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## ECONOMIC OF SNAIL REARING IN NDUKWA WEST LOCAL GOVERNMENT AREA OF DELTA STATE, NIGERIA

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**Abstract:** The study analysis economics of snail rearing in Ndukwa West Local Government Area of Delta State, Nigeria. It considered the socio-economic characteristics of snail rearing farmers; the profitability of the enterprise, the problems associated with snail farming in the study area. It also makes recommendations based on the findings. A total of 50 respondents from five clans in the L.G.A. were selected. A well structured questionnaire was administered to the chosen farmers. The work was analyzed using descriptive statistics and budgeting technique. The budgetary technique was used to determine the profitability of the enterprises, which was found to be profitably in the study area at a gross margin of ₦234,370, net farm income of ₦191,981.3, mean net farm income of ₦ 3,839.6 and net return on investment of ₦ 1.56. Constraints in snail production in decreasing magnitude were slow growth, predator attack, theft, feed availability, source of foundation stock, mortality, capital, marketing and inexperience. It was recommended that extension agents should teach farmers on improved technique in snail rearing, more research should be carried out, government should establish breeding centers, provide farmer's with incentives and other inputs and encourage farmers to form cooperative societies.

**Keywords:** Economic, Snail Rearing, Ndukwa West Local Government Area, Delta State Nigeria

### INTRODUCTION

Successive government had embarked on policies and programmes aimed at boosting sustainable macro and micro livestock's production in Nigeria. Micro livestock production refers to species of animals that are associated with small body size, moderate nutrition and management (Akinnusi, 1998). Snail is one of such micro livestock that has recently attracted attention among farmers in Nigeria as aftermath of the alarm by Food and Agriculture Organization (FAO). On animal protein deficiency among Nigeria (Akinnusi, 2000) and FAO (1986) noted that the average animal protein intake in Nigeria is low, calling for concerted effort towards alleviating this crisis of protein shortage. There is therefore the need to look inward and integrate into our farming system some non-conventional meat sources (Ebenebe, 2000). This will complement the conventional source of animal 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.

### OBJECTIVES OF THE STUDY

The broad objective of this study is to evaluate the economics of snail production among farmers in Ndukwa West local Government Area of Delta State. The specific objectives are to:

- i. Determine the socio-economic characteristics of snail farmers in the study area;
- ii. Examine the profitability of snail production in the area;
- iii. Determine the problems militating against snail production in the area; and
- iv. Make policy recommendations base on the findings

*Uche Okeke*

## **JUSTIFICATION FOR THE STUDY**

This study will be useful to farmers who are involved in snail farming. It will also help those farmers to have the intention to start snail production. The study apart from enhancing domestication and commercialization of snail farming will also assist researchers, policy makers, extension agents and research institutions in their plan for sustainable snail production.

## **REVIEW OF RELATED LITERATURE**

The review of related literature is undertaken under the subheading of common breed and sources of foundation stock, housing of snail, feeds and feeding of snails, nutritional composition of snail, cultural and social value of snail, socio-economic characteristics of snail farmers, profitability of snail farming and constraints of snail farming. Common breed of snail and sources of foundation stock Akinusi (1998) revealed that *Archachatina Marginata* is the most common breed of snail reared in south west Nigeria. Ogunniyi (2009) stated that 98.1% of the breed reared is *Archachatina marginata* because of the fact that it has more meat than other species and it commands higher price thereby giving more revenue to the snail farmers. The southwestern Nigeria had environmental condition that is favorable to the rearing of *Archachatina marginata* (Omole, 1998). Foundation stock may be obtained from the following sources, snail farmers, research institute, market, direct from bush and hawkers.

### **Housing of Snail**

Amuson and Omidiji (1999) stated that there are three main housing systems for rearing of snail. They are extensive system also referred as pasture, free range or outdoor system, semi-intensive (outdoor) and intensive system which may be indoor or outdoor.

### **Feeds and Feeding of Snails**

Giant African snails have voracious appetite. They are known to eat at least 500 different types of plants including peanuts, beans, peas and melon. If fruits or vegetable are not available that snail will eat, they will take a wide variety of ornamental plants, and tree barks (Akinusi, 1998). The food also includes grains waste product, such as maize, plantain and succulent vegetable including, nuts, cherry, water leaf, cassava, cocoyam, soft sheets and lettuce (Okafor, 2001).

### **Nutritional Composition of Snail Meat**

Snail as human and livestock food serve as valuable sources of nutrition to human and animals with high level of protein, iron, lysine, leucine, arginine, calcium and phosphorus, relatively low amount of sodium, fat and cholesterol compared to poultry and other livestock. (Imevbore and Ademosun, 1988, Simpson, 1990, Thompson, 1996, Wosu, 2003). In general, the nutritional compositions of fresh snail meat are shown in table 1.

**Table 1: Nutritional Composition of Fresh Snail**

Nutrients	Value
Crude protein	18.20%
Carbohydrate	2.88%
Ether extracts	1.36%
Fat	1.01%
Crude	0.07%
Ash	1.37%
Nitrogen free extracts	4.95%
Iron	12.2mg/100g
Water	74.06%
Constituents	50.50mg/100g

Source: Ogbeide 1968 and Wosu (2003).

### **Cultural/Social Value of Snail**

In study conducted in Oshimili South Local Government Area of Delta State, Nigeria Obeteru (2008) reported that the rural inhabitants of the area outside food, uses snail to ward off evil spirit, appealing gods, use as sacrifice, preparation of talisman, treatment of bone fracture, treatment of infertility, curing of eye problem and suppression of high blood pressure.

### **Socio-Economic Characteristics of Snail Farmers**

Snail farmers are composed of mainly male. According to Ogunniyi (2009), Alyeloja and Ogunjinmi (2010) and Ahmadu and Ojogho (2012), all reported that 73.6%, 90% and 74% of snail farmers are male respectively. Jusuf (2002) reported that 58.8% of snail farmer had tertiary institution. Raheem (2001) stated that 96% of the snail farmers used personal saving as a source of initial capital. Ogunniyi (2009) reported that 41.6% of the respondents have five years of experience.

### **Profitability of Snail Farming**

According to Ogunniyi (2009) snail farmer's made profits from their production with gross margin of ₦29,432.78 and net farm income of ₦ 24,089.03 per farming season, showing that snail farming in the study area is a profitability business. Also Ahmadu and Ojogho (2012) reported that snail production required as low as about N37 only to raise a snail to an average marketable size.

### **Constraints to Snail Farming**

Ogunniyi (2009) stated that the major problems faced by snail farmers are predators such as lizards, snake, frog, bird, ants, termites, cockroaches and theft. Parasite, nematodes, fungi and arthropods may equally attack snail. Okorie (2012) noted that the natural enemies/predators of snails are members of namely vertebrate groups, ground beetles, crickets, centipedes, snakes, toads, turtle, birds, rats, mice and lizard. Humans also pose very serious threat to snails through pollution and destruction of natural habitats of snails.

## **METHODOLOGY**

The study was carried out in Ndukwa West Local Government Area of Delta State. It is one of the 25 L.G.A. in Delta State. The Local Government Area has its headquarters in kwale, Delta North senatorial zone. It consists of (8) communities which are kwale (headquarters), Utagba Uno, Ogume, Onitsha Ukwani, Abi, Emu, Obeti Egbo, and Ndemili. It's population stood at 149, 3251 (National population census, 2006). It occupied a land area of 816km<sup>2</sup>. The area is

*Uche Okeke*

predominantly agrarian with crops such as yam, cassava, maize, plantain and melon grown as major crops. Livestock's such as bird and goat are reared under free range around the homestead.

**POPULATION AND SAMPLING PROCEDURE**

The study is made up of snail farmers in the area. The communities used in the study were selected using random sampling techniques. Five villages will be selected and they include Onitsha Ukwani, Ogume, Utagba Uno, Kwale and Ndemili. Ten snail farmers were selected from each of the villages making it a total of 50 respondents.

**METHOD OF DATA COLLECTION**

Data for the study will be obtained from primary and secondary sources. Primary data includes the use of questionnaire administered to the respondents, oral interview and personal observations. Data will be collected on socio-economic characteristics of the respondents such as age, education, gender, marital status, major occupation, minor occupation, household size, and reason's for snail farming. Secondary data will be taking from textbooks, journals etc.

**Measurement of Variable**

A reasonable number of variables were deployed in this study. They include snail production variables, socio-economic variables, constraints to production and depreciation of assets. Snail production variables are the snail production outputs and snail production inputs, labour, feeds and prices of inputs and output. Socio-economic variables are the famer's age, educational level, farming experience, gender and household size.

**METHOD OF DATA ANALYSIS**

Objective (i) was achieved with the use of descriptive statistics such as mean, percentage, frequency, bar chart, pie chart and table. Objective (ii) will be achieved with the use of budgetary method and likert scale will be used in achieving objective (iii). The budgetary method to be used in determining the profitability of the enterprise is given as follows

$$\begin{aligned} \text{GM} &= \text{TR} - \text{TVC} \\ \text{NFI} &= \text{TR} - \text{TC} \\ \text{NROI} &= \frac{\text{TR}}{\text{TC}} \end{aligned}$$

WHERE	GM	=	Gross Margin
	TR	=	Total Revenue
	TVC	=	Total Variable Cost
	NFI	=	Net Farm Income
	TC	=	Total Cost
	NROI	=	Net return on investment

**RESULTS AND DSISCUSSION**

The results will be discussed under socio-economic characteristics of snail farmers, cost and returns of snail production and constraints of snail production.

### Socio-Economic Characteristics of the Respondents

The socio-economic characteristics are the age of the respondents, gender, marital status, educational level, farming experience, house hold size, occupation, sources of labour, sources of fund and reasons for rearing snail of the respondents.

### Age Distribution of the Respondents

The Age distribution of the respondents is shown in the table 1 below. It showed that

**Table 1: Age Distribution of Respondents**

Age range	Frequency	Percentage
0-20	2	4
21-35	4	8
36-50	38	76
51 and above	6	12
<b>Total</b>	<b>50</b>	<b>100</b>

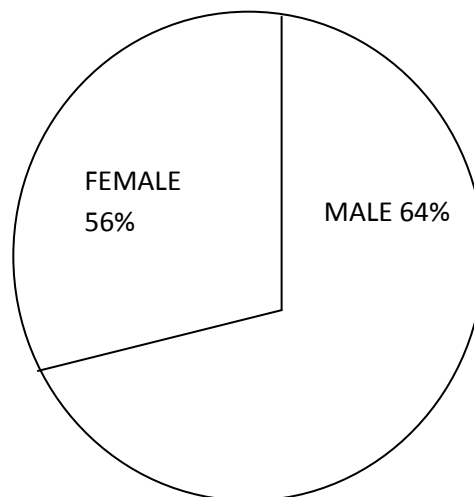
Source: Field survey, 2013.

Most of the farmers (76%) falls under the age range of 36-50 years, 51 and above had 12%, 21-35 had 8% while 0-20 years had 4%. It showed that majority of the snail farmers are in their active age range, indicated that snail farming is relatively new in the study area.

### Gender of the Respondents

The gender of the respondents are shown in diagram

**Diagram 1: Gender of the Respondents**



Source: Field survey, 2013.

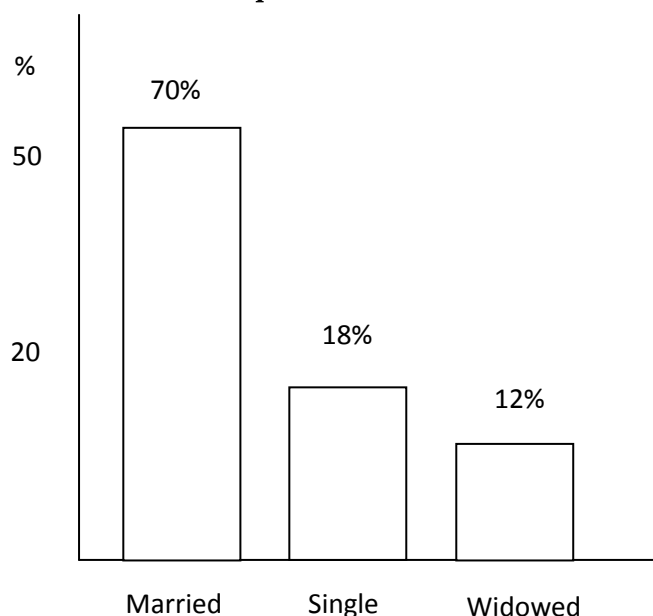
From the diagram 1, 36% of the snail farmers are female whereas the majorities (64%) are male. it shows that snail farming is male dominated in the study area.

### Marital Status of the Respondents

The marital status of the respondents shows that 70% are married, 18% single while 12% are widowed. It shows that married people are more involves in snail farming.

Uche Okeke

Diagram 2: Marital Status of the Respondents

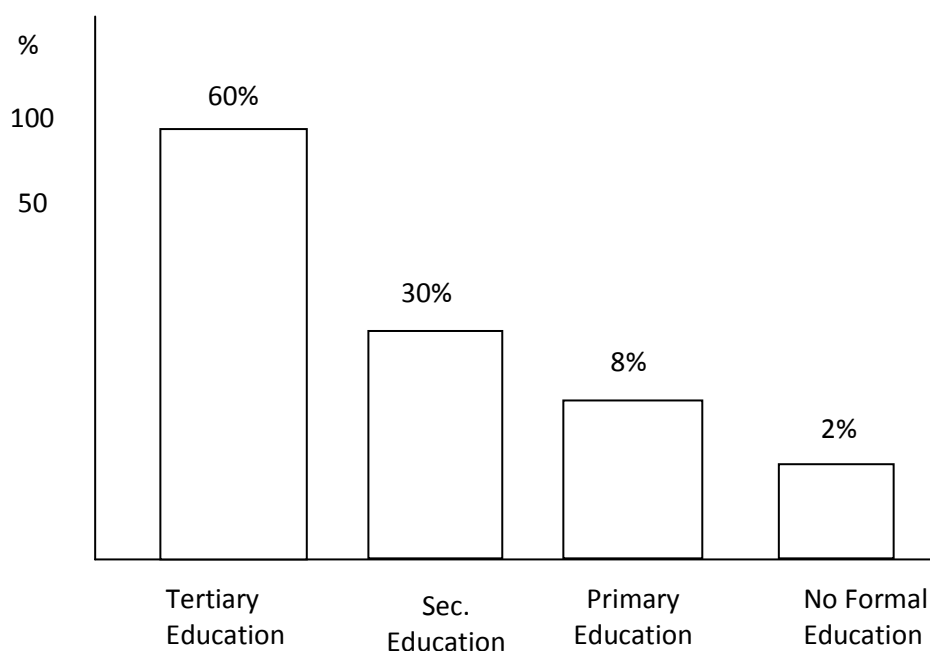


Source: Field survey, 2013.

### Educational Level of the Respondents

The educational level of the respondents shows that majority 60% of the snail farmers had tertiary education, 30% had secondary education, 8% had primary education while 2% had no formal education as shown in diagram 3. This implies that education is vital in snail rearing especially in the area of book keeping and proper management.

Diagram 3: Educational Level of the Respondents



Source: Field survey, 2013.

### Farming Experience of the Respondents

The distribution of the farmers according to the number of years spent on snail rearing is shown in Table 2 below. Those that had experience of 1-5 years are 96%, while those that had experience between 6-10 years are 4%. This implies that more have started to enter into snail rearing due to important attached to it.

**Table 2: Farming Experience of the Respondents**

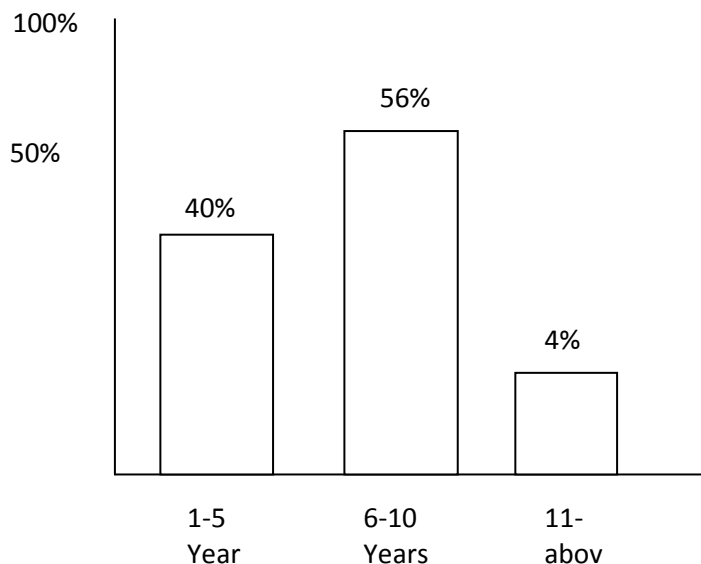
Year of experience	Frequency	Percentage
1-5 YEARS	48	96
6-10 YEARS	2	4
<b>TOTAL</b>	<b>50</b>	<b>100</b>

Source: Field survey, 2013.

### Household Size of the Respondents

The analysis of the household size of the respondents shows that 1-5 persons had 40%, 6-10 person had 56% whereas 11 and above

**Diagram 4: Household Size of the Respondents**



Source: Field Survey, 2013.

Had 4% the implication is that the family will have a large source of labour which will influence the business positively.

### Distribution of Respondents by Occupation

Table 3 shows that majority of the snail farmer (56%) are civil servant, 36% were farmers while 8% were traders in the study area.

*Uche Okeke*

**Table 3: Distribution of Respondents by Occupation**

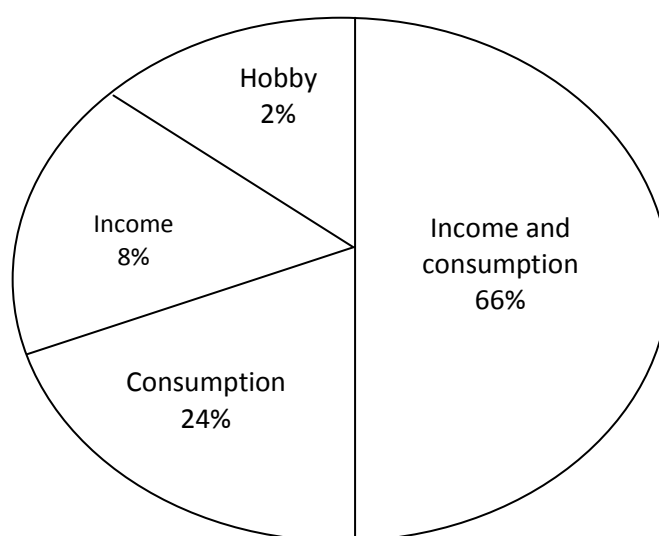
OCCUPATION	FREQUENCY	PERCENTAGE
Farming	18	36
Civil servant	20	56
Trader	4	8
<b>Total</b>	<b>50</b>	<b>100</b>

Source: Field survey, 2013.

**Reasons for Rearing Snail by the Respondents**

The study shows that majority 66% of the respondents rears snail for economic reason (income generation and consumption) 24% keep snail for consumption only, 8% only for income and 2% rears snail as a hobby.

**Diagram 5: Reasons for Rearing Snail by Respondents**



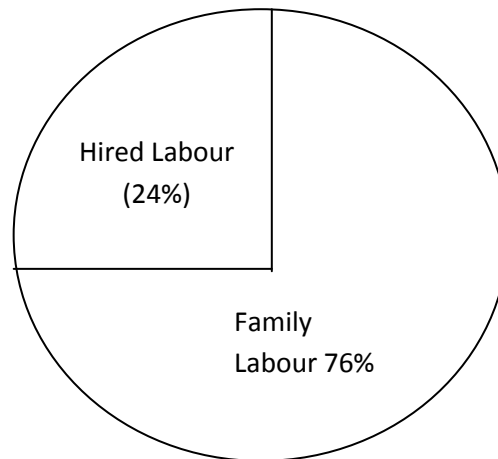
Source: Field Survey, 2013.

**Sources of Labour of the Respondents**

Diagram 6 shows that an overwhelming majority (76%) of the respondents makes use of family labour in rearing their farm operations while 24% of the respondents employed hired labour. It implied that most of the respondents make use of family labour in their farm. This will make the labour cost to reduce.



**Diagram 6: Sources of Labour of the Respondents**



Source: Field survey, 2013.

**Sources of Fund of the Respondents**

The data in table 4 shows that 52% of the initial source of capital used in setting up a snail farm in the study area are from the personal saving, while the remaining 40% and 8% are from friends/ relatives lenders and money respectively.

**Table 4: Sources of Income of the Respondents**

Source of income	Frequency	Percentage
Personal saving	26	52
Friends/relatives	20	40
Money lenders	4	8
<b>Total</b>	<b>50</b>	<b>100</b>

Source: Field survey, 2013.

**Cost and Returns Analysis**

The costs that were considered include variable and fixed cost incurred during the rearing of the snail. The variable inputs such as labour, feeding, transportation, kerosene, parent stock and water. The result of the net farm income presented in table 5 shows that labours constituted 50.2% of the total variable cost while the percentage share of total variable cost for feeding, transportation, kerosene, parent stock and water were 15.19%, 7.69%, 3.75%, 19.30% and 1.98% respectively. Labor cost took the largest component of total variable cost. The cost and return analysis also showed the gross margin of ₦234,370, and net return on investment of ₦1.56. The net return on investment of ₦1.56 shows that for every one naira invested in snail production, an additional ₦1.56 will be gained. From these profitability ratios, it shows that snail production is a profitable business in the study area.

Uche Okeke

Table 5: Profitability of snail production

Items	Amount (N)	Percentage
Variable stock	315,000	
Parent stock	15,560	19.13
Feed	12,250	15.19
Labour (Family and Hired)	32,000	52.09
Transportation	6,200	7.69
Kerosene	3,020	3.75
Water	1,600	1.98
<b>Total variable cost</b>	<b>80,630</b>	<b>100</b>
Gross Margin (GM=TR-TVC)	<b>234,370</b>	
Fixed input		
Lantern	2,126	5.02
Feeder	4,500	10.02
Watering can	2,000	4.72
Rake	2,000	4.72
Hand towel	2,280	5.37
Hoe	5,360	12.64
Bowel	10,160	23.98
Rain boot	4,187.5	9.88
<b>Total fixed cost</b>	<b>42,388.7</b>	<b>100</b>
Total cost (TC=TVC+TFC)	123,018.7	
NET Farm Income (NEI=Gm-TFC)	191,981.3	
Mean Net Farm Income (MNFI = $\frac{NFI}{n}$ =	3,839.6	
Net return on investment (NROI = $\frac{NFI}{n}$ )	1.56	

Source: Field Survey, 2013.

Note: TC = Total Cost

TVC = Total Variable Cost

TFC = Total Fixed Cost

N = Number of Respondent

### Constraints Militating against Snail Farming

The major constraints of snail production in the study area includes; slow growth, predator attack, theft, feed availability, source of foundation stock, mortality, capital, marketing and inexperience (Table 6). The ranking of these problems was done by means of a 3 point likert scale which indicates slow growth, predator attack and theft as very severe, feed availability and source of foundation stock as severe and mortality, capital, marketing, and inexperience as not severe.

**Table 6: Problems Militating against Snail Farming**

Problem	Mean Score	Rank remark
Slow growth	3.59	1 <sup>st</sup> very severe
Predatory Attack	3.38	2 <sup>nd</sup> very severe
Theft	3.20	3 <sup>rd</sup> very severe
Feed Availability	2.84	4 <sup>th</sup> very severe
Source of foundation stock	2.74	5 <sup>th</sup> severe
Mortality	2.52	6 <sup>th</sup> not severe
Capital	2.21	7 <sup>th</sup> not severe
Marketing	2.19	8 <sup>th</sup> not severe
Inexperience	2.13	9 <sup>th</sup> not severe

Source: Survey data, 2013.

### CONCLUSION AND RECOMMENDATIONS

The research examined the economics of snail rearing in Ndukwa-West Local Government Area of Delta State, Nigeria. Primary data were generated from random sampling of 50 snail famers. Data generated were analyzed using descriptive statistics. Results on the socio-economic characteristics of respondents revealed that majority of the farmers (64%) were male within active age range of 36-50 years, about 70% were married, most of the snail farmers (56%) are civil servants, 56% had household size of between 6-10 persons, 60% attained tertiary education, while majority 96% had 1-5 years of experience and 66% rear snail for income and consumption. On profitability, results of the enterprise budgeting analysis indicated gross margin, net farm income, mean net farm income and net return on investment of ₦234,370, ₦191,981.3, ₦3,839.6 and ₦1.56k respectively. The farmers returned on the average ₦1.56 for every ₦1.00 invested in the business. Furthermore, the problems militating against snail farming in the area includes slow growth, predator attack, theft, feed availability, source of foundation stock, mortality, capital and marketing and inexperience.

### RECOMMENDATIONS

Based on the fact that snail rearing is a viable enterprise in Ndukwa West Local Government Area of Delta State and in order to achieve higher profitability in the enterprise, the following recommendations are made:

- Extension agents should embark on intensive educational programs on the principles, practices, and prospects of snail farming on a free basis.
- More research should be carried out on slow growth. This can be in form of formulating compound ration to aid faster growth.
- Government can establish breeding centers where farmers can acquire foundation stock and inputs at subsidized rate.

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**Uche Okeke**

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