

ECONOMIC ANALYSIS OF SMALL HOLDER SHEEP PRODUCTION IN DAWAKIN KUDU LOCAL GOVERNMENT AREA OF KANO STATE

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Abstract

This study investigated the economic analysis of small holder sheep production in Dawakin Kudu Local Government Area of Kano State. Specifically, the study described the socio-economic characteristics of small holder sheep farmers, estimated the profitability of sheep production, examined the factors influencing sheep production and identified the constraints militating against sheep production in the study area. A total of 120 small holder sheep farmers were purposively and randomly selected for the study. Data collected through structured questionnaire were analysed using descriptive statistics, net farm income analysis and multiple regression analysis. The results showed that sheep production in the study area was generally practiced by majority of farmers (93 %) who were in their active age of between 21 - 60 years and the majority (75 %) of the sheep farmers had farming experience of 6 years and above. Sheep production in the area was profitable with a positive net profit of N 1,503,972.00. The regression analysis showed that sheep number, foundation stock cost and medication cost were directly related to the revenue of sheep farmers and significant at 1% and 5 %, respectively. The major constraints militating against sheep production in the area were: high cost of feed (91.7 %), high cost of transportation (87.7 %), inadequate capital (79.2 %), diseases infestation (76.7 %), scarcity of labour 75.8 %, high cost of veterinary drugs (74.2 %) and water shortage (72.5%). It was recommended that the sheep farmers should form a cooperative society so that they can pool their resources together to solve some of the identified problems such as high cost of feed, high cost of transportation and inadequate capital.

Keywords: *Smallholders, Sheep production, Profitability, Regression and constraints*

Introduction

Livestock keeping in and at the periphery of major and secondary sources of livelihood to rural settlers in West African countries such as Nigeria. Until recently this was considered as out-of-place and as a sign of poverty (Dossa *et*

al., 2015). Despite being an integral component of rural agriculture, it has received little attention from researchers and policymakers compared to urban crop and/or vegetable farming.

Sheep is an important source of meat in Nigeria. They are also the main form of

livestock raised in the rural areas. Most rural households own a few small ruminants, which are kept both for sale and for home consumption. Sheep have been important sources of animal protein in Nigeria and most people are engaged in sheep production particularly to improve their standard of living. Domestic sheep (*Ovisaries*) form an important part of the economy in term of income generation, feed intake and ecological niche in the agricultural system across the developing countries. This is because they make a very valuable contribution to household income, especially to the poor in rural areas. The small size of sheep has distinct economic, managerial and biological advantages among all the livestock that makes up the farm animals in Nigeria. Economically, low individual values mean a small initial investment and corresponding to small risk of lost by individual death. Managerially, they are conveniently cared for and occupy little housing space, have lower feed requirements and supply both meat and milk in quantities suitable for immediate family consumption. This attribute may partly be due to their lower feed requirements compared to cattle, because of their body size (Okunlola *et al.*, 2010). Sheep are reared for various reasons such as income generation, religious purpose, household consumption, game and as security against crop failure. Sheep are biologically more advantageous than larger ruminants, for instance, sheep appear to withstand drought better than cattle their short reproductive cycle allow them to quickly recover from rapid resumption of breeding following a drought of devastating disease infestation. Thus, rearing of sheep provide the easiest and a readily accessible source of finance to meet immediate social and financial obligation (Isaac and Titilayo, 2012).

Sheep in Northern Nigeria has ceremonial importance. Sheep are predominantly breeds for ceremonial slaughter in Nigeria. They are required for Islamic festivals such as Salah festival, naming ceremonies and marriages (Jabo and Adamu, 2018).

Profitability is the primary aim of all business ventures. Without profit the business will not survive in the long run. The profitability of any business can be deduced from the relationship between the cost incurred in running the farm business and the returns accruing from it. Zekeri *et al.* (2015) in their study revealed that the average total variable cost was N8, 726.36 per sheep per year, while the estimated average cost of feed is N4, 105.50 accounting for 40.7% of average variable cost component. It is followed by acquisition cost of young ewe which averaged N3, 552.31 representing 35.2 %; N677.33 was spent on medication (7.8%) of the total variable cost of production, followed by transportation cost that amounted to N391.22 representing 4.5% per sheep per year. Fixed cost was negligible in sheep production. The average revenue per sheep among women in the study area was found to be N10, 829.74. The analysis showed that gross margin per sheep per year was N2102.95 and return on naira invested was N 0.24. Hence the cost and return analysis indicated that sheep production among women in the study area was profitable (Zekeri *et al.*, 2015).

Baba *et al.* (2015) using farm budgeting analysis in their study revealed that the variable cost constituted 69.83% of the total cost of production of sheep enterprise and fixed capital accounted for 30.17%. Their result further revealed that a typical farmer realized a net farm income of N88, 820.43 per production cycle and the average production cycle is

five months which showed that sheep production is profitable in the study area.

Among the challenges of sheep production, feed shortage has been established to be the greatest of them as reported by many and various scholars. According to Zekeri *et al.* (2015), inadequate capital, diseases incidence, inadequate feed and water shortages were the significant problems facing sheep production in three selected local government areas of Kano state. Baba *et al.* (2015) in their study reported that the sheep farmers identified feed problem, management problem and disease problem as their major constraints hindering sheep production in the study area as indicated by as many of the sheep farmers, respectively.

The objective of this study is therefore to investigate the economic analysis of small holder sheep production in Dawakin Kudu of Kano State.

Methodology

Study Area

The study was carried out in Dawakin Kudu Local Government Area of Kano State. It is situated in Sudan savannah zone within latitude 13° 53' N and 10° 25' N and longitude 7° 40' E and 10° 53' E. The state was created in July, 1967. It has a total of 44 Local Government Area and a population of about nine million with 4,947,952 male and 4,453,336 female (National Population Commission, 2006) with a growth of 2.9% per annum (KNSG, 2006). There are two distinct seasons; wet season (May -September) and dry season (October-April). The maximum temperature ranges between 21- 39°C (KNSG, 2023). Annual rainfall ranges between 787 and 960mm. Farming is the main occupation of its people, who are predominantly Hausa/Fulani engaged in production of crops like millet, sorghum,

maize, cowpea, groundnut, pepper, onion and rearing animals like cattle, sheep, goat and poultry.

Sampling Procedures

Multi stage sampling techniques was used for the study. The first of sampling technique was purposive selection of Dawakin Kudu local government area of Kano based on good number of small holder sheep producers residing in the local government area. The second stage of sampling was purposive selection of six (6) villages known to have appreciable number of small holder sheep producers. The third stage was the random selection of twenty (20) small holder sheep producers in the selected villages. A total of one hundred and twenty (120) small holder sheep producers that was used for the study.

Method of Data Collection

Primary data was used for the study. The primary data was collected through the use of well-structured questionnaire. Personal interview was also conducted for illiterate people who can neither read nor write.

Analytical Techniques

Simple descriptive statistical tools, net farm income analysis and multiple regression analysis were used to analysed the data that was collected for the study.

Simple Descriptive Statistics Tools

Simple descriptive statistics such as frequency distribution, percentages and mean was used to present result for socio - economic characteristics of the respondents and the constraints militating against sheep production in the study area.

Net Farm Income Analysis

Net farm income analysis was used to estimate the profitability of small holder sheep producers in the study area.

The net farm income analysis was specified as: $NFI = GM - TFC$

Where:

$$GM = TR - TVC$$

NFI – Net farm income from sheep production in Naira.

GM = Gross Margin from sheep production in Naira

TR = Total Revenue obtained from sheep production in Naira

TVC = Total variable costs associated with sheep production in Naira

TFC – Total fixed costs associated with sheep production in Naira (Depreciated value)

Multiple Regression Analysis Model

This was used to analysed factors influencing sheep production revenue among the small holder producers in the study area. Implicit form of the model was given by;

$$Y = f(X_1, X_2, X_3, X_4, X_5, e)$$

Where;

The explicit forms of the multiple regression function used were expressed as follows:

a.Linear function

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

b.Semi Log Function

$$Y = \log \beta_0 + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + e$$

c.Cobb-Douglas function (double log)

$$\log Y = \beta_0 + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + e$$

The model with highest value of R - Square and highest number of variables with significant values was chosen as the lead equation.

Where;

Y = total revenue from sheep production in Naira;

β_0 = intercept;

$\beta_1, \dots, \beta_5$ = coefficients of X_s variable to be estimated;

X_1 = flock of sheep in Naira;

X_2 = labour (man-days);

X_3 = cost of foundation stock in Naira;

X_4 =; cost of feeding in Naira

X_5 = cost of medication in Naira;

e = random error term.

Result and Discussion

Socio- Economic Characteristics of Respondents

Gender of Respondents

The result of the gender of the respondents is presented in Table 1. The result reveals that 81.7 % of the sheep farmers in the study area are male while 18,3% are female. This could be attributed to the fact that sheep production is tedious and stressful, hence may be more suitable for males than the females. The result also revealed that male dominated sheep production in the study area. This result was in agreement with the work of Oni *et al.* (2022) that reported that male dominated small ruminant production in Ondo state but negate the findings of Baba et al. (2015) that reported that female dominated sheep production in Zuru local government area of Kebbi state, Nigeria.

Age of Respondents

The result of age of the respondents is presented in Table 1. The result showed that the majority of the sheep farmers fell between the age levels of 31-40 years (30.0 %), 28,3 %, were between the age of 41-50 years old, 26.7 % were aged 51-60 years, 8.3 % were aged 21 -30 years and only 6.7 % were above 60 years of age. The result shows that about 93% of the sheep farmers were in their active age, hence age may likely have positive impact on sheep production in the study area. This tally with the findings of Osotimehin *et al.* (2006) who reported that farmers age affects their efficiency in performing farm management decisions.

Marital Status of Respondents

The result of marital status of the respondent is presented in Table 1. The results indicated that 90 % of the sheep farmers were married and 10. % of them were single. This revealed that large

number of the sheep farmers were married which therefore meant that they have family to care for. It also showed that most of labour required for sheep production may be provided by the family. This result agrees with the findings of Darkyong (2010) who noted that dominance of married people in any goat production business have positive effect on the business by raising money to cater for their large family size

Household Size of Respondents

Table 1 shows that about 42.3 % of the respondents had a household size that ranges between 1 – 5 persons, 41.7 % of the respondents had a household size that ranges between 6 –10 persons and 8.3 % of the respondents had household size that is 16 persons and above while 6.7% had a household size that ranges between 11 – 15 persons. The results revealed that majority of the respondents have a large household size which shows that their labour need may be provided by the family. This high household size means that farmers have the manpower and capacity to rear sheep on a large scale. This finding is similar to (Deborah, 2011), who reported that majority of farmers (52.5%) in Kano state had 1-9 household size.

Educational Level of Respondent

The result of the educational level of the respondents is presented in the Table 1. The result showed that 41.7 % of the sheep farmers had tertiary education, 31.7 % had no formal education, 20 % of the sheep farmers had secondary school certificate while only 6.7 % attended primary school. This showed that about 68% of the sheep farmers are educated. This implied that most of the farmers can read and write which will help them in interpreting the recommended dosage of any drugs and vaccines, plus other feed supplements that need to be administered to the sheep and can also follow standard feeding guide lines. The

high level of education may also lead to better management especially in the area of record keeping.

Years of Experience of Respondents

This refers to the period spent in the business. Experience is very vital in any business (Darkyong, 2010). The result of years of experience of respondents is presented in Table 1. The result revealed that 35 % of the respondents had 6 -10 and 16 years and above experience, respectively. 25 % had 1-5 years' experience in sheep production, 5 % of the sheep farmers had been rearing sheep for a range of between 11- 15 years' experience. This showed that about 75 % of the sheep farmers had an experience in sheep production that is 6years and above. This signifies that the majority of the sheep farmers must have gained enough knowledge to be able to manage their sheep well as the saying goes that experience is the best teacher.

Sources of Capital

The result showing how the respondents sourced for their capital for sheep production is presented in Table 1. The table revealed that the majority (83.3 %) of the sheep farmers got their capital through personal savings. 15 % of the farmers obtained their capital from friends and families, and 1.7 % of them got capital from cooperative societies. The result shows that majority of the sheep farmers saved money for their farming activities which makes them to be better in averting risk in case of low output which may be due to outbreak of diseases.

Respondents According to their Source of Labour

The result in Table 1 shows that 80 % of the respondents used family labour, while 20 % of the respondents used hired labour. The result revealed that labour supply came majorly from the family members which might be a limitation to expansion of the business by the farmers.

Table 1: Socio- Economic Characteristics of Respondents

Parameter	Frequency	Percentage
Gender		
Male	98	81.7
Female	22	18.3
Total	120	100.0
Age Range (year)		
21 -30	10	8.3
31-40	36	30.0
41-50	34	28.3
51-60	32	20.7
Above 60 years	8	6.7
Total	120	100.0
Marital Status		
Single	12	10.0
Married	108	90.0
Total	120	100.0
Household Size		
1 – 5	52	43.3
6 – 10	50	41.7
11 -15	8	6.7
16 and above	10	8.3
Total	120	100.0
Educational Level		
No Formal Education	38	31.7
Primary	8	6.7
Secondary	24	20.0
Tertiary	50	41.7
Total	120	100.0
Years of Experience		
1- 5	30	25.0
6 – 10	42	35.0
11 – 15	6	5.0
Above 15	42	35.0
Total	120	100.0
Source of Capital		
Personal Savings	100	83.3
Friends / Families	18	15.0
Cooperative Societies	2	1.7
Total	120	100.0
Source of Labour		
Family	96	80.0
Hired	24	20.0
Total	120	100.0

Costs and Returns Analysis of Sheep Production in the Study Area

Table 2 shows the budgetary analysis of sheep production. The budgetary analysis comprises total revenue and total cost of production. The table revealed the mean value for costs and returns obtained from the 60 small holder sheep production in the study area. The table shows that the total variable cost was ₦ 773,790.00, the depreciated total fixed cost was ₦ 83,350.00 which made the total cost to be

₦ 857,140.00, while the total revenue was ₦ 2,361,112.50. The gross margin of the small holder sheep production was ₦ 1,587,322.50 and the net income (profit) was ₦ 1,503,972.50 which indicates that sheep enterprise is profitable. This result is in agreement with work of Zekeri *et al.* (2015) who reported that sheep production was profitable among small holder women farmers in Gwarzo, Tofa and Gabasawa local government areas of Kano state, Nigeria.

Table 2: Costs and revenues associated with sheep production in the study area

Item	Estimated Mean Value (Naira)
Fixed Cost	
Housing(pens)	351,275.00
Feeders and drinkers	67,500.00
Land	113,167.50
Boreholes	30,605.00
[A]. Total Fixed Cost	562,547.5
[B]. Depreciated Fixed Cost	83,350.00
Variable Cost	
Foundation stock	114,120.00
Feeds	515,880.00.
Medications	14,562.50
Labour	60,665.00
Transportation	68,562.50
[C]. Total Variable Cost	773,790.00
[D]. Total Cost (B+C)	857,140.00
Revenue	
Sheep	2,310,450.00
Manure	50,662.50
[E]Total Revenue	2,361,112.50
[F]. Gross Margin (E – C)	1,587,322.50
[G]. Net Farm Income (Profit) (F – B) or (E-D)	1,503,972.50

Regression Analysis of Sheep Production in the Study Area

Cobb – Douglass production function was chosen as the lead. Based on some econometric criteria. This analytical tool has been used to analyse sheep production in the study area. The result of the analysis is described in Table 3 below. The independent variable considered were number of sheep owned by the farmer,

cost of labour, cost of foundation stocks, cost of feeding and cost of medication in the model in which joint effect has influence on the dependent variable which is the production of sheep. The value of the coefficient of multiple determinations (R^2) is 67.1%. This percentage of the total variation in the dependent variable is explained by variation in the independent variable effect on the sheep production

while the remaining 43.9 percent may be attributed to variation techniques. Number of sheep (0.34) and cost of foundation stocks (0.72) were significant ($P \leq 0.10$) and their regression coefficients were positive which implies that an increase in the number of sheep and cost of foundation stocks lead to an increase in sheep production; so that the producers will earn more in order to cater for his/her family needs. Cost of medication (0.47) is significant ($P \leq 0.05$) which indicated that the higher the amount spend on medication by the producer the more the likelihood to have more revenue from production of sheep, and to produce optimally thereby increasing the revenue

from sheep production. The significance of cost of medication in this study is in agreement with the study of Hamisu (2015), who reported that cost of medication was also a significant ($P \leq 0.05$) variable in their regression analysis of sheep production in Gombe metropolis. Cost of feeding (0.11) and cost of labour (0.03) were not significant ($P > 0.10$), but they were positively signed which implies that feeding of an animal and availability of labour are also important factors in sheep production in which the animal will grow fat and will even attract higher price in the market which in turn will improve the financial status of the producers.

Table 3: Estimated regression results derived from Cobb-Douglas production function in the study area

Variables	Coefficients	Standard error	t-value	Significant level
Constant	- 0.255	0.871	- 0.212	0.771
Sheep number(X_1)	0.340	0.065	5.247***	0.000
Labour cost(X_2)	0.031	0.033	0.919	0.362
Foundation stock cost(X_3)	0.716	0.115	6.253***	0.000
Feeding cost(X_4)	0.110	0.128	0.858	0.394
Medication cost (X_5)	0.472	0.209	2.257**	0.028
F-value:	80.75			
R ² -value	0.671			
R ² - Adjusted	0.641			
D- W	1.032			

*** $P < 0.01$ ** $P < 0.05$ ns=not significant

Constrains Militating Against Sheep Production in the Study Area

The constraints militating against smooth running of the sheep enterprise in the study area are presented in Table 4. The major constraints identified as the hindrances to the optimum production of the sheep enterprise were high cost of feed

(91.7%) which ranked first, high cost of transportation (81.7%) ranked second, the third constraints is inadequate capital (79.2%), diseases infestation (76.7 %), scarcity of labour (75.8%), high cost of veterinary drugs (74.2%) and water shortage (72.5%) were all identified to be major constraints militating against sheep

production in the study area. The findings of this study collaborate that of Oni *et al.* (2022) that also identified inadequate capital as a major constraint to small ruminant production in their study. The study also supports the work of Baba *et al.* (2015) that reported that majority of sheep producers in their study area identified high feed cost and disease outbreak as constraints affecting sheep production in Zuru local government area of Kebbi

state, Nigeria. However, only few women sheep producers in Gwarzo, Tofa and Gabasawa local government areas of Kano state, Nigeria identified inadequate capital; diseases incidence; inadequate feed and water shortages as significant constraints to sheep production as reported by Zekeri *et al.* (2015) which contradicts the findings obtained in this study.

Table 4: Constrains militating against sheep production in the study area

Constraint	Frequency	Percentage	Ranking
High cost of feed	110	91.7	1 st
High cost of transportation	98	81.7	2 nd
Inadequate capital	95	79.2	3 rd
Diseases infestation	92	76.7	4 th
Scarcity of labour	91	75.8	5 th
High cost of veterinary drugs	89	74.2	6 th
Water shortage	87	72.5	7 th

Conclusion

The result of the study showed the majority of sheep farmers were in their active age of between 21-60 years and male dominance with majority had one form of education or other that ranged from primary school to tertiary institutions. Majority of the respondents were mostly married with large number of household size which gives assurance for adequate provision of labour. Sheep rearing as the study revealed was profitable enterprise with number of sheep available, cost of foundation stocks and cost of medication been the variables that significantly influenced the revenue from sheep rearing. Constraints which militated against increase in profitability in sheep rearing include high cost of feed, high cost of transportation, inadequate capital, disease incidences, scarcity of labour, high cost of veterinary drugs and shortage of water. Sheep rearing could be effectively

used as a vehicle for eradicating poverty in the area studied. Based on the result gotten from this study, it is recommended that there is a need for the sheep farmers to form a cooperative society so that they can pool their resources together to solve some of the identified problems such as inadequate capital and linkage to financial institutions should be explored so as to provide access to production loans for resource poor sheep farmers to improve their capital base and savings capabilities 'and capacities

References

- Baba, M.D., Dabai, J.S., Sakaba, A.M. and Sanchi, I.D. (2015). Economics of Sheep Production in Zuru Local Government Area of Kebbi State Nigeria. *Current Research in Agricultural Sciences*, 2(1): 31-35.
- Darkyong, T.G. (2010). The performance of sweet orange Marketing in

- Kano Metropolis” An unpublished M.Sc. Thesis. Department of Agric Economics, Bayero University, Kano.
- Deborah, S.S. (2011). Commodity chain analysis of benniseed along Kano and Jigawa states axis. Unpublished M.Sc. Thesis Bayero University Kano.
- Dossa, L.H., Sangare, M., Buerker, A and Schlecht, E. (2015). Production objectives and breeding practices of urban goat and sheep keepers in West Africa: regional analysis and implications for the development of supportive breeding programs *Springer*, 4: 281.
- Isaac, B.O. and Titilayo, B.O. (2012). Small Ruminants as a Source of Financial Security: A Case Study of Women in Rural South-West Nigeria. Institute for Money, Technology and Financial Inclusion. Working Paper 2012-2. Pp21.
- Jabo, M.S.M. and Adamu, M. (2018). Determinants of Sheep Pricing Kaduna State, Nigeria. *Production Agriculture and Technology*, 14(2): 25-31.
- Kano State Government (KNSG) (2006): National Population Commission, census report 2006. Pp 30-35.
- National Population Commission (2006): National Population and Housing Census. Federal Republic of Nigeria.
- Okunlola, O.O, Amuda, A.J. and Ayanwamide, F.M. (2010). Farmers Perception of Livestock Farming in Oyo State: A case Study of Small Ruminants Farmers. 35th Proceeding of the Nigeria Society for Animal Production held in the University of Ibadan Nigeria. pp 9-16.
- Oni, O.O., Ibhaze, G.A., Ogunwande, I.O. and Onibi, G.E. (2022). Socioeconomic Characteristics of Farmers, Profitability and Militating Factors Affecting Small Ruminant Production in Ondo State, South-West, Nigeria. *International Journal of Environment, Agriculture and Biotechnology*, 7(2): 69 -77.
- Osotimehin, K.O., Tijani, A. and Olukomogbon, E.O. (2006). “An economic analysis small-Scale dairy milk processing in Kogi State, Nigeria.
- Zekeri, M. Makarfi, A.M. and Ahmed, A.S. (2015). Economic Analysis of Small Holder Sheep Production among Women in Gwarzo, Tofa and Gabasawa Local Government Areas of Kano State, Nigeria. *International Journal of Agriculture Innovations and Research*, 3(5): 1447 – 1452.