ECONOMIC ANALYSIS OF SNAIL PRODUCTION IN OGUN STATE, NIGERIA

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Abstract: There is a retarded growth in snail production in Ogun state, Nigeria which has led to high production costs and average market prices of the product. The study therefore explored the economics of snail production in the State using primary data collected from one hundred and twenty (120) snail farmers through a multistage sampling technique. The data obtained were analyzed using descriptive statistics, budgetary analysis, and Ordinary Least Square (OLS) regression. The descriptive statistics revealed that males who were married and still in their active age group dominated snail production in the study area. The average household size was found to be 6 persons per household with an average snail faming experience of 7 years. The Budgetary analysis showed that snail production was profitable in the study area with gross margin of ₦75, 551.47 and net farm income of ₦45, 364.47. The result of the Ordinary Least Squares (OLS) regression revealed that education level ($p<0.01$), years of experience ($p<0.05$), and stock size ($p<0.01$) significantly increased the profitability of snail farms in the study area. The study concluded that profit of the snail farms will increase with an increase in years of schooling, years of experience, and stock size. Therefore, the study recommended that government should provide effective extension services on snail production and provision of accessible loans with fair interest rates to snail farmers.

Keywords: Heliciculture, Snail production, Profitability, Budgetary analysis, Animal protein and Ogun State.

Introduction

Snails are invertebrates with bilateral symmetry and a calcerous shell as their soft, segmented exoskeleton. These are phyla Mollusca members. Snails are primarily found in humid woodland areas of West Africa, where communities collect them for food and other purposes (Onuigbo, 2015). Snail meat is white and resembles seafood in both flavor and texture. In the tropics, where it is frequently used in human nutrition, snail has enormous potential. Snails are abundant in protein and have medicinal value; therefore demand for snail meat has grown over time in both domestic and international markets.

According to FAO (2016), Nigerians consume little animal protein on average, which necessitates a concerted effort to address the country's protein shortage situation. Therefore, the two primary sources that are considered as ways to meet this need for protein are plants and animals. While important amino acids like methionine, tryptophan, and lysine are needed for proper growth, plant protein is low in these nutrients (Welson, 2001). As a result of its high concentration of these amino acids, animal protein, which may be found in fish, livestock, and wild animals (bush meat), is referred to as first-class grade protein.

Regrettably, the general public is becoming less and less able to afford the traditional and regular sources of animal protein supply such as beef, pork, goat meat and chicken in the nation. The snail is one of the significant alternate sources of animal protein that has received little attention in Nigeria. The usual proteins derived from animal sources can be supplemented by snail meat. Snail is an extremely good source of animal protein in the diet of both wealthy and poor Nigerian households. Snails are a significant source of protein, amino acid, and other essential micronutrients for healthy living. The protein content of Snail meat is between 37% to 51%, as opposed to 20.3% for guinea pigs, 18.3% for chicken, 17.5% for cattle, 16.4% for sheep, and 14.5% for swine. The iron concentration ranges from 45 to 59 mg/kg with low fat ranging from 0.05-0.08 percent (Engmann, 2013).

In addition, the non-edible parts, the visceral and the shell which together make up around 40% of the snail's weight can be fed to monogastric animals. Moreover, some chemicals found in snails can induce some germs to agglutinate, which is effective for treating a number of conditions like whooping cough (Abere and Lameed, 2008). Snail is beneficial to pregnant women and is also used to cure a variety of illnesses, including pile, rheumatism, anemia, asthma, stomach ulcers, and many more. Due to its low fat and cholesterol content, its flesh also serves as a potent preventative for vascular illnesses. The shell is a useful component in the creation of buttons, rings, jewelery, and other decorative items (Abere and Lameed, 2008; Aminu et al., 2020).

Despite all the importance attributes of snail consumption, there are so few farms in Ogun State dedicated to the commercial breeding and production of snails. The demand-supply imbalance has grown for snail meat over time, likely as a result of increasing population and the need to fill animal protein deficiency. The rising imbalance between supply and demand can also be ascribed to the production system's inefficiency, which results from farmers' inability to utilise resources effectively. As a result, children and women who pick snails from bushes and sell them in local markets or by the roadside are the major sources of snail for consumption in the state.

In view of the above, the economics analysis of snail production in Ogun State, Nigeria, needs to be examined.

The findings of the study will be useful to policy makers and snail farmers to formulate good heliciculture policies and better future investment decisions in Ogun State. Thus the study intends to provide answers to the following pertinent research questions:

i. What is the cost and returns to snail production?
ii. What are the factors influencing snail production?

Review of Relevant Literature

Researchers in the early 1970s revealed that it was possible to grow the gigantic land snail in Africa (Ojoye, *et al.*, 2004). Snail production, particularly through hunting, has been practiced at a subsistence level in Nigeria for many years. In 1980, the Federal Snail Organization at Lagos built a pilot farm at Onikan, where a few local species were tried. Modern snail culture procedures began relatively recently in Nigeria (Chinwuko, 2003). In response to a request from the Federal Government, the Food and Agriculture Organization began the development of snail culture in the Niger Delta Area in 1986. (FAO, 2002).

The study of Ojo and Zira (2017) on economics of snail production in Jos, Plateau state, showed that snail production was profitable in the study area with the farmers earning average profit of ₦24,978.02 per year. The regression result revealed that educational level, years of experience in snail farming and size of the farm were statistically significant.

In the same vein, Aderounmu *et al.* (2019) investigated the profitability of snail marketing in Ibadan North East Local Government area of Oyo State. The study showed that the total revenue was estimated to be ₦1,457,700.00k and total cost was ₦1,285,320.00k while gross margin was ₦172, 380.00k and benefit- cost ratio was 1.13. This implies that for every ₦1.00 invested in the business, the marketer will make a return of ₦1.13k. Marketing efficiency was 88%. Major constraints to snail marketing in the study area were poor market patronage (87.1%) and seasonality (82.9%). The study recommended that marketing of snail in the area should be restructured and standardized to command frequent patronage and command higher price value.

Furthermore, the study of Aminu *et al.* (2020) on technical efficiency of snail farmers in Ijebu East Local Government Area of Ogun State, Nigeria showed that majority of the farmers (63.3 percent) were male with average age of 42 years, and average household size of 6 people. The study showed that the significant factors influencing the output of the snail farmers in the study area were stock size, family labour and feed while the age of the farmers, educational status, snail farming experience, extension contact and total income were identified as the significant determinants of technical efficiency.

Overall, various studies have confirmed that snail farming are technically and economically feasible to set up in Nigeria. Careful management, and incorporation of snail farming into existing farming ventures will bring about a better and significant dividends.

Materials and Methods

We employed both primary and secondary data for this study. A structured questionnaire was used to obtain primary data from the snail farmers in the study area. The questionnaire was designed to gather data on output, input, prices of outputs and inputs, and certain key socioeconomic variables of the snail farmers. Secondary data was subsequently gathered from a variety of periodicals, statistical publications, books, and articles relevant to snail production. According to Ogun State Government division classification, we have four (4) divisions in Ogun State, namely Egba, Ijebu, Remo and Yewa divisions. To ensure an even distribution of the sample for this study, a multistage sampling technique was employed in the selection of one hundred twenty (120) snail farmers.

The first stage involved purposive selection of two divisions out of the four divisions based on predominant number of snail farmers in those divisions viz: Ijebu and Remo division. In the second stage, three (3) Local Government Areas (LGAs) from each of the two divisions that were notable for snail farming were purposefully chosen, totaling six LGAs for this study. Finally, the third stage involved selection of twenty (20) snail farmers from each of the LGA thus, making one hundred twenty (120) snail farmers selected for the study. Descriptive statistics, budgetary analysis and Ordinary Least Square regression (OLS) were used to analyse the data.

Model specification

Ordinary least squares (OLS)

Ordinary least squares (OLS) regression analysis was used to examine the factors influencing snail production in the study area. The production technology employed by the snail farmers was specified using the Cobb–Douglas frontier production function as used by Osinowo and Tolorunju (2019), which is specified below:

$$lnYi = ln\beta 0 + \beta 1 lnX_{1i} + \beta 2 lnX_{2i} + \beta 3 lnX_{3i} + \beta 4 lnX_{4i} + \beta 5 lnX_{5i} + \beta 6 lnX_{6i} + \beta 7 lnX_{7i} + Vi - Ui$$

Where:

Y = Profit made by snail farmers (₦)

X_1 = Educational level (years)

X_2 = Years of experience

X_3 = Age (years)

X_4 = Cost of Equipment (₦)

X_5 = Cost of Feed (₦)

X_6 = Labour (Man days)

X_7 = stock size (Number)

μ = Error term.

Budgetary Analysis

In order to examine the cost and returns of the snail farmers in the study area, budgetary analysis was employed to estimate the profitability of the snail farms enterprise. The

profitability was measured using profitability ratio analysis, which was specified as follows:

Profit (Π) = (Total Revenue (TR) – Total Cost (TC))/TC
= (Total Variable Cost (TVC) +Total Fixed Cost (TFC))/TR
= Unit price of Snail (P) × Quantity of snail Sold per cycle (Q)

From the results of the Budgetary Analysis, the following were obtained.

i. Gross Margin (GM) = TR – TVC
ii. Net Farm Income(NFI) = GM – TFC
iii. Profitability index or Return on Sale = NI / TR.
iv. The Rate of return on investment (%) (RRI) = (NI / TC) x 100.

Results and Discussion

Socio-Economic Characteristics of Snail Farmers in the Study Area

According to a descriptive analysis of the socioeconomic characteristics of the snail farmers as shown in table 1, the study revealed that 60 percent of the respondents were male while 37.5 percent of the respondents fell within the age bracket of 41 and 50 years old with a mean age of 43 years old. This shows that majority of the respondents were in their prime age of labor productivity. The marital status of the snail farmers in the study area shows that 67.5 percent of the snail farmers were married while 20.8 percent were single. This shows that married individuals are more likely to engage in snail farming in the study area, possibly to boost their household income. This outcome is in contrary to the findings of Obinaju and Asa (2016).The study also shows that about 47.5 percent of the snail farmers were educated up to secondary school level with an average of 11.3 years of schooling. The socioeconomic characteristics of the snail farmers in the study area as shown in table 1 also revealed that 60 percent of the respondents have a household size of 6-10 people per household with a mean household size of 6 persons. The snail farming experience of the respondent's ranged from 2 to 20 years, with majority (54.2 percent) of the respondents having between 5 to 10 years' experience with an average of 7years experience.

Table 1: Socio-economic characteristics of snail farmers

Characteristics	Frequency	Percentage
Sex Distribution		
Male	72	60
Female	48	40
Age Distribution		
≤ 30	23	19.2
31-40	37	30.8
41-50	45	37.5
51-60	15	12.5
Marital Status		
Single	25	20.8
Married	81	67.5
Divorced	9	7.5
Widow / Widower	5	4.2
Educational level (years)		
No formal education	6	5
Primary education	33	27.5
Secondary education	57	47.5
Tertiary education	24	20
Household Size Distribution		
1-3	39	32.5
4-6	72	60.0
7-9	7	5.8
10 and above	2	1.7
Years of Experience		
1-5	31	25.8
6-10	65	54.2
11-15	19	15.8
16 – 20	5	4.2
Total	**120**	**100**

Source: Field Survey, 2023

Cost and returns of snail production

The cost and returns analysis of snail production in the study area is presented in table 2. The cost and returns analysis revealed that total variable cost (₦45,556.30) contributed the highest portion of the total cost with 60.1 percent. Total fixed cost (₦30,187.50) accounted for only 39.9 percent and the average total cost of production was ₦75,743.80 per snail farmers.

From these results, the gross margin was estimated to be ₦75,551.97 while the net farm income was calculated to be ₦45,364.47. This implies that snail production was profitable in the study area. From the analysis, it was discovered that the percentage rate of return on investment

for the snail farms is 59.89 percent. This implies that a profit of 59.9 kobo is earned on every one naira spent on snail production. However, the estimated operating ratio (O.R) is 0.38 percent, and this suggested that the total cost of production is made up of approximately 38 percent of fixed cost component, thus making the snail business worthwhile to invest in.

Table 2: Cost and return structure of snail farming

Items	Average cost (₦)	% in TC
Variable input		
Snail purchased	**35,970.85**	47.5
Feed	5,135.83	6.8
Calcium supplement	107.08	0.1
Labour	1,383.62	1.8
Hatching	495.79	0.7
Other variable cost	2463.13	3.3
Total variable cost	**45,556.30**	60.1
Fixed input		0.0
Housing structure	21,131.01	27.9
Watering can	3,756.66	5.0
Feeder	2,999.83	4.0
Other depreciation cost	2,300.00	3.0
Total fixed cost	**30,187.50**	39.9
Total cost	***75,743.80***	100
Total Revenue	***121,108.27***	
Gross margin(TR-TVC)	***75,551.97***	
Net Farm income (GM-TFC)	***45,364.47***	
Rate of return on Investment	***59.89***	
Rate of return on Variable Cost	***0.02***	
Operating Ratio (TVC / TR)	***0.38***	

Source: Field Survey, 2023

Factors influencing snail production

The regression analysis was carried out on the factors influencing snail production in the study area. The Cobb-Douglass function was specified for the regression analysis and table 3 revealed the result obtained from the regression analysis. The result indicated that the R-squared for the estimated regression model is 51 percent. This implies that the total variation in the profit made by the snail farmers was explained by the explanatory variables included in the model. The F-value of the model is 11.98 which imply that all the dependent variables are statistically significant at 1 percent significance level in influencing the profit made by the snail farmers. From Table 3, it was observed that the coefficients of educational level **(X_1),** years of snail farming experience **(X_2)** and stock size **(X_7)** are positive and statistically significant at 1 percent, 5 percent and 1 percent significance level respectively. The study revealed that a one percent increase in X_1, X_2 and X_7 will increase the level of snail farmers profit by about 0.48, 0.14 and 0.64 percent respectively. The regression result met our *a priori* expectation and is also in agreement with the earlier findings of Aminu *et al.* (2020).

Table 12: Estimates for Regression Analysis

Variables	Coefficient	Standard error	T-value
Constant	8.722		7.421***
Educational level (years)	0.484	0.341	4.213***
Years of experience	0.140	0.311	0.199**
Age (years)	0.181	0.054	0.651
Cost of Equipment (₦)	-0.049	-0.078	-0.803
Cost of Feed (₦)	0.021	0.099	1.081
Labour	-0.041	-0.025	-0.341
Stock size (Number)	0.638	0.627	6.592***
R^2	**0.51**		
Adjusted R^2	**0.43**		
F-value	**11.98**		

*** and ** denote statistical significance at 1% and 5%, respectively.

Source: *Field Survey, 2023*

Conclusion and Recommendations

The study concluded that males who were married and still in their active age group dominated snail production. The average household size was found to bet 6 persons per household size with an average snail faming experience of 7 years. The study showed that snail production is profitable in the study area but level of profitability depends on factors such as the number of years spent in school (educational level), the number of years of experience, and the stock size of the farms. The coefficients of Education level (X_1), years of experience (X_2), and stock size (X_7) all had positive, statistically significant effects on the profitability of the snail farms. This indicated that the profit of the snail farms increased with an increase in these three variables. Thus the study recommended that:

1. Since the coefficient of education was positive, government should enact laws aiming at offering free educational seminars to all illiterate snail farmers in order to teach them potential methods of snail production. Snail farmers should be provided little incentives to ensure that they attend these seminars in large numbers.
2. The study recommended that government should support snail farmers by offering them accessible loans with reasonable interest rates. This will increase their capital and enlarge their farm stock size, which significantly increased their profit margins.
3. Likewise, provision of effective extension services on snail production can significantly stimulate interest in new innovation of snail farming.

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