. Knowledge of this is necessary to assist the current/prospective goat farmers and agricultural policy makers in taking decisions and making recommendations that will improve production and profitability of goat enterprise.

## MATERIALS AND METHODS

The study was conducted in Osun State, Nigeria. The selection of respondent farmers was multi-stage. In the first stage, three Local Government Areas (LGAs) noted for rearing of goats were purposively selected out of 36 LGAs. These are Ife North, Ife South and Ife Central. Second stage involves selection of four villages from each LGA and in the third stage five respondents from each village were selected using simple random selection at each sampling stage. A total of 60 respondents were

interviewed. Primary data were collected using a pre-tested questionnaire on socio-economic characteristics, physical quantities and prices of inputs and output.

Data generated were analyzed using descriptive statistics (frequency distribution and mean) and budgetary analysis. Descriptive statistics was used to describe the socio-economic characteristics of the respondents. The budgetary analysis was used to estimate costs and return to goat production. This involves the determination of the Net Farm Income (NFI) which is the difference between the gross revenue and total costs. This represents the return to unpaid labour management and equity capital (Net worth). NFI is also the money that can be withdrawn from the business without affecting equity capital. The total costs comprise fixed and variable costs of production; the former do not change as volume of production changes while the latter change. To further substantiate the profitability of this enterprise, efficiency ratio such as ratio of net returns to total expenses (return per Naira invested); operating expense ratio (operating expenses divided by gross revenue expressed as a percentage); net farm income ratio (net farm income divided by gross returns) and benefit cost ratio were analysed.

## RESULTS AND DISCUSSION

**Socio-economic characteristics of farmers:** The mean age of the respondents was 50 years while the modal age was 50-59 years. This indicating that the respondents were old and not much physical energy contribution to farming could be expected from them (Table 3). Majority (65%) of goat farmers were female showing that the enterprise is female dominated. Most (98.3%) respondents were married which confers some level of emotional stability on the respondents and this may have a positive link with the farmers' performance. More than half of the respondents had family size ranging between 6 and 10 which may mean larger farmer's farm but smaller amount of produce offered for sale (Ekong, 1988). The larger part of the produce has to be used for family feeding thereby reducing the amount available for sales. The analysis further revealed that 81.6% of the farmers were educated. Out of which 36.6% had only primary education. Ogunfeditimi (1981) and Meretiwon (1981) remarked that education is vital to the success of agricultural production and enhance the effectiveness of agricultural extension agent's work. The mean year of experience in goat farming was 16.3 years. This shows that most of the farmers were not new in the enterprise.

Table 3: Socio-economic characteristics of goat farmers in Osun State, Nigeria

Parameters	Frequency	Relative frequency (%)	Mean
<b>Age range (years)</b>			
20-29	3	5.0	50.2
30-39	10	16.7	
40-49	7	11.6	
50-59	30	50.0	
60-69	10	16.7	
<b>Gender</b>			
Male	21	35.0	
Female	39	65.0	
<b>Marital status</b>			
Married	41	68.3	
Single	1	1.7	
Divorced	3	5.0	
Widowed	15	25.0	
<b>Household size</b>			
1-5	18	30.0	8.0
6-10	32	53.3	
11-15	2	3.3	
16-20	8	13.4	
<b>Educational level</b>			
No formal education	11	18.4	
Primary education	22	36.6	
Secondary education	20	33.3	
Tertiary education	7	11.7	
<b>Membership of association</b>			
Goat farming association	23	38.3	
Cooperative society	37	61.7	
<b>Years in rearing goat</b>			
1-5	3	5.0	16.3
6-10	7	11.7	
11-15	11	18.3	
16-20	14	23.3	
21- 25	25	41.3	
<b>Breeds of goats</b>			
Shael desert goat	2	3.3	
Sokoto red goat	3	5.0	
West African dwarf goat	55	91.7	

**Costs and returns:** The estimated costs and return to goat enterprise were ₦244,182 and ₦560,000, respectively (Table 4). Cost of foundation stock accounted for half (50.8%) of the total cost while revenue from weaned kids had the highest share (61.4%) of total revenue. The total revenue on the average was ₦560,000 while the gross margin and return to management were ₦324,668 and ₦315,818, respectively. The profit margin percentage was 56.4% while the ratio of net returns to total expenses (return per Naira invested) was 1.3. That is, every ₦1 expended returned ₦1.3 to the enterprise and the operating expense ratio of 42 indicates that 42% of gross revenue was used to cover operating expenses which accounted for about 96.3% of the total costs. The benefit cost ratio and labour efficiency ratios were 2.3 and 13.7, respectively that is output earnings per ₦1 expenditure on labour was 13.7, meaning that labour were well managed. These ratios are indicative of the profitability of goat enterprise in the study area.

**Constraints in goat farming:** The major constraints encountered in goat production system in the study area

Table 4: Enterprise budget for goat production (30 does and 1 buck) under tropical condition

Items	Mean amount (₦)	Percentage of revenue/cost
<b>Revenue</b>		
*86 weaned kids @ ₦4,000/kid	344,000	61.4
27 Culled doe @ ₦8,000/doe	216,000	38.6
Total Revenue (TR)	560,000	
<b>Variable costs</b>		
Cost of foundation stock	124,000	50.8
31 weaned kids at ₦4,000/kid		
Cost of labour	40,782	16.7
Cost of drugs and veterinary services	15,500	6.3
Maintenance cost on house units	10,050	4.1
Cost of feed	45,000	18.4
Total Variable Costs (TVC)	235,332	96.3
Gross Margin (GM) = (TR-TVC)	324,668	
<b>Fixed costs</b>		
Depreciation on house unit	8,850	3.6
Total Fixed Costs (TFC)	8,850	3.6
Total Cost (TC) = (TFC+TVC)	244,182	
Net Income (NI) = (GM-TFC)	315,818	
Profit margin (%) = $f/a \times 100$		56.4
Return per naira outlay (₦) = $f/e$		1.3
Operating expense ratio (%) = $b/a$		42.0
Benefit Cost Ratio (BCR) = $a/e$		2.3
Labour efficiency = $a/iv$		13.7

\*Foundation stock: 30 does, 1 buck; Number of doe remaining at maturity = 27 does (10% mortality); 27 does kidding twice a year (108 kids on the average); 86 does survived to weaning age (20% mortality)

Table 5: Production constraint of goat farmers in Osun State, Nigeria

Production constraints	Frequency	Percentage
Financial constraints	40.0	66.7
Disease outbreak and mortality	24.0	40.0
Poor foundation stock	20.0	33.3
Low profit	15.0	25.0
Feed resource problem	0.5	8.3
Inadequate knowledge of goat husbandry	10.0	16.7
Problem of space	8.0	13.3

are listed in Table 5. The major limiting factors encountered are shortage of capital, high mortality rate, poor foundation stock and low profit in order of importance. More than half (66.7%) of the respondents complained of financial problem. The availability of institutional credit was relatively easy for large goat farming projects but was a major constraint for the small entrepreneurs with projects of <50 goats and had limited capital for collateral security. High mortality and poor growth in kids was a major constraint for 40% of the farmers; respondents complained of poor access to veterinary doctor. Mortality and morbidity losses due to diseases in goats have been a major constraint in the traditional flocks (Shalander, 2007). Difficulty in getting good quality breeding animals was also a major (33.3%) constraint. The best animals (particularly males) from the traditional flocks were sold for slaughtering to traders/ butchers. That resulted in scarcity of good quality breeding animals. The absence of organized efforts for breed improvement of goats has been compounding this problem. Since, large goat flocks of

different breeds under commercial production are only few, the entrepreneurs had to select the breeding animals from the available traditional flocks mostly through middlemen. Therefore, it takes a long time to establish a good flock. Another major constraint was realization of low prices (25%) for the surplus live goats. The trade of live goats which is unorganized and is in the hands of a large number of middlemen, traders and butchers does not favour goat farmers. The live goats were sold not on the basis of their body weight in the livestock markets this resulted in under-estimation of the value of live animals hence low profit.

## CONCLUSION

Based on the major findings from the study the following conclusions and recommendation were made. Provisions should be made by governments and other stakeholders in the agricultural sector to provide small scale goat farmers access to institutional credit through microfinance institutions and commercial banks sources. This could enable farmers to embark on large scale goat farming projects, obtain good quality breeding animals to increase production and profitability. Majority (66%) of the respondents was females hence the business can be incorporated into the women empowerment programs of the present administration in order to generate employment and alleviate poverty. Farms managed on scientific lines should be encouraged to become the centres of production of superior quality breeding animals. These will reduce the problem of poor foundation stock. Service centres will have to be established to provide technical knowledge, recommended inputs and market information this will go a long way in solving the problem of inadequate knowledge of goat husbandry. Goat farmers can earn best profit by producing and marketing towards festive sale during yuletide period. Also, small size modern slaughter houses need to be established near the production centres to maintain commercialization of goat production.

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