

ECONOMICS OF RED PALM TREE WEEVIL LARVAE (*Rhynchophorus Ferrugineus*) PROCESSING, MARKETING AND VALUE CHAIN IN BAYELSA STATE

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ABSTRACT

The study examined the Economics of Red Palm Tree Weevil Larvae (*Rhynchophorus Ferrugineus*) commonly called maggot (Bayelsa Sua) processing, marketing and value chain in Bayelsa State. A multistage sampling technique was used to select 60 processors/marketers for the study. The data collected were analyzed using descriptive statistics and costs and return analysis. The result showed that majority (96.7%) of the respondents were female, married (48.3%), with primary education (63.3%) and 28 years old on the average. Majority (60%) sourced their capital through personal savings. While 60% of the processors and marketers sell directly to retailers, 65% roast the maggot and transport it by motor vehicle. Results further showed that a monthly revenue of ₦200,000.00, average total cost of ₦ 132,612.00 per month; gross margin and net income of ₦69,000 and ₦67,387.5 respectively per month were realized. The return on investment was ₦ 1.50. The study revealed that the enterprise does not have a well-developed value chain, and no notable value additions. The respondents perceived that maggot is cheap when compared to meat and fish, easily available, medicinal, easily preserved, rich in protein, a cultural delicacy, and a delicacy for both the poor and rich among others. Lack of credit facilities, inadequate capital, high market levy, inadequate supply of maggot and inadequate preservation methods hamper maggot processing and marketing. Therefore, awareness concerning maggot profitability should be created and processors should be educated to develop better processing, marketing and value addition skills to make it more attractive to all classes of people.

Key words: *Rhynchophorus Ferrugineus*, Processing, Marketing, Value chain

INTRODUCTION

Rhynchophorus spp and the *Oryctes spp*, commonly known as “Bayelsa Sua” or maggot meat are red palm tree weevil larvae which are edible species of the palm tree weevil in the Southern part of Nigeria especially Bayelsa State. Although the taste and dietary value of the larva is rather more attractive, there are several benefits such as the fact that palm tree larvae serves as a great source of nutrients for people living in the tropics, a great source of employment from the process of harvesting the larvae helps to increase income generated from palm wine tapping, source of enjoyment for consumers who enjoy its products as snacks in bars or the road side (FAO, 2012). They are the most delicate stage of the life cycle of the red palm weevil, after the eggs have hatched between the soft hollow of the new palm trees or on the bottom of the

leaves. Red palm weevil larva is a great reserve of protein, lipid and carbohydrate, it also contains considerable amount of minerals that include: potassium, magnesium, manganese, iron, phosphorus, calcium, zinc, chromium, copper, lead and nickel. The larva further contain large amount of fiber that could serve as a great source of dietary roughage (Omotoso & Adedire, 2007). Alternative animal and other protein sources that may have been underutilized include the novel protein foods (NPFs) such as products based on vegetable protein and micro-organisms. Available on the market include seitan, tofu, soy meat, tempeh, quorn and meatless based on lupins. There are milk drinks that are not based on dairy (such as 'soy milk') and egg substitutes (Cazaux, Van Gijseghem & Bas 2010).

Understanding the network, linkage, flow and volume in the maggot value chain is also an important aspect of this study. Value chain can be defined as the full range of activities and participants involved in moving agricultural products from input suppliers to farmers' fields, and ultimately, to consumers (Miller and Jones, 2010). Value chain approach presents a good picture of the process of creating value.

In view of the significant contributions of maggot to the economy of rural and urban households in Bayelsa, it is imperative to analyze the economics of maggot processing, marketing and value chain in the study area with a view to enhancing the enterprise. More so there tend to be rising demand for maggot over supply in the face of relatively rising maggot processing and marketing enterprises. It is of the view that if the processing and marketing of maggot is efficient, its supply can generate a greater demand for the commodity because farmers may try to domesticate it to alleviate the challenge of seasonality.

In view of the rising demand for maggot in the face of ineffective and inefficient processing and marketing, it is therefore pertinent to examine the economics of maggot processing, marketing and value in Southern Ijaw Local Government Area of Bayelsa. The specific objectives are to: describe the socio-economic characteristics of maggot processors and marketers; determine the costs and returns associated with maggot processing and marketing; examine the processors and marketers perception of maggot, identify the maggot value chain and identify the constraints associated with maggot processing and marketing.

METHODOLOGY

Study area: The study was conducted in Southern Ijaw Local Government Area of Bayelsa State. Southern Ijaw is located on latitude $04^{\circ} 48^{\text{I}} 17^{\text{II}}$ N longitude $6^{\circ} 04^{\text{I}} 44^{\text{II}}$ E. The area has a coastline of approximately 60km on the Bight of Benin; with a population of 319,413 accounting for 18.75% of the total population of Bayelsa state (NPC, 2006) and covers an area of 2,682km². The state generally covers an area of about 21,110 square kilometers, out of which more than three-quarter is occupied by water, with moderately low land. The Southern Ijaw Local Government Area is made up of six clans which include Apoi, Bassan, Boma, Olodiana, Oporoma and Ogboin Clan. The people and language are known as Izon. The predominant occupations in the area are fishing, farming, trading, lumbering, palm wine tapping and weaving (BYSG, 2008).

Sampling procedure: A multistage sampling technique was adopted in drawing the sample for the study. The First stage involved the purposive selection of six communities in Southern Ijaw Local Government Area which included; Otuan, Anyama, Angiama, Oporoma, Igbomotoru I and Amassoma community due to the preponderance of maggot exploitation in these communities. The second stage involved the random selection of 10 maggot processors and marketers in each of the communities. This gave a total of 60 respondents for the study. Structured questionnaire was however used to elicit information from the processors/marketers.

Processing of maggot: The most popular way of preparing the red palm weevil larvae (Bayelsa suya) is by frying in a fry pan. The larvae are washed, boiled with a little amount of salt, pepper, seasoning cube and water. Heating should continue until the larvae are cooked and the pan is dry off water. The larva will become almost flattish at this point. Then it is heated and stirred continuously on the dry fried pan until it becomes swollen into a brownish oily product (May, 1984). Another way of preparing the larvae is by roasting. In this case they are washed, salted and pierced into a stick to form a row like in barbecue stick. Then, they are gently roasted with the charcoal until they are light brownish (Mercer, 1994).

Data analysis: This study used descriptive statistics such as frequency distribution and percentages, four point Likert scale, and costs and return analysis to analyze the data. The cut off point for the Likert scale was 2.5. Strongly agree =4, Agree=3, Disagree =2, strongly disagree =1
Then $4+3+2+1/4 = 2.5$

Costs and return analysis was used to estimate the gross margin and net income from maggot processing. It is expressed as: Net Income (NI) = GM – TFC, given that GM = TR – TVC

Where GM = Gross margin, TR = Total Revenue from Maggot Processing, TVC = Total, Variable Cost of maggot processing, TFC = Total Fixed Cost of maggot processing, TC = Total Cost (TVC+TFC), and Return on Investment (ROI) = TR/TC.

RESULTS AND DISCUSSION

Table I: Socio-economic and Value Chain Characteristics of Maggot Processors and Marketers

Variables	Frequency N=60	Percent
Age (years)		
≤20	12	20.0
21-30	17	28.3
31-40	25	41.7
41-50	4	6.7
>50	2	3.3
Sex		
Male	2	3.33
Female	58	96.67
Marital Status		
Married	29	48.3
Single	21	35.0
Divorced	10	16.7
Household size		
≤5	35	58.3
6 -10	23	38.3
>10	2	3.3
Level of Education		
Never attended school	9	15.0
Primary education	38	63.3
Secondary education	10	16.7
Tertiary education	3	5.0
Source of Capital		
Personal Savings	36	60.0
Money lenders	4	6.7
Gift from relations	7	11.6
Cooperative	13	21.7
Customers to whom Maggot is sold		
Wholesalers	4	6.7
Retailers	36	60.0
Final consumers	7	11.6
All of the above	13	21.7
Methods of Transportation		
Motor Vehicle	39	65.0
Speed Boat	21	35.0
Method of Processing		
Frying	21	35
Roasting	39	65
Marketer Status		
Permanent basis	28	46.7
Temporary basis	13	21.7
Rotation	19	31.6
Method of selling Maggot		
Hawking with trays	45	75.0
Display on tables	15	25.0
Methods of buying		
Buying in basket	10	16.7
Buying by counting	50	83.3

Source: Field Survey, 2015

The result on Table I showed that (3.3 %) of the respondents were male, while (96.7%) were female. This implies that women are more involved in the processing and marketing of Bayelsa suya, which could be attributed to the fact that marketing of agricultural produce in Nigeria is dominated by females. This result is in consonance with Kainga (2013) which revealed majority (73.3%) of people who are into water melon marketing in Yenagoa Metropolis of Bayelsa State were female. The result showed that majority (41.7%) of the respondents were within the age of 31-40 years, and the least (3.3%) were >50 years. The mean age was 28 years; this implies that the marketers were still in their youthful and productive age and thus are expected to make more profit at this age. Majority (48.3%) of maggot processors and marketers were married, while (35.0%) were single and (16.7%) were divorced. Majority (58.3%) had a household size of ≤ 5 persons, while the least (3.3 %) had a household size of >10 persons and a mean household size of 6 persons. This implies that the marketers have fairly large household sizes, thus family labour would be available for the processing process. Majority (63.3%) of the maggot processors and marketers had primary education; the least (5.0 %) had tertiary education. The respondents' education level was low, this implies that Bayelsa Suya is gaining ground among female primary school leavers in the study area and this low level of education could as well reduce their processing and marketing efficiency and thus affect their profit.

Table I also showed that (60.0%) of the respondents accumulated capital through personal savings and (6.7%) maggot processors and marketers acquired capital through money lenders and (11.7%) through gifts from relation and (21.7%) from cooperative. This implies that access to capital is a challenge to the processing and marketing of maggot in the study area. The result also showed that (6.7%) maggot processors and marketers were wholesalers and (60.0%) maggot processors and marketers were retailers, while (11.6%) maggot processors and marketers sell directly to final consumers and (21.7%) maggot processors and marketers sell as both wholesalers and retailers.

Table I showed that majority (65.0%) of the maggot processors and marketers transport their maggot through motor vehicle while (35.5%) through speed boat. Moreover, majority (65%) of the maggot processors and marketers process by roasting, while (35%) of the maggot processors and marketers process by frying. This implies that consumers prefer roasted maggot to fried maggot. Table I also showed that majority (46.7%) of maggot processors and marketers engage in maggot marketing on permanent basis, (21.7%) were on temporary basis while (31.6%) were on rotational basis. This implies that majority of the respondents' process and market maggot as their main source of income.

Seventy-five percent of maggot processors and marketers hawked with trays and (25.0%) of maggot processors and marketers displayed on tables. The result also revealed that (16.7%) of the respondents buy in basket while (83.3%) buy their maggot by counting (Table I). This implies that majority of maggot processor and marketers prefer counting to the use of basket.

Value Chain Associated with Maggot Processing and Marketing

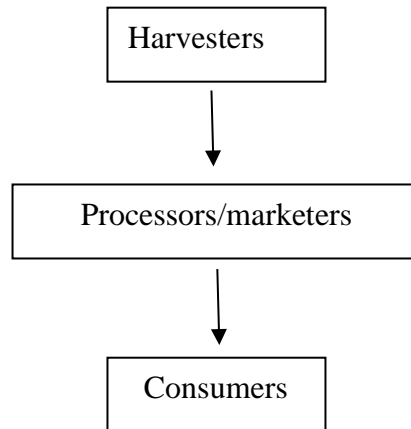
The study identifies the key players in maggot value chain as harvesters, processors/marketers and consumers. The study revealed that the maggot (Bayelsa suya) does not have a well-developed value chain (Table II); this probably is because of the challenges associated with preserving and storing the processed product for a long time and probably due to lack of required technology. The maggot is expected to get to the consumer within a week or stand the risk of getting bad. In the area of value addition, the key players are the processors or the marketers who process the maggot and sell to the consumer. Apart from processing into Bayelsa suya, there are no notable value additions in the chain which need further development in order to maximize its inherent potentials in product value chain to consequently create employment in particular and as a veritable means for economic development.

Table II: Value Chain Associated with Maggot Processing and Marketing

Value Chain	Frequency	Percent
Harvesting	10	16.6
Processing	60	100
Marketing	60	100
Processing/Marketing	60	100
Storage	0	0
All	0	0

Source: Field Survey Data, 2015

Figure I: Value Chain Schema for Maggot Processing and Marketing



Source: Field Survey Data, 2015

Table III Costs and Return of Maggot Processing and Marketing per month

Variables	Quantity	Amount (₦)	Percentage (%) of Variable Cost
Variable Cost			
Cost Price of maggot	5,000	100,000	76.33
Cost of processing		10,000	7.63
Cost of packaging		5,000	3.81
Cost of transportation		7,000	5.30
Market levy		2,000	1.51
Cost of preservation		2,000	1.51
Cost of Labour		5,000	3.81
A: Total Variable Cost		131,000	100
Fixed cost			
Cost of Wheel barrow at 1.66% depreciation per month	1	250	
Cost of two pots @ 2.5% depreciation per month	2	750	
Cost of two tray pans at 2.5% depreciation per month	2	250	
Cost of three spoons at 2.5% depreciation per month	3	112.5	
Cost of two basin at 2.5 depreciation per month	2	250	
B: Total Fixed Cost		1,612.5	
Revenue			
Revenue from Sale	5@200	200,000	
C: Total Revenue		200,000	
D Gross Margin (C-A)		69,000	
Profit (D-B)		67,387.5	
ROI =C/A+B		1.5	

Source: Field survey, 2015

The profitability of maggot processing in the study area was estimated using cost and return analysis. The result in Table III shows that the average revenue per month from the business in the study area was ₦200,000.00 with total variable cost ₦131,000.00. The gross margin of ₦69,000.00 was reported for the study area with net income of ₦67,387.5 per month from maggot processing. The unit price of maggot is ₦20.00. The result implies that maggot processing in the study area is profitable. The Return on Investment (ROI) of ₦ 1.5 shows that for every one naira that is spent in maggot processing and marketing 50k profit is being made. This implies that maggot processing and marketing is profitable and viable in the study area.

Table IV: Processors and Marketers' perception of Maggot (Bayelsa Suya)

SN	Items	Mean	Decision	Rank
1	It is prestigious	4.00	Agree	1 st
2	It is a cultural delicacy	3.80	Agree	2 nd
3	It is cheap when compared to meat and fish	3.75	Agree	3 rd
4	It is highly palatable	3.54	Agree	4 th
5	It is a very good appetizer	3.50	Agree	5 th
6	It can be eaten at any time whichever way	3.33	Agree	6 th
7	It is presentable even to strangers	3.27	Agree	7 th
8	It is rich in fat and oil	3.20	Agree	8 th
9	It is medicinal	3.00	Agree	9 th
10	It is rich in protein	2.90	Agree	10 th
11	Readily available	2.89	Agree	11 th
12	It can be easily preserve	2.60	Agree	12 th
13	It is indigenous to Bayelsa State	2.50	Agree	13 th
14	It is a delicacy for only the poor	2.23	Disagree	14 th
15	It is eaten only by Bayelsans	1.65	Disagree	15 th

Source: Field Survey, 2015

The result in Table IV showed the perception or how the processors and marketers of maggot view maggot. The marketer perceived that maggot is cheap when compared to meat and fish, easily available, it is medicinal, it can be easily preserved, it is rich in protein, it is a cultural delicacy, it is a delicacy for the poor and rich, it can be eaten at any time whichever way, it is indigenous to Bayelsa State, it is highly palatable, it is presentable even to strangers, it is a very good appetizer, it is a prestigious snack. This implies that the processors and marketers have a good perception of Maggots (Bayelsa Suya).

Table V: Constraints Associated with Maggot Marketing and Processing

SN	Constraints	Mean	Decision	Rank
1	Lack of credit facilities	3.45	Agree	1 st
2	Inadequate capital	3.40	Agree	2 nd
3	High market levy	2.96	Agree	3 rd
4	Inadequate supply of maggot	2.89	Agree	4 th
5	Inadequate preservation method	2.76	Agree	5 th
6	Seasonality of maggot	2.58	Agree	6 th
7	High cost of maggot	2.54	Agree	7 th
8	Risk associated with processing	2.52	Agree	8 th
9	Poorly developed market channel	2.50	Agree	9 th
10	Inadequate standardization	2.50	Agree	9 th
11	Inadequate means of transportation	2.30	Disagree	10 th
12	Poor patronage	2.20	Disagree	11 th

Source: Field Survey, 2015

Result in Table V showed that the constraints associated with maggot processing and marketing were found to be lack of credit facilities, inadequate capital, high market levy, inadequate supply of maggot, inadequate preservation methods among others. This is because these constraints have mean which is greater than the bench mark of 2.5. Poor patronage and inadequate means of

transportation were disagreed upon as constraints because they have means which are less than 2.5

CONCLUSION

The study revealed that maggot processing and marketing is in the hands of women who are barely educated, and is a profitable venture which has prospect of becoming a sustainable business enterprise. The supply of maggot can be greatly enhanced if the processing and marketing system is efficient and value addition is addressed. The processors and marketers are of the opinion that maggot is a delicacy that the people love and esteem so much. The major challenges of maggot processors and marketers include lack of credit facilities, inadequate capital, high market levy, inadequate supply of maggot and inadequate preservation method among others.

RECOMMENDATIONS

Spoilage is a major factor that affects maggot processing and marketing, thus efficient storage facilities and processing methods should be provided. Maggot is harvested on a seasonal basis; there is need for domestication to sustain the enterprise. Strong effort should be directed to the education of the processors and marketers of maggot to enhance value addition activities. It is therefore recommended that awareness should be created concerning its profitability, thus processors should be educated to develop better skills of processing, marketing and value addition to make it more attractive to all classes of people; women should be encouraged with loans and market levy should also be reduced. Furthermore there is need to foster the product value chain and value additions for employment generation and as a tool for economic development.

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