



# **Economics of West African Dwarf (WAD) Goat Production among Small Holder Farmers in Humid and Tropical Region of the World**

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## **Author's contribution**

*The sole author designed, analysed, interpreted and prepared the manuscript.*

## **Article Information**

DOI: 10.9734/JAERI/2018/v17i230046

### Editor(s):

(1) Dr. Krzysztof Skowron, Nicolaus Copernicus University in Toruń, Poland.

### Reviewers:

(1) Özdal Gökdal, Adnan Menderes University Çine Vocational School, Turkey.

(2) Marco Ferretti, University of Pisa, Italy.

Complete Peer review History: <http://www.sdiarticle3.com/review-history/28098>

**Original Research Article**

**Received 02 June 2016**  
**Accepted 18 August 2016**  
**Published 25 March 2019**

## **ABSTRACT**

Economics of West African Dwarf (WAD) goat Production by Small Holder Farmers in humid and tropical region was studied using 120 farmers selected from southeast states of Nigeria. The information generated for the study comprised farmers' socio-economic characteristics and other quantitative variables relevant to the study using mainly structured questionnaire and personal interviewed, descriptive Statistic such as percentage response and budgetary technique were used to address the objectives of the study. The mean of age of the farmer was 54 years, level of education was 11 years, while years of rearing experience and house hold size were 10 and 7 respectively. The result of net farm income analysis revealed that an average total cost of goat production was \$127,517 per 12 herds of goat with cost of purchasing breeding kids input resource constituting the highest (30%) of total costs of production. A positive net farm income of \$23938 was realized by average goat farmer in the study area, indicating the profitability of the enterprise. The identified problems limiting goat production in the region were poor access credit, problem of pests and diseases, seasonality of forage, theft problem, poor extension contact, poor nutrition of confined animal and technology too costly. There are needs for policies options and measures to enhance farmers' access to education, access to credit, extension services, and access to drugs at subsidized rates to ensure goat production by the farmers.

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*Keywords: Economics; West Africa dwarf goat; production; small holder farmers; humid and tropical regions.*

## 1. INTRODUCTION

Agricultural development in many sub Saharan African countries focused more on crop production with rearing of animal given less attention. This results in among others, decline in protein intake of most households in the region to less than the Food Agricultural Organisation (FAO) recommended minimum daily protein of animal origin of 35 kg/ person [1,2]. This could be responsible to protein deficiency associated diseases such as Kwashiorkor that is prevalent among many households in the region [3]. Therefore, there is dire need to enhance the households' intake of protein of animal origin by encouraging them to increase their scope of rearing domestic animals especially those that are familiar with.

Apart from poultry, the goat is the most numerous when compared to other domestic livestock species in humid and tropics regions [4,5]. Goat rearing is endowed to many farmers in the humid and tropical regions because of the following factors include increasing demand in the region for producing milk, meat, skin, hair and miscellaneous reasons, including investments and insurance against crop failure [6], lower cost of production compared with other livestock, and the ability of goats to effectively utilize poorer quality forage, all year-round goat production with effective reproductive management, excellent browsers and forage for biological controls for weeds, forage on a broader range of plants than do other small ruminant livestock and survive well on poor or fair grazing areas, efficient converters of low quality forages to meat, milk and hide products, require comparatively fewer resources (labor and buildings) than other livestock [7,5]. Furthermore compared to other meats, chevon is lower in calories, total fat and saturated fat, higher in protein content, unique taste and relative 'healthful' nature of goat meat and easily digestible and Goats can walk for long distances in search of feed and this behaviour assist them in meeting their nutrient requirements than other livestock [8,9].

The West African Dwarf is the predominant breed of the humid tropics from southern West Africa through central Africa. This breed of goat is found in the region, south of latitude 14°N across West Africa in the coastal area which is

humid and favours high tsetse flies infestation [10]. The West African Dwarf is small bodied, compact breed short legs and 'blocky' body, very hardy [11]. This breed exhibit variation of colour including; all white, black, brown or spotted black or brown on a white coat which makes it difficult to be distinguish clearly from the Yankasa [8,12]. The adult West Africa male weights approximately 37 kg with a well-developed throat ruff and are horned. Ewe has mature weights of 25 kg and capable of reproducing twins and triplet [13,14].

World goat production was estimated to be 79 million with more than 77% from developing countries. Nigeria constitutes about 34 million goats, which represents about 4% of the current world population [15,16,17]. Nevertheless, despite the high production of goat and as well as concomitant of other large stock of livestock production, most countries in this zone could not be able to meet their protein requirements of the citizenry. This is evidenced by lowly consumption of about 7grammes of annual protein dairy against the average requirement of 29g/coput/day, representing 75% shortfall that is observed in developing countries [4,18].

The constraints to goat production in the humid zones according to [15,16,19] are small herd size, parasite, fortages of forages especially during dry season, low priority from farmers and often government, no industrial feeds, limited extension service and no veterinary care in most rural communities Other limiting factors to the growth of goat industry are seasonality of demand, competition from traditional red meats, erratic carcass quality and seasonality of reproduction in goats which negates the year-round availability of chevon [20,4].

There is therefore, the need to access the socioeconomics characteristics of the West African Dwarf (WAD) goat farmers as it affects their performance in rearing and their productivity in terms of profit accruing from goat production in the study area. This would lead to formulation and implementation of polices that would enable farmers to improve on their performances. Specifically, the objectives of the study were to describe the farmers' socio-economic characteristics, estimate the costs and returns in goat production, and identify the constraints to improved goat production technologies.

**2. MATERIALS AND METHODS**

The South East Nigeria was the main focus of the study, which lies between latitude 5°9' and 7°75'N of equator and longitude 6°85' and 8°46' East of Greenwich Meridian. It has a total land mass of 10,952.400ha. The zone has population of 16,381.729 people [21]. The zone is made up of five states viz: Abia, Anambra, Ebonyi, Enugu and Imo States. It lies within the rainforest and derived savanna region of the country and bordered in the North by Benue and Kogi States, in the West by Delta and Rivers States, in the South by Akwa Ibom State and in the East by Cross River State. South east states have two major seasons in the year, the rainy season which last from the month of April-October and the dry season that lasts from November to March. The temperature of the area varies between 18°C – 34°C. The inhabitants engage in agriculture mainly crop farming, agricultural produce marketing and animal rearing. Other non-agricultural activities engaged by people for sustenance include civil service, petty trading, vulcanizing, driving, carpentry, mechanics and others.

Multistage random sampling technique and purposive selection were used to select states, agricultural zones, local government areas, communities and respondents. In stage 1, three out of five states in South East Nigeria were purposely selected because of high intensity of WAD production [10]. The selected states were Abia, Anambra, and Enugu. Stage 2 involved the random selection of two agricultural zones out of three from each state. This brought to a total of six agricultural zones. The agricultural zones selected were: Enugu North and Enugu West for Enugu State, Anambra and Aguata Zones for Anambra State, while Umuahia and Ohafia Zones for Abia State. These selected zones were further stratified into local government areas. In the third stage, one local government area each out of six local government areas was purposively selected from each zone based on goat rearing performance. The local government areas were Nsukka local government area for Enugu North, Aninri local government area for Enugu West, Oyi local government area for Anambra, Orumba South for Aguata, while Ikwuano and Umunneochi local government areas for Umuahia and Ohafia zones respectively.

In the next stage, two communities out of four were randomly selected from each of the local

government areas, giving a total of 12 communities. The lists of the goat farmers with the help of agricultural extension agents and local leaders respectively in the communities were obtained to form the sample frame. However, 10 goat farmers were randomly selected from each community. This gave a total of one hundred and twenty farmers for the study.

Structured questionnaire and interview schedule were used to collect information on farmers' socio-economic characteristics, such as age, education level attainment, farming experience and income level of the household heads. More so, information was gathered on items used to compute cost and returns in goat production and constraints to goat production. The data were analyzed using mean counts and net farm income.

The net farm income can be calculated by gross margin less fixed input. The net farm income can be expressed as thus:

$$\text{Gross Margin (GM)} = \sum_{1-1}^n F_1 Q_1 - \sum_{1-1}^m r_1 x_1 \quad (1)$$

Return per naira (RPN) was calculated using the formula, RPN = NR / TC. Where

$$\text{NR} = \text{Net returns and TC} = \text{Total Cost} [13] \quad (2)$$

The various ratios were computed to explain the extent to which a goat farmers employs the production factors at his/her disposal to the fullest in order to achieve some desired goals.

- (i) Operating expense ratio = Total Variable Cost / Gross Revenue - - - (3)
- (ii) Net farm income (NFI, Profit) = Gross margin (GM) – Total fixed cost (TFC) or

$$\text{Net farm income (NFI)} = \sum_{1-i}^n P_1 Q_1 \left[ \sum_{1-1}^n r_1 x_1 + K \right] \quad (4)$$

Where GM = Gross margin; NFI = Net farm income; P<sub>1</sub> = Market (unit) price of output Y (₦); Q = quantity of output Y (kg); r<sub>1</sub> = unit price of the variable input (₦); x<sub>1</sub> = quantity of variable input (kg); x<sub>1</sub> = quantity of variable input (kg); Kn = Annual fixed cost (depreciation) (₦); i = 1 2 3 .....n; j = 1 2 3 ..... M.

$$(iii) \text{ Benefit Cost Ratio (BCR) = Total Revenue (TR) / Total Cost (TC) } - - (5)$$

### 3. RESULTS AND DISCUSSION

Table 1 shows the average statistics of socio-economic characteristics of the farmers in the study area. The mean age of the respondents was 54 years. This implies more ageing goat farmers than the young ones. Most Youths who are financially constrained to start a farming business could prefer white “collar job” for at least mere sustenance [6]. The result also showed that the average household size was 7. Family size is an important source of family labour. The implication of high number of family size that is of labour age according to [22] would help to reduce the cost of hired labour as most poorer household head in particular employ the services of his/her members in order to conserve the money that could have been offered for labour. The mean of level of education was 11 years. The finding concurs with [23], who reported a mean of 10. It is expected that educated farmers will be more receptive to improved farming techniques [24]. The average years of rearing experience was 12 years. The years of farming experience helps the farmers in setting realistic targets [25]. The mean no. of extension contact was 10.14. This implies good extension outreach. Extension helps to dissemination innovation to the farmers in order to enhance their productivity.

Table 1 also revealed that the mean income of the respondents was ₦35,000. This finding agrees with work of [26]. As reported by [27] the high income farmers are often categorized as early adopters in adoption process.

Table 2 shows the estimated results of the tobit model. Four variables were considered to be significant in explaining the adoption of goat production technologies in the study area. The X<sup>2</sup>

was highly significant at 1% level of probability, indicating goodness of fit. The coefficient of education and extension contact were positive and highly significant at 1% level of probability, while that of age of the farmer was positive and significant at 5% alpha level. This implies that increase in the variables will lead to increased adoption of goat production technologies.

Educational attainment has the capability to enhance persons’ efficiency in resource use, less risk averse and more readily innovation acceptance [3]. The number of extension contacts has profound effect on technology adoption. The effect is stem from the fact that extension services help to disseminate information and mode of application or usage of technology as well as the availability of technological inputs to farmers [28].

Table 2 shows the costs and return of goat farmers in the study based on the 2014/2015 market price of inputs and output. The analysis revealed that cost of breeding goat (kid) (30.9%) had the highest share of the total cost of production. According to Rogers EM [27] kids particularly from doe, who could give at least three kids in a kidding, are endeared to the farmers and often very scarce and expensive to procure.

Furthermore, cost of feed constituted about 21.1% of the total cost of production. Cost of feed is expensive, particularly during dry season when forages are scarce and supplementary feeds such as concentrate are used to maintain the animals’ health and productive life. These concentrates like grants apart from being grossly inadequately produced domestically couple with its recent import ban in the country are in serious competition among man, livestock and industries. These, thus make the concentrates more expensive and scarce especially during late season of the crops [1].

**Table 1. Summary statistics of socio-economic distribution of the respondents**

Variable	Mean	Standard deviation	Minimum	Maximum
Age (yrs)	54.2	8.72	26	73
Household size (No)	7.10	7.07	4	12
Level of education	11.08	5.92	0	20
Farming experience (yrs)	12.04	6.72	4	23
Extension contact (No.)	10.14	4.72	4	8
Income (N)	35,000	57,311	6,750	46,000

Source: Field Survey, 2015

**Table 2. Costs and return analysis in goat production**

Item	Costs and Return	Percentages
<b>Revenue</b>		
Revenue from the sales of 8 ewe goat at N10,200	89,600	
Revenue from sales of four ram goat as N8,700	34,800	
Cost of manure	5,200	
<b>Total revenue</b>	<b>129,600</b>	
<b>Cost</b>		
Total fixed cost		
Cost of goat house depreciation	2,846	
<b>Total variable cost</b>		
Cost of veterinary service	8,860	19.7
Cost of purchasing she goat at N1,250 each	10,000	
Cost of purchasing four he goat at N950 each	3,900	30.97
Cost of labour	6,200	13.8
Cost of transportation	1,950	4.3
Cost of feed	10,800	21.1
Total variable cost	41,700	
Total cost (TVC + TFC)	44,886	
Gross Margin TR – TVC	87,890	
Benefit cost ratio $\frac{TR}{TC}$	2.88	
Net farm income = TR – TC	84,714	

Source: Field Survey, 2015

TC = Total cost, TR = Total revenue, TFC = Total fixed cost

**Table 3. Constraints to goat production**

Constraints	Frequency	Percentage
Lack of finance/credit	70	87.5
Theft problem	54	67.7
Poor extension contact	50	62.5
Poor nutrition of confined animal	50	62.5
Technology too costly	40	50
problem of pests and diseases	58	72.5
Seasonality of forage	54	67.5
Inadequate time	20	25

Source: Field Survey, 2015

\*Multiple response

Table 3 above showed that cost of veterinary (19.7%) occupied a significant portions of the total cost of production. High cost of drug coupled with adulteration and substandard for instance is a major threat to livestock industry in Nigeria [19]. The least (4.3%) was cost of transportation. The implication could be that most of the farmers' purchase their production inputs such as breeding goat, concentrates and others from local markets within their communities of which little or no transportation cost. Goat is profitable venture with net farm income of ₦84,714. The benefit cost ratio was ₦2.88, indicating that every one naira spent, ₦2.88 will be realized.

Table 3 shows that majority (87.5%) of the respondents encountered the problem of lack of finance/credit facilities. Farmers' poor access to credit according to [11] could be attributed to high collaterals, high interest rate, short loan repayment period as charged by lending agencies and location of these lending agencies in urban area. This finding corroborated by (7) who reported that paucity of fund for adoption of the technologies is a persistent problem in the adoption process. Also, 72.5% of the respondents encountered problem of pests and diseases. As asserted by [6] reported that because of lack of veterinary posts in the most rural area of the humid zone of West Africa, goat

and other small stock is decimated by diseases, notably Pests de Petits Ruminant (PPR).

Furthermore, 68% of the respondents complained of poor contact with extension agent. Extension services are the major source of innovation dissemination and technical assistance to farmers in the developing countries [27]. However, poor extension outreach is partly because of wide gap of extension agent and farmers ratio have been variously acknowledged to be responsible for extension services' failure to perform its' major roles [28,27,25]. This has negative sign to agricultural development in the country.

Moreover, sixty seven dot seven percent (67.7%) of the respondents complained about seasonality of forages for goat feeding problem. This finding concurs with [7] who reported that seasonality of forages leads to feed shortage since feeds are abundant only during the wet season. Also [29] opined that and in most localities in the goat rearing zone, animals need to be confined or tethered in many areas to avoid damaging of the crops, thus farmers spend a lot of time and labour to find, cut and carry natural grasses for their animals. In addition, poor nutrition of the goat confined was complained by 60% of the respondents. This problem is more peculiar to confined goat as their growth rate is usually half of free roaming goat free roaming animal particularly goat is capable of selecting more nutritious part of grass and browse but confined animals are limited in choice to what farmer provide from bush and fallow land [28,6]. More so, 76.7 percent of the respondent encountered the problem of theft to especially goat tethered in the bush to graze forages. High cost of technologies (50%) adversely affected the adoption of goat production technologies in the study area. The high cost of technologies in relation to high cost of building material in constructing animals' pen and high cost of veterinary drugs affected negatively the adoption of the technology. As reported by Iwueke CC [29] reported that lots of yam minisett farmers in south eastern Nigeria farming system refused to adopt the technologies introduced to them because of inadequate and high cost of production inputs which are critical to the success of the technology.

#### **4. CONCLUSION AND RECOMMENDATIONS**

The results from this study showed that goat production is a profitable venture. The important

factors directly related to adoption of goat production technologies were education level, extension contact, age of the farmer and family size.

The most important limiting factors to the adoption of goat production technologies were lack of fund, technology too costly, innovation too difficult and unaware and insufficient information.

Based on the result, the following recommendations were made:

- (1) Policies option aimed at improving farmers' access to education through aggressive awareness campaign and mass mobilization as most farmers were old and cannot go to school.
- (2) There is urgent need to improve extension delivery and agricultural credit availability to the farmers in order to enhance promotion of the adoption of goat production technologies
- (3) Improved goat production technological inputs for adoption should be made available at subsidized rate bearing in mind that most of the farmers are resource limited.
- (4) Farmers with large household size should be encouraged to be actively involved in adoption of these technologies, since large household size can provide the much needed labour at least cost.

#### **COMPETING INTERESTS**

Author has declared that no competing interests exist.

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