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Snail Farming as an Environment Friendly and Viable Enterprise in Ondo State, Nigeria

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ABSTRACT The study evaluated snail farming as an environment friendly and viable enterprise in Ondo State, Nigeria. Specifically it identified the socio-economic characteristics of the respondents, determined profitability and examined productivity of snail farming in the study area. A multistage sampling technique was used to select 50 snail farmers and structured questionnaire administered on them. Descriptive statistics, budgetary and production function analyses were employed to analyse the data collected. The study revealed that 92% of the respondents belonged to the active segment of the population while the remaining 8% were aged. Analysis showed that 91.43% of the respondents reared both *Archachatina marginata* and *Archatina archatina*. The profitability analysis revealed that an average farmer incurred a total cost of N8347 but earned an average total revenue of N33798.82 per production cycle which indicates that an average farmer earned a net revenue of N25,452 per production period. The result of the production function postulated for snail farming in the study area reveals that the postulated regressors explained about 64.4% in the variation of the regressand. A Return to Scale (RTS) of 0.7336 suggests that snail production in the state fell in the rational stage (that is, stage II) of the production surface.

INTRODUCTION

The per capita consumption of animal protein in Nigeria is only 9.3g/day as against 34g/day recommended by the Food and Agriculture Organization (FAO) to be the minimum requirement for the growth and development of the body (Shaib et al. 1997). Snail is one of such micro-livestock that recently attracted attention among Nigerians as aftermath of the alarm raised by Food and Agriculture Organization (FAO) on animal protein deficiency among Nigerians (Adesope 2000; Akinusi 2000). African giant snail (*Archachatina marginata*) can be one of the micro-livestock that could serve as ready meat for a vast majority of the populace especially in the tropics. According to Cobbinah (1988), the bulk of snails that are consumed in Nigeria today are from people who gather them from bushes and sell in local markets or along roadsides. However, Efarmspro (2006) reported that wild snails 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. Agbogidi and Okonta (2011) said that snails can be reared in urban environment without infringing on the peace of neighbours, the practice requires small space and besides, snails have been shown to adapt to various environmental conditions hence can be raised in small towns, cities, farms, at backyard or commercial levels at villages. Also, Agbogidi et al. (2008) said that snails generally are noiseless and quite easy to handle. Goodman (2008) reported that the amount of capital required for the establishment of a snailery is appreciably small and the practice requires little labour with no strenuous physical exertion. Apart from the nutritional importance of snail to health and ability to be reared under various conditions, many researchers have also worked on the viability of the business. For instance, Lameed (2006), Oguniyi (2009), and Adinyal et al. (2011) confirmed in their studies that snail farming was a profitable business. Amusun et al. (1999) said that snail is considered as a delicacy and good source of animal protein of high biological value in Nigeria, Republic of Benin and other West African Countries. Snail is an important source of protein in many parts of West and Central Africa (Blay et al. 2004). Snails have good quality protein and are rich in potassium, phosphorus, essential amino-acid and vitamin C and B complex (Baba and Adeleke 2006; Okpeze et al. 2007). Abere and Lameed (2008) said that the low cholesterol level of snails makes them useful in the treatment arteriosclerosis and other heart related diseases. Other curable ailments by snails in Nigeria include whooping cough, anemia, ulcer, asthma, age problems, hypertension and rheumatism (Abere and Lameed 2008). Imevbore (1990) said

that about 42% of the live weights of snails are edible. Hassan (1999) said that protein content of snail is about 37-51% compared to that of guinea pig (20.3%), poultry (18.3%), fish (18%), cattle (17.5%), sheep (16.4%) and swine (14.5%). Awesu (1980) contended that the edible portion of *Archachatina maginata* contained crude protein (18.28%), ash (1.57%), N.F.E (4.95%), calcium 160.5mg/100g, ether extract (1.36%), crude fibre (0.07%), magnesium 30.3mg/100g, potassium 71.7mg/100g, iron 12.2mg/100g. According to Cobbinah et al. (2008), crushed snail shells may be applied in chicken feed or liming to improve the quality of acidic (fish pond) soil.

Objectives of the Study

In view of the contribution of snail to the provision of protein to the dietary need of Nigerians and environment friendly nature of snail farming this study therefore set the following as objectives :

(i) it identified the socio-economic characteristics of snail farmers in the study area.
(ii) it examined profitability of snail farming .
(iii) examined the resource –use efficiency of snail farming in the study area.

RESEARCH METHODOLOGY

Study Area

This study was carried out in Ondo State situated in the South-Western Nigeria. Ondo State is one of the six states that made up south-western Nigeria. This State lies between longitude $4^0$30" and 6^0 east of the Greenwich Meridian and latitude 5^0 45 and 8^0 15" north of the equator. The state has a population of 3,441,024 (National Population Commission 2006). The state has a tropical climate with its characteristic high temperature all the year round, heavy rainfall during the rainy season (April to October) and dry wind during the dry season (November to March). This favourable climate accounts for reason why about 75 percent of the inhabitants are farmers. They grow both arable and permanent crops. Apart from farming inhabitants also engaged in occupations like manufacturing and commerce.

Sampling Technique

A multi-stage sampling technique was used for this study. At the first stage two local government areas (that is, Akure South and Akure North) were purposively selected because of the prevalence of snail farmers in the area. At the second stage a random sampling technique was used to select 25 respondents from each local government area making a sample size of 50 and structured questionnaire administered on them.

Analytical Technique

Descriptive statistics such as frequency distribution and percentages were used to analyze the socio economic characteristics of the respondents .

Budgetary analysis using Net Return approach is used to determine the profitability of snail farming in the study area. The Net Return was represented by

$$NR = TR - TC \quad (1)$$

Where
NR= Net Return
TR= Total Revenue
TC= Total cost

Production function analysis using Ordinary Least Square (OLS) was used to quantitatively determine the influence of some socio-economic characteristics of respondents on the revenue generated from the enterprise and also to examine the resource-use efficiency of snail farming in the study area. The production function postulated for snail farming in the study area is implicitly represented as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, u_i) \quad (2)$$

Where
X_1 = Cost of Labour
X_2 = Cost of Feeds
X_3 = Number of snails reared
X_4 = Age of Respondents
X_5 = Farming Experience
X_6 = Education
U_i = Error term or disturbance term

Data collected was assumed to fulfil the assumption of multiple regression model. These assumptions include absence of multicollinearity among the explanatory variables, normally distributed error term with zero mean and constant variance and non auto regression disturbance (Koutsoyiannis 1977)

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

Table 1 reveals that 18% of the respondents were 30years old or less while 34% of them were

between 31 and 40years old. Only 8% of these respondents were more than 50 years old while 40% of them were between 41 and 50 years old. Analysis suggests that snail farming was dominated by the active segment of the population which accounted for 92% of the respondents. This may not be unconnected with scarce white collar job. These findings are synonymous with Adinyal et al. (2011) in their study that snail farming was dominated by the active segment of the population accounted for 83.33% of the respondents in their study area. Table 1 also showed that 92% of the respondents were males while the remaining 8% were females. Table 1 also reveals that 64% of these farmers were married while 26% of them were single. Only 10% of these respondents were divorced. This result may have a positive effect on the availability of family labour. Analysis also reveals that 86% of the respondents were literates which can have positive effect on their adoption of new technology.

Table 1: Socio-economic characteristics of snail farmers in the study area

Variable	*Frequency*	*Percentage*
Age (yrs)	*N = 50*	
≤ 30	9	18
31- 40	17	34
41-50	20	40
> 50	4	8
Total	50	100
Sex		
Females	4	8
Males	46	92
Total	50	100
Marital Status		
Single	13	26
Married	32	64
Divorced	5	10
Total	50	100
Level of Education		
No formal education	7	14
Primary education	19	38
Secondary education University	213	426
Total	100	100

Breeds of Snails Reared by Respondents

Table 2 showed that 74.29% of the respondents reared *Archachatina marginata* while 25.71% of them reared *Archatina-archatina*. About 91.43% of these farmers reared both *Archachatina marginata* and *Archatina-archatina*. Analysis reveals that majority (74.29%) prefers rearing of *Archachatina marginata* which may be due to the fact that it is larger in size, tastes better and has higher market value than any other breed . Analysis also indicates that most of the respondents reared more than one breed of snail on their farm. This study agreed with the findings of Hamzat (2000) that *Archachatina marginata* is common in Nigeria and commonly reared by farmers because of their large body size and easy to manage.

Table 2: Breeds reared by respondents

Types of breeds	*Frequency*	*Percentage*
Archachatina marginata	26	74.29
Archatina archatina	9	25.71
Both *A. marginata and A. archatina*	32	91.43

Snail Rearing Techniques Among the Respondents

Table 3 showed that 54% of the respondents used drums and tyres while 70% of them used trench pen and tyres for their snail rearing activities. About 62% of these respondents used drums and fenced pens to rear their snails. Analysis suggests that most of the respondents combined two or more methods to rear their snails.

Table 3: Snail rearing techniques among the respondents

Technique used	*Frequency*	*Percentage*
Drums and tyres	27	54
Trench pen and tyres	35	70
Drums and fenced pens	31	62

Profitability Analysis

Table 4 showed that the cost of feeds accounted for 56.94% of the total cost while labour gulped 19% of the total cost. Transportation cost accounted for 2.03% of the total cost while the cost for acquiring right type of soil for snails rearing accounted for 1.03% of the total cost. The cost for depreciation of fixed inputs gulped 16% of the total cost while the cost for buckets accounted for 5% of the total cost. The table also revealed that an average farmer incurred a total cost of N8,347 but earned an average total revenue of N33,798.82 per production cycle. This indicates that an average farmer earned a net farm income of N25,452 per produc-

tion cycle suggesting that snail farming is a profitable venture in the study area. This agreed with the findings of (Lameed 2006; Ogunniyi 2009; Adinyal et al.2011) in their studies that snail farming was profitable in the study area.

Table 4: Costs and return for snail farming in the study area

Items	*Amount (N)*	*Percentage of TC*	*Percentage of TR*
Cost of feeds	237,633	56.94	14.06
Cost of labour	79,295	19	4.69
Cost of soil	42,986	1.03	2.54
Cost of transportation	12,520	2.03	5.01
Cost for buckets	20,867	5	1.23
Depreciation	66,776	16	3.95
Total cost	417,340	100	24.70
Total revenue	1,689,941		
Net return	1,272,601		
Total cost/ farmer	8,347		
Total revenue/ farmer	33,798.82		
Net return/ farmer	25,452		

Production Function Analysis

The linear, Cobb-Douglas and exponential functional forms of production function were tried using ordinary least square technique (see Table 5). The estimated functions were evaluated in terms of the statistical significance of the coefficient of multiple determination (R^2) as indicated by F value, the significance of the coefficients and the magnitude of the standard errors. Based on these statistical and economic criteria, Cobb-Douglas functional form was selected as the lead equation. The coefficient of multiple determination (R^2) obtained in this study, that is, 0.644 shows that 64.4% of the variation in the revenue of the respondents were explained by the included explanatory variables. Cost of labour, number of snails, farming experience and education had positive signs which suggest that an increase in these variables would lead to an increase in revenue of respondents.

Cost of feed and age of respondents had negative signs which indicate that an increase in these variables would lead to a decrease in the revenue of respondents.

Resource-use Efficiency of Snail Farming in the Study Area

All the variables had positive elasticity of production except cost of feeds and age of respondents that had negative signs as shown in Table 6. Variables with negative elasticity of production indicate that they are in stage III of the production zone. The Return to Scale (RTS) is computed by summing up the production elasticities of inputs was 0.7336 which indicate that snail production in the state fell in the rational stage (stage II) of the production surface.

Table 5: Estimates of production function for snail farming in the study area

Variables	*Linear function*	*Cobb-Douglas function*	*Exponential function*
Constant	15950.833	5.176	10.021
	(5869.211)	(3.012)	(0.138)
Cost of labour	0.384	0.196	9.575
	(0.138)	(6.319)	(0.436)
Cost of feed	1.527	-0.0009684	325.92
	(0.801)	(0.099)	(781.41)
Number of snails reared	1.975	0.677*	909.845
	(0.645)	(0.014)	(602.158)
Age of respondents	3.517	-0.135	974.805
	(1.649)	(0.364)	(529.118)
Experience	3.809	0.08653	4301.177
	(16.426)	(0.127)	(4274.320)
Education	-1.268	0.0003277	-1718.777
	(4.374)	(0.062)	(972.903)
R^2	0.621	0.644	-0.558
R^2	0.597	0.621	0.508
F value	41.391	27.732	39.404

*Significant at 5%

Table 6: Elasticities of production and return to scale

Variables	*Elasticities of production*
Cost of labour	0.106
Cost of feed	-0.0009684
Number of snails reared	0.677
Age of respondents	-0.135
Experience	0.08653
Education	0.0003277
RTS	0.7335617

CONCLUSION

The study revealed that 92% of the respondents belong to the active segment of the population while the remaining 8% were aged. Analysis showed that 91.43% of the respondents reared both *Archachatina marginata* and *Archatina archatina*. The profitability analysis revealed that an average farmer incurred a total cost of N8347 but earned an average total revenue of N33798.82 per production cycle which

indicates that an average farmer earned a net revenue of N25,452 per production period. The result of the production function postulated for snail farming in the study area reveals that the postulated regressors explained about 64.4% in the variation of the regressand. A Return to scale (RTS) of 0.7336 suggests that snail production in the state fell in the rational stage that is, stage II) of the production surface. From the foregoing, one can concluded that the shortage of protein in Nigerian diet can be greatly improved with the consumption of snails.

RECOMMENDATIONS

In view of the findings above, this study therefore recommends that snail farmers should increase their level of production as they tend to earn more profit with small capital investment; snail farming should be encouraged because of the fact that it can be reared in wide range of environment; government should target snail farming as a strategy of arresting low protein consumption of the citizens as it is cheaper to manage than other livestock.

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