Economic analysis of snail production in Ibadan, Oyo state

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Abstract: This study analyzed the economics of snail production in Ibadan Zone of Oyo state. A multistage random sampling procedure was used to select sixty respondents from the study area; a well structured questionnaire was used to collect data. The data were analyzed using frequency counts, percentages, budgetary technique and stepwise regression analysis. The findings showed that most of the snail farms are owned by individuals who were part-time snail farmers (84.9%) and financed their snail production (98.1%) through their personal savings. Management practice revealed that most of the respondents reared Archachatina marginata (98.1%). Budget analysis showed that snail production is profitable with the farmers making an average profit of ₦24, 089.03k while regression result revealed that years of education(t=2.835), years of experience (t=2.786) and farm size(t=2.197) are statistically significant and explain about 25% of the total variation in the profit made by the snail farmers. Due to its profitability and low capital investment nature, it is recommended for farmers without substantial capital, unemployed and those aspiring to augment their income.

INTRODUCTION

In recent times raising of micro livestock by rural household is becoming popular due to the fact the (i) the households have realized the need to diversify their source of income, thereby reducing the risk involved in depending on crop production as the main source of income. (ii) there is need to bridge the gap between protein requirement and actual protein consumed by the people which are not sufficiently supplied by crop production (Ajibefun, 2000).

Snail is one of such micro livestock that has recently attracted attention among farmers in Nigerians as an aftermath of the alarm raised by FAO on animal protein deficiency among Nigerians (Adesope, 2000; Akinnusi, 2000). It has been reported by FAO (1986) that the average animal protein intake in Nigeria is low, calling for concerted effort towards alleviating this crises of protein shortage. Unfortunately, the conventional and regular sources of animal protein supply in the country like beef, pork, goat meat and poultry are getting out of reach of the common populace due to the economic down-turn. There is therefore the need to look inward and integrate into our farming system some non conventional meat sources (Ebenebe, 2000). These will complement the conventional animals as source of animals protein supply. The challenge thus falls on the micro-livestock in which Nigeria is richly endowed. This research work therefore focuses on snail as one of such micro livestock.

Snail meat is socially well accepted in many parts of Nigeria. It is commonly known as

"Congo meat" and it also one of the most delicacies in Nigeria. Many species of edible land snails are recognized in Nigeria but the popular species of economic interest in the West Africa giant snails *Archatina achatina* and *Archachatina marginata.*

Snail farming has numerous advantages which are highlighted below: can be cheaply maintained in terms of housing, feeding, health care etc; highly adaptable to a variety of conditions (villages, farms backyard, shed, cities etc); they reproduce rapidly; they are efficient producers of meat; they have high medicinal value-they are used in the prevention and care of diseases like hypertension; Due to the fact that snail are small, noiseless and easy to handle, they can be reared in the urban areas without infringing on the peace of the neighbours (Odunnaiya, 1991).

In spite of the considerable external and local demand, commercial snail farms such as those in Europe, South-East Asia and the Americas do not exist in West Africa. In Nigeria and Ghana, where snail meat is particularly popular, snails are gathered from the forest. However, wild snail population is declining rapidly due to indiscriminate hunting of snails before they reach maturity, bush burning, use of agro chemicals, deforestation and change in weather (Efarmspro,2006).From the above observation, it is therefore important that snail farming (heliculture) should be encouraged, because it is only through conscious efforts made by man to farm snails would conservation of these species of animals be made possible.

In view of the above problems, there is the need to analyze the economics of snail production in Ibadan zone of Oyo State, Nigeria.

Specifically, this study seeks to:

(i) examine the socio-economic characteristic of the snail farmers;

(ii) determine the cost and returns of snail production;

(iii) identify the factors influencing snail production; and

(iv) examine the problems faced by snail farmers in the study area.

METHODOLOGY

The Study Area- The study was carried out in Ibadan zone of Oyo state. Ibadan is the largest city in West Africa, South of Sahara. It is located in the tropical zone lying between latitudes 7^0N and 9^0N of the equator and longitudes 3^0E and 5^0E of the Greenwich Meridian. The mean daily maximum temperature of 24.5^0C is experienced in August when there is dense cloud cover. An annual rainfall of 1120mm-1140mm is experienced.

Ibadan zone consist of fourteen Local Government Areas (LGAs). According to 2006 census, a population of 2,872,890 peoples was recorded in the study area out of which 49.38% were male and 50.42.% were female (NPC , 2006). The major occupation of the people in the study area is trading. Crops such as maize, cassava, vegetables, etc are grown there while livestock such as sheep, goat, local poultry (chicken and duck), swine and micro-livestock (snails, honey-bees and rabbits) are raised in the zone.

Population, Sampling Procedure and Sample Size- The population of the study is the snail farmers in the study area. A multistage random sampling procedure was used to select the respondents. In the first stage, the city was stratified into four strata. In the second stage, a

local government area was randomly selected from each stratum. The last stage involves random selection of fifteen respondents from each local government area making a total of sixty snail farmers. The information collected was subjected to reliability test and due to outlier and inconsistency; the respondents were reduced to 53.

Method of Data Collection- The data in this research work are mainly primary data that are obtained by conducting interviews through well-structured questionnaire that covered information on the socio-economic characteristics of snail farmers in the study area, the management practices employed in snail production, the cost incurred on and return accrued to snail production, factors affecting snail production, problems encountered in snail farming, possible solutions for the problem and likely areas of improvement in snail production activity in the study area.

Method of Data Analysis- The analytical techniques employed include descriptive statistics, budgetary techniques and stepwise regression analysis. Descriptive Statistics such as frequency counts, percentage and mean was used to measure socio-economics characteristics of the respondents.

Budgetary techniques were used to determine the gross margin and net farm income obtained from snail production in the study.

GM = TR – TVC

NFI = GM – TFC

Profit = TR – TC

Where GM = Gross Margin

TR = Total revenue

TVC = Total Variable Cost

NFI = Net Farm Income

TFC = Total Fixed Cost

TC = Total Cost

Mean was used to compute the cost of the various inputs such as cost of land, feeds, equipment and labour employed, cost of water and cost of hatchlings used in the production process.

All equipment used were depreciated using straight line method of depreciation in order to guide against over valuation of the cost incurred in each production year.

Profitability ratio analysis such as Benefit Cost Ratio (BCR), Gross Revenue Ratio (GRR), Expense Structure Ratio (ESR)s and rate of Returns (ROR) was used to measure the profitability of the snail farms and also to ascertain that snail production is a worthwhile venture.

Stepwise regression analysis was used to analyze the relationship between the profit made by the snail farmers (₦) and the inputs used in snail production. The functional form used was Cobb-Douglas production function. The model for the regression analysis is given below:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, \mu)$$

Where

Y	=	Profit made by snail farmers (₦)
X_1	=	Level of education (years)
X_2	=	Years of experience
X_3	=	Cost of Equipment (₦)
X_4	=	Cost of Feed (₦)
X_5	=	Family labour (Man days)
X_6	=	Farm size (acre)
μ	=	Error term.

RESULTS AND DISCUSSIONS

Socioeconomic Characteristics of the Respondents- The results of the socio-economic characteristics of the snail farmers such as gender, age, marital status, educational status, religion, social organization, years of experience, major

occupation and source of capital is presented in Table 1.

Table 1 shows that 73.6% of the snail farmers are male while 26.4% were female. This shows that snail farming is a male dominated venture in the study area. This study agrees with the findings by Raheem (2001) that majority of the snail farmers are males (76%). The Table also shows that about 38% of the respondents are in the age bracket 30-39 years with a mean age of 38 years. This implies that most of the snail farmers are in their active age group. The reason for this is that snail farming is a new business in the study area and as such older people are yet to be involved in the rearing of snail on commercial basis, rather they rear snail for family consumption and as a way of getting themselves busy. Majority of the snail farmers (75.5%) are married while 24.5% were single. This indicates that married people are more involved in snail farming in the study area probably to increase household income. This study is in line with findings by Yusuf (2002).

Majority (58.5%) of the snail farmers had tertiary education while just 3.8% had primary education. Education is vital to snail rearing especially in the area of record keeping and proper management. Also commercial snail rearing being new in agricultural production activity is seen to be embraced by the educated people. More than half (62.5%) of the respondents are Christians, 35.8% were Muslims while 1.9% were traditional worshippers. This implies that there is no religious prohibition against snail rearing due to nutritional, medicinal and economic importance of snail. About 79% of the respondents belong to social organization such as cooperative society, farmers' development union, farmers' congress and community development associations. This implies that apart from snail rearing activities, they still have other activities they attend to and this is possible since snail rearing is not time consuming.

Data in Table 1 also reveals that 41.6% of the respondents have years of experience of between three to four with a mean years of experience of 5 years. This implies that more people are now going into snail production due to increase in the awareness on the importance attached to snail production. About 84.9% of the respondents practice snail farming on part-time basis while the remaining 15.1% practiced snail farming on full-time basis. This implies that snail farming does not deprive the respondents of the time for other productive activities. Of the part-time farmers, majority (60%) were civil servant, 26.7% were traders while 8.9% and 4.4% were students and contractors respectively. This implies that they are involved in snail rearing as a source of increasing household income and for household consumption.

The data in Table 1 also shows that 98.1% of the initial source of capital used in setting up a snailery in the study area is from personal savings while the remaining 1.9% is from relatives and friends. This finding also agrees with the findings of Raheem (2001) that 96% of the snail farmers used their personal saving as a source of initial capital.

Table 1: Socioeconomic characteristics of the respondents

Social-economic Characteristics	Frequency	percentage
Gender		
Male	39	73.6
Female	14	26.4
Age		
20-29	12	22.6
30-39	20	37.7
40-49	17	32.1
50-59	2	3.8
60 and above	2	3.8
Marital Status		
Single	13	24.5
Married	40	75.5
Educational Status		
No-formal Education	0	0
Primary Education	2	3.8
Secondary Education	20	37.7
NCE/OND	11	20.8
HND/University	20	37.7
Religion		
Christianity	33	62.3
Islam	19	35.8
Traditional	1	1.9
Member of Social organization	42	79.2
Yes	11	20.8
No		
Years of experience	17	32.1
1-2	22	41.6
3-4	14	26.3
5-6		
Mode of Practising	8	15.1
Full-time	45	84.9
Part-time		
Major Occupation	27	60.0
Civil service	12	26.7
Trading	4	8.9
Student	2	4.4
Contracting		
Source of Capital	52	98.1
Personal saving	1	1.9
Relations and friends		

Source: Field survey, 2007.

Management Practice in Snail Production- The data in Table 2 shows that 98.1% of the breed reared is *Archachatina marginata*. This is due to the fact that it has more meat than other species and thus command higher price thereby giving more revenue to the snail farmer.

This study agrees with findings by Hamzat (2000) that *Archachatina marginata* is common in Nigeria and it is an excellent source of animal protein, having large body size and easy to manage. Majority of the farmers reared their snail in fenced pen (43.4%), followed by Drums or pots (32.15) and the least is used tyres. This implies that fenced pens are the most preferred among the breeding location.

Farm record is very important in agricultural business because it shows the overall performance of that particular enterprise at any point in time. As a result of the importance of record keeping, data in Table 2 shows that greater number of the respondents (90.6%) keep record of their snail production activity, 26.4% of the feed consumed by the snails in the study area came from domestic waste, 22.6% came from green feed while 17% each came from green feed and compound ration and green feed and domestic waste. This implies that the cost of feeding and sustaining snails are minimal and affordable since snail is able to convert low quality feed such as green feed and domestic waste into high quality animal protein thereby reducing the cost of feeding.

The data in Table 2 also reveals that most of the farmers in the study area feed their snails once a day with a mean frequency of feeding being 1.06 which is approximately one. This implies that snails do not require much feed since it is able to convert low quality feed to high quality animal protein and meat. More than three quarters (83%) of the respondents used well water in their snailery. This implies that the farmer would not be spending much on water since a well can be dug in the snailery to ease management activity thereby reducing the cost of snail production in the long

run. The mean family labour used was found to be 24 mandays which implies that majority of the snail farmers are still practicing on a small scale.

Table 2. Management Practices

Management Practices	Frequency	Percentage
Breed of Snail		
Archachatina marginata (Igbin apinnu)	52	98.1
Achatina achatina (Igbin ilako)	1	1.9
Where Snail are Grown		
Fenced pens	23	43.4
Drums or pots	17	32.1
Trench pens	8	15.1
Tyres	2	3.8
Others	3	5.7
Record Keeping		
Yes	48	90.6
No	5	9.4
Feed consumed		
(1) Green feed	12	22.6
(2) Compound Ratio	5	9.4
(3) Industrial by-product	0	0
(4) Domestic waste	14	26.4
(5) 1α 2	9	17.0
(6) 1 α 4	9	17.0
(7) 2 α 3	2	3.8
(8) 2 α 4	2	3.8
Frequency of feeding		
1	51	96.2
2	1	1.9
3	1	1.9
Source of Water		
(1) Well	44	83.0
(2) Stream	1	1.9
(3) Water supply	6	11.3
(4) 1 α 3	1	1.9
(5) 2 α 3	1	1.9
Family Labour used (Mandays)		
1-20	26	49.1
21-40	18	33.9
41-60	7	13.2
61-80	1	1.9
81-100	1	1.9

Source: Field survey, 2007

Gross Margin and Net Farm Income Analysis- Snail farmers made profits from their production with gross margin of ₦27, 432.78k and Net farm income of ₦ 24, 089.03k per farming season. This shows that snail production in the study area is a profitable business.

Table 3. Gross Margin and Net Farm Income Analysis for one farming season

Items	Cost (₦)
Total Revenue	39,628.13
Variable cost	
Hatchling cost	11,628.66
Feed cost	338.49
Water cost	92.45
Transport	144.75
Total Variable cost	**12,204.35**
Gross margin	**27,423.78**
Fixed cost	
Land	547.17
Cost of equipment	2787.58
Total fixed cost	**3334.75**
Net farm Income	**24089.03**

Source: Field survey, 2007

The data in Table 4 shows that BCR is greater than one. Judging from investment decision criteria, this implies that snail farming is profitable. The gross revenue ratio was found to be 0.388, which implies that from every ₦1.00 returns to the snail industry, 38.8k is spent. The expense structure ratio was found to be 0.181, which also implies that 18.1% of the total cost of production is made up of fixed cost component, thus making the business worthwhile to invest in. Also, the rate of returns was found to be 1.574 which shows that for every one naira invested in snail production 157k is gained. From all these profitability ratios snail production is a profitability business in the study area.

Table 4: Profitability Ratio of the Snail

Ratios	Values
Benefit Cost Ratio TR/TC	2.574
Gross Revenue Ratio TC/TC	0.388
Expense Structure Ratio	0.181
FC/TC	1.574
Rate of Returns NR/TC	

Source: Field survey, 2007

Regression Analysis- Stepwise regression was carried out and the variables that have low contribution to the research work were excluded from the model. The Cobb-Douglass function was specified for the regression analysis. The model obtained is as shown in Table 5. The third model is chosen because of the number of significant variables, R^2 and F-value.

The result of the analysis shows that years of education (X_1); years of experience (X_2) and farm size (X_6) are significant factors influencing the profit made by the snail farmers in the study area. These variables are significant at various levels of significance indicated. This implies that farmers with more years of experience tend to earn more profit in snail production than farmers with less years of experience. Also, profit increases with increase in farm size and years of education.

The R^2 for the estimated regression showed that about 25% of the total variation in the profit made by the snail farmers was explained by the explanatory variables while the remaining 75% unexplained was due to the variables not included in the model is the error term.

The F-value of 5.466 is statistically significant at 5% level of significance. This implies that all the variables (X_1, X2, and X_6) significantly influence the profit made by the snail farmers.

Table 5: Stepwise Regression Analysis

Model	Coefficient	Standard error	t-ratio	R^2	F
1. (Constant)	3.752	0.289	13.105***	0.107	6.113**
$L_N X_1$	0.167	0.068	2.472**		
2. (Constant)	3.341	0.352	9.485***		
$L_N X_1$	0.184	0.066	2.779***	0.177	5.374***
$L_N X_2$	0.292	0.124	2.061		
3. (Constant)	2.364	0.560	4.222***		
$L_N X_1$	0.181	0.064	2.835***	0.251	5.466**
$L_N X_2$	0.408	0.146	2.786***		
$L_N X_6$	0.753	0.343	2.197**		

*** - Significant at 1% level of Significance
** - Significant at 5% level of significance

Problems Encountered in Snail Production- The major problems faced by the snail farmers in the study area are Predators such as rats, lizard, snake, frog, bird, ants, termites and cockroaches (43.4%), theft (18.9%), lack of finance (13.2%), lack of space (9.4%) and inexperience (3.8%). This implies that the major problem faced by the snail farmers in the study area is that of predators (Table 6).

Table 6: Distribution of the respondents according to problems encountered in snail production

Problems	Frequency	Percentage
No Problem	6	11.3
Lack of Finance	7	13.2
Lack of Space	5	9.4
Theft	10	18.9
Predators	23	43.4
Inexperience	2	3.8
Total	53	100

Source: Field survey, 2007

CONCLUSION AND RECOMMENDATION

Based on the major findings of this research, the following conclusions were drawn. Snail farming is a profitable venture if carried out with adequate management and the right type of breed; Snail farming can be handled as a part-time business because it is not time consuming; A large number of feed consumed by the snails come from domestic waste and green feed which made the cost of feeding to be low; Profit made in snail production is being influenced by years of education, years of experience and farm size; and the main problems of snail production is predators.

In view of this, this study therefore recommends that; more people should venture into snail production and the already involved farmers should enlarge their production; farmers should take great care by avoiding or removing of all materials that can cause harms to the snails; and due to snail's profitability and its low capital investment nature, it is recommended for farmers without substantial capital, unemployed and those aspiring to augment their income.

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