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Article · March 2011

DOI: 10.4314/gaep.v6i1.64025

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A SURVEY OF SNAIL FARMS IN CROSS RIVER STATE, NIGERIA

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ABSTRACT

The existence of snail in the wild has become threatened, and information on the efficiency and effectiveness of ex - situ management of snails in many areas is urgently needed for consistent supply of snails. This work, therefore surveyed the practice and adoption of snail farming technology in Cross River State, Nigeria. Cross River State was stratified into three zones, and three local government areas were randomly selected from each stratum. A total of nine Local government Areas were randomly selected for the study. A set of pre – tested structured questionnaire and in-depth interviews were used to elicit information from owners of all the functioning snail farms in selected Local Government Areas. Group Discussion was held with management of all non functioning snail farms. Data collected were augmented with on - farm investigation. Results were presented in form of percentages, frequency of counts and tables. Owners of snail farms in the study area were all males, Christians and literates. Majority of the farms (71.43%) were between 1 and 3 years old. About 35.71% of established farms have stopped functioning and the active ones (64.39%) may become passive before 5 years due to poor management (100%), inadequate knowledge of snail farming (100%), lack of capital (100%) and no encouragement from the government (100%). Majority of the respondents (71.43%) embarked on snail farming as hobby while some joined for conservation of snail (42.86%). Only 14.29% established snail farms for income generation. With exception of farm 7 with 1600 snails, no other farm had above 300 snails. Farm 1 has only 30 snails. About 57.14% of the respondents sourced their breeding stocks from the wild alone. Snail feed were locally sourced by all respondents. The housing system mostly used by respondents was enclosure with nets (71.42%) while only 14.20% used motor tyres and concrete trench indicating low scale of production. All the 9 functioning snail farms are located in Calabar, Boki, Obubra and Yakurr while other areas had no adoption of the technology. Calabar metropolis had the highest concentration of 3 farms. Incubation period of snail eggs was unknown to most respondents (71.40%) revealing that they had not been breeding snails. The impact of snail farming has not been felt in the study area.

Keywords: Snail farming, Sustainable utilization, Poverty alleviation, Cross River State

INTRODUCTION

Nigeria is endowed with abundant food, a climate that supports various species of wildlife, domestic animals and crops; yet more than 70% of the population are hungry (Federal Office of Statistics, 1999), with a mean daily protein consumption of about 30g below the recommended dose per person (Udedibie 2000; Benjamin *et al*, 2006). This deficit in protein consumption was caused by the increasing growth of human population (Oyenuga, 1968) together with the rising standard of living which placed great pressure on the existing sources of animal protein (Fagbuaro *et al*, 2006). In order to save the people from nutritional imbalance, it becomes therefore imperative to explore for an alternative protein sources that are readily available and affordable by both average income earners and the

rural inhabitants. Molluscs (particularly edible snails), which constitute the major and cheapest source of non conventional (wildlife) protein in Nigeria (Yoloye, 1984; Ademola *et al*, 2004) and have served as a significant and essential part of the daily diet of Calabars, Itsekiris, Yorubas, many coastal tribes (Fagbuaro *et al*, 2006), Ibos and people living in the forest belt (Anonymous, undated) were recommended for *ex situ* management to facilitate their multiplication and conservation.

Snail meat is high in protein (37 -51%) compared to that of guinea pig (20.31%), poultry (18.3%), fish (18.0%) cattle (17.55), sheep (16.40%) and swine (14.5%), with Iron (45 -59mg/kg) and low fat (0.05 – 0.08%) content (Anonymous, undated). It contains almost all the amino acids needed for human nutrition and therefore has a wide local and international utilization in West Africa, Asia and Western Europe where it is popular. In France, the annual requirement is about 5 million kg, over 60% of which is imported. The estimated annual consumption in Italy is about 306million snails. The demand in Nigeria outstrips supply because of the high export value and the consequential high demand for hard currencies which makes exporters eager to source snails at all costs, thus it became scarce, expensive and unaffordable for average income earning households. In the quest to make money, young and mature snails are harvested unsustainably, thereby hindering continuous reproduction which, is worsened by habitat destruction through deforestation and pesticide use.

With this present consumption pressure, edible snails which have been identified as a suitable and potentially affordable alternative protein source in rural areas may become locally extinct if the commercialization of snail farming is not intensified. Snail farming has been successfully commercialized in Europe, Asia, and Far East especially in Italy, France, South Korea, Taiwan and China (Hodasi, 1989). Snail farming is a potential viable business because of the ready market for snails and the high reproduction rate of snails. Irrespective of this ready market for snails and the simplicity of snail farming operations, the rate of adoption of snail farming technology in Nigeria has been low even among rural communities – where poverty and unemployment are high, and where local feeds and space for farming snails are abundant.

The study therefore surveys the snail farms in Cross River State with the view of assessing the adoption level of the technology by farmers, the reasons for embarking on such practice, characteristics of the farmers and the problems militating against snail farming in Cross River State, Nigeria.

METHODOLOGY

Study Area:

Cross River State is located between latitudes 4^o45¹ and 6^o52¹ and longitudes 7^o51¹ and 9^o28¹ East of the equator. The State was chosen based on the following reasons: Cross River is one of the Niger Delta states where the restiveness of youths has been attributed to high rate of poverty and unemployment. The State is rich in biodiversity which need to be conserved.

Agriculture is the occupation of the people, with most people in the Northern part of the State (Obudu and Obanliku) engaged in Apiculture (Honey production), while those in the southern riverrine area are mainly fishermen – occupations that could be compatible with snail farming. Snails and oyster are well consumed in the State.

Most of the local fruits and leaves recommended by Ayodele and Ashimolowo (1999) and Ogogo (2008) for feeding snails are common in the State.

Data Collection:

Cross River State was stratified into three (based on existing geopolitical zones): South, central and northern senatorial zones. Each zone has six local government areas. Three

local areas were randomly selected from each stratum. In all, nine local government areas were selected for the study. All known snail farmers in each selected local government area were identified through the Agricultural Development Programme (ADP) extension agents.

Local Government Areas	Number of Farms	Percentages
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Questionnaires and reconnaissance survey (on – farm investigation) were used to elicit information from all the snail farmers in selected local government areas. Group discussion was held with management of the 5 non functioning snail farms on problems militating against effective snail farming. Data obtained were analysed using percentages and frequency counts.

RESULTS

Socio - demographic Characteristics of Respondents

All the respondents in the study area were Christians and married males of 41 years and above (71.42%) (Table1). Majority of the respondents (71.42%) attended tertiary institution while secondary school and primary school certificate holders were 14.29% each.

Table 1: Socio - demographic Characteristics of Respondents in Study Area (n =7)

Parameter	Variable	Frequency	Percentage
Sex	Male	7	100
	female	0	0
Age	31 – 40	2	28.58
			71.42
Marital Status	Single	0	0
	Married	7	100
	Others	0	0
Religion	Christianity	7	100
	Muslim	0	0
	Others	0	0
Level of Education	Primary	1	14.29
	Secondary	1	14.29
	Tertiary	5	71.42

Location of Snail Farms

Table 2 shows that all the snail farms in the study area were located in four local government areas: Calabar Municipal (3), Boki (2), Obubra (1) and Yakurr (1).

Table 2: Distribution of snail farms based on Local Government Areas in the study area

Akpabuyo	0	0
Biase	0	0
Calabar Municipality	3	42.86
Boki	2	28.57
Obubra	1	14.29
Yakurr	1	14.29
Obudu	0	0
Obanliku	0	0
Yala	0	0
Total	7	100

Reasons for establishing Snail Farms

Table 3 shows that most respondents (71.43%) embarked on snail farming as a hobby. Others ventured into it to ensure conservation of snail (42.86%) and research (28.57%). Only 14.29% established snail farms as a source of income.

Table3: Respondent's reasons for establishing snail farms

Reasons	Frequency	Percentage
Hobby	6	85.71
Conservation of snails	3	42.86
Research	2	28.57
Income generation /improve standard of living	1	14.29

Characteristics of Snail Farms in the study areas

Characteristics of snail farms were analysed on the basis of size (Table 4), Age (Table5) and number of snails per farm (Table 6). Farm sizes of 25m² and 10m² were each established in 2 different sites. Other three farms had sizes of 13m², 9m² and 5m². Majority of the farms were between 1 and 3 years old (71.43%) while age range of 4 – 5 years constituted 28.57% (Table5). Table 6 shows that Farm 7 had the highest number of snails (1600) while Farm 1 had only 30 snails. With exception of farm 7 no other farm had above 300 snails.

Table 4: Size of snail farms in the study area

Farm size(m ²)	Frequency	Percentage
5	1	14.29
9	1	14.29
10	2	28.57
13	1	14.29

25	2	28.57
62	7	100

Table 5: Age of snail Farms surveyed in the study Area

Age (Years)	Frequency	Percentages
1	1	14.29
2	2	28.57
3	2	28.57
4	1	14.29
5	1	14.29
Total	7	100

Table 6: Number of snails in surveyed farms

Serial number of Farms	Number of snails	Percentages
1	30	1.16
2	45	1.73
3	120	4.62
4	200	7.71
5	300	11.56
6	300	11.56
7	1600	61.66
Total	2595	100

Housing, Feeding and inspection of Snails

Feed materials used by all the respondents in feeding the snails were plantain (*Musa paradisaca*), paw paw (*Carica papaya*) fruit and leaves, cassava (*Manihot esculentum*) peels, banana (*Musa sapientum*) / plantain (*Musa paradisiacal*) leaves and kitchen waste. The housing systems mostly used in the study area were enclosures with nets (71.42%). Motor tyres and concrete housing system constituted 14.29% each (Table 7). Table 8 shows that the feeding regimes as indicated by respondents were twice per week (57.24%) and once a week (42.86%). Inspection of the farms were on daily (42.86%), weekly (28.57%) and twice a week (28.57%) basis as presented in Table 9

Table 7: Housing systems employed by snail farmers in the study area

Type of housing system	Frequency	Percentages
Motor tyres	1	14.29
Enclosures with nets	5	71.42
Concrete trench	1	14.29
Total	7	100

Table 8: Feeding schedule employed by snail farmers in the study area

Feeding schedule	Frequency	Percentages
Once a week	3	42.86
Twice a week	4	57.14

Total	7	100
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Table 9: Inspection schedule of snails

Inspection schedule	Frequency	Percentages
Daily	3	42.86
Once a week	2	28.57
Twice a week	2	28.57
Total	7	100

Breeding of Snails

Table 10 shows that 57.14% of the respondents sourced their breeding stocks from the wild alone while 42.86% sourced their stocks from both the wild and the market. Majority of the respondents(71.42%) have no idea of the incubation period of snails(Table11).Though disparity exists in respondents' knowledge of the maturation age of snails in Table 11, however, all indicated between four and six months.

Table 10: Source of breeding stocks

Source	Frequency	Percentages
Wild	4	57.14
Wild/market	3	42.86
Total	7	100

Table 11: Respondent's knowledge of the incubation and maturation period of snail eggs

Duration (months)	Frequency	Percentages
2	1	14.29
2 -3	1	14.29
No idea	5	71.42
Total	7	100
knowledge of maturity age		
4 -5	3	42.86
5	2	28.57
6	2	28.57
Total	7	100

Constraints to snail farming and suggested solutions

High cost of housing materials, pest attack and theft were respectively ranked as the first, second and third major constraints to snail farming by the respondents in the study area (Table 12). As presented in Table 12, loan to small farmers, establishment of model farms, and constant supply of water were respectively ranked first, second and third as suggested solutions by respondents.

Table: 12 Respondents' ranking of Constraints and suggested solutions to Snail Farming in the study area

Constraints	Rank
High cost of housing materials	1
Pest attack	2
Theft	3
Mortality	4
Hibernation	5
Ant attack	6
Suggested solution	

Loan to snail farmers	1
Proper housing /establishment of model farms	2
Constant water supply	3
Security Against Thieves	4
Good hygienic practices	5

DISCUSSION:

Socio - demographic Characteristics of Respondents

The study area was dominated by Christians, hence there was no religious law forbidding consumption or rearing of snails unlike in states dominated by Muslims. This implies that the area should therefore favour commercial rearing of snails. The respondents were responsible as married people and could give valid information. Males are better risk takers (in adoption of new technologies) than females. Though Federal Office of Statistics (FOS)(1984) in Longe (1988) and Aina and Salau (1992) reported that about 62% of rural females in Cross River State are farmers, showing that rural females in Cross River State participate actively in farming; however, they mainly cultivate crops and practice agricultural technologies they have adequate knowledge of, in order to reduce losses. The respondents were all literates and mature, though still in their active ages. This implies that they can take quality decisions and analyse issues critically.

Location of Farms

Establishment of snail farms in only four local government areas (out of the nine sampled) is an indicator of poor adoption which may have been caused by lack of awareness. Location of three snail farms in Calabar metropolis can be related to city influence. Urban dwellers are better informed and therefore tend to adopt new technologies earlier than rural dwellers due to easy access to information. Even when awareness is not formally created in their dwelling city, they can access information on a prevailing new technology in other areas through the mass media. This agrees with Benjamin *et al* (2006) on adoption of grasscutter farming technology in Ibadan. Effiong (2007) and Ekwere (2007) obtained similar result on adoption of snail farming in Akwa Ibom State and Cross River State respectively.

Respondents' participation in snail Farming

Establishment of snail farms by respondents was mainly motivated by hobby and partly conservation instead of income generation. This agrees with the report of Akinnusi (1998) that snail farming is now being approached as a hobby by interested individuals while commercial ventures are expected to spring up when many people come to appreciate the advantages of snail farming. It also agrees with the findings of Imevbore (1989) that not less than 106 Nigerians are rearing *Archachatina maginata* in gardens behind their houses mostly for subsistence and shared interest. Business motivated by hobby alone can hardly attract investors and many participants because most people are driven by income generation and profit making. Participation due to hobby can rarely sustain business at commercial scale. And conservation of snail can only be sustained when the masses are sure of an affordable alternative means of sourcing snail, and the availability of snail when needed.

Characteristics of snail farms in the study area

Snail farming is just a budding enterprise in the study area. The farm sizes were small, with the largest in the study area being 25m² (Table 4). This indicates very low scale of production. There are only 7 functioning (and 5 none functioning) snail farms in the study area. Most of the farms were between 1 and 3 years old (Table 5). The fact that majority of the farms had below 300 snails (Table6) predicts that some of the active farms may become passive before they reach 5 years. This cannot be unconnected with poor management and the

fact that the potential benefits of snail farming technology are yet to be known in the study area. This can also be attributed to lack of awareness by the Extension Department of the Cross River State Ministry of Agriculture. Hodasi (1989) gave a similar report that snail farming is yet to be fully adopted in West Africa as compared to other parts of the world where it has been fully commercialized. It also agrees with Elmslie and Imevbore (1989) that the scale at which snails are being reared in Nigeria and West Africa as a whole is too small to make positive impact.

Housing, Feeding and inspection of snails in the study area

Enclosures with nets were mostly used by respondents to house the snails (Table 7). This can be attributed to the fact that the farmers were not able to spend much money on snail farming since most were operating at subsistence level. However, some may be afraid to expend much money as the success of the project cannot be guaranteed since they are not well informed about snail farming, and had either heard or seen some of the farms in the neighbourhood stopped functioning. The feed materials used by all the respondents would have agreed with the recommendations of Imevbore (1989), Ogogo (1989) and Ayodele and Ashimolowo (1999) except that supplements that can enhance shell formation and optimum performance of snails were not added. Besides, the varieties were not much. This can be ascribed to ignorance of the farmers about the nutritional relevance of the various feed materials to snail growth. All the feed materials were cheap; being locally sourced and should therefore be of immense contribution in minimizing the cost of rearing snails in the study area especially if commercial farming of snails were embarked upon. Majority of the respondents fed the snails on weekly basis (Table 8), which disagrees with the recommendation of Imevbore (1990) and Ogogo (2008) that feeding of the snail at shorter intervals encourages optimum performance. The inspection of the snails on daily basis (Table 9) could be attributed to zeal and could be correlated to the fact that most respondents embarked on snail farming as a hobby.

Source of Breeding Stocks

The incubation period of snail eggs were unknown to respondents because their stocks were either sourced from the wild or market. This kind of stock procurement could be the possible source of pest and disease infestations among the farms surveyed. The paucity of information on the breeding and maturity age of snails that exist among respondents implies that respondents just dabbled into the technology. They were not taught and therefore lacked adequate information on the 'technical know how' for rearing snails. Breeding of snails is one of the easiest means a poor snail farmer can migrate from a subsistence way of life into the cash economy because of the high reproductive rate of snails. Snail farming that is devoid of breeding can hardly produce at a profitably commercial scale. This can be the plausible reason most farms in the study areas have few snails and operate at subsistence level (Table 6). This low production and non sustainability in operation has made snail farming unattractive and has led to poor adoption of the technology by the people.

Problems of Snail farming and suggested solutions in the order of preference

Most of the problems encountered by farmers were due to inadequate knowledge of the technology, and non commercialization of their production. Sourcing of stock mostly from the wild (Table 10) was due to ignorance of the implication of that on the health status of snails, whereas they are not conversant with the treatment of snail diseases. Besides, there were no model farms previously in existence for procurement of good stocks. Respondents could not expand their financial budget as they were unaware of the potential benefits accruable from snail farming. High cost of housing material was rated the greatest challenge to snail farming but if the farmers were business oriented (Table3) and profitably operating at low scale, money could be saved to build concrete house. Closure of snail farms and high rate

of pest attack can also be attributed to poor management. Besides, the government has not really assisted the farmers through creation of awareness and training. Theft in snail farms were experienced because snail farming technology is yet to be well adopted in the area, so people still treat snails as common goods that should be freely harnessed when found whether in the wild or in *ex situ* management. Increase in level of adoption of the technology could have led to local legislations against stealing of snails from farms.

Giving loan to small scale snail farmers is important though the respondents may have ranked it first just because in Nigeria, people (especially rural dwellers) always expect the various tiers of government to provide everything for them free of charge. However, some interested but poor farmers can be encouraged through loans. Ranking of the establishment of model farms second shows that the respondents are willing to know about snail farming but may have not been opportune. The fact that most respondents dabbled into the practice as a hobby will make them zealous in seeking for knowledge on snail management.

CONCLUSION AND RECOMMENDATIONS

Snail farming is not popular in the study area. There has been poor adoption of the technology and none of the existing snail farms has been sustainably managed for about eight years. The interest of unemployed youths and the rural poor who are supposed to be among the target groups for adoption were not captured, and the utilization pressure on snails in the wild persists. The extension Department of Cross River State Ministry of Agriculture should create more awareness on the relevance of snail farming in job creation and poverty alleviation, and the economic benefits of commercial rearing of snails. Interested persons should be encouraged by the Government through provision of stocks and take – off capital. However, distribution of the capital should be monitored to ensure that the target agents are reached and that disbursed funds are properly utilized

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