SOCIO-ECONOMIC ANALYSIS OF CATFISH (*CLARIAS GARIEPINUS*) PRODUCTION IN BAYELSA STATE, NIGERIA

OKPUKPARA, B. C. AND MORGAN, C. N
Department of Agricultural Economics, University of Nigeria, Nsukka
Corresponding author's Email: nimiyemorgan@yahoo.com, benedozie@yahoo.com
Mobile No. : +234-8161194200

ABSTRACT

The study which was conducted in Bayelsa State, Nigeria, examined the socio-economic characteristics of catfish (Clarias gariepinus) production in Bayelsa State, Nigeria. A multi-stage sampling technique was used to select three (3) Local Government Areas (Yenagoa, Ogbia and Kolokuma-Opokuma) purposively based on their predominance in commercial catfish farming and randomly five (5) communities each from the three (3) LGAs. Furthermore eight (8) catfish farmers in each community were randomly selected making a total number of one hundred and twenty (120) catfish farmers and analyzed using descriptive statistics and budgetary technique. The costs and returns analysis indicated that the Total Fixed Cost was ₦881,500.00 while Total Variable Cost was ₦3,956,025.01 with Net Farm Income of ₦3,113,183.32 during production period of six months. Return on investment was ₦0.64 which implies profitability of catfish production in the study area. The study also identified high cost of feed (18.6%), inadequate finance (13.2%), inadequate seed supply (11.1%), lack of land (10.5%), lack of organized market (9.5%), high cost of transportation (8.9%), lack of modern technologies (7.4%), high cost of labour (7.4%), inadequate water supply (6.3%), high spread of pest and disease (5.3%) and inadequate storage facilities (3.3%) were the major problems faced by catfish farmers. It is therefore suggested that there is a need of government support in terms of revitalization and prioritizing funding of extension delivery system of the state owned Agricultural Development Programmes (ADPs). This will help to mobilize and motivate the extension agents to reach the target farmers with relevant information on improved farm management practices.

KEY WORDS: Socio-economic, Returns, Production, Catfish, Bayelsa State.

INTRODUCTION

Fish farming is the sub-set of aquaculture that focuses on rearing of fish under controlled or semi-controlled conditions for economic and social benefits. Aquaculture is the rearing of aquatic organisms under controlled or semi-controlled conditions for economic and social benefits. Aquatic organisms include fishes, molluscs, crustaceans and aquatic plants. Culture implies some forms of intervention in the rearing process to enhance production such as regular stocking, feeding, protection from predators etc Food and Agricultural Organization (FAO), (2006). In Nigeria, the production of food has not increased at the rate that can meet the increasing population. While food production increases at a rate of 2.5%, food demand increases at a rate of more than 3.5% due to

high rate of population growth of 2.83% (Ojo & Fagbenro, 2010). The apparent disparity between the rate of food production and demand for food in Nigeria has led to a food demand supply gap thus leading to a widening gap between domestic food production and total requirement, an increase resort to food importation and high rates of increase in food prices and as a result, wide spread hunger and malnutrition are evident in the country (Ugwumba & Chukwuji, 2010).

The growth of a country's population is usually accompanied by increase in the demand for the basic necessities of life including water, food and shelter. This is the case with the unrestricted increase in the demand for protein rich food items of animal origin especially. The Food and Agriculture Organization (FAO), (1991), recommended that an individual takes 35 grams per caput of animal protein per day for sustainable growth and development. However, the animal protein consumption in Nigeria is less than 10 grams per person per day, which is a far cry from the FAO minimum recommendation (Onoja & Achike, 2011). The major animal protein sources in the country include cattle, goat, sheep, poultry and fish. Out of these sources fish and fish products provide more than 60% of the total protein intakes in adults especially in the rural areas (Adekoya, 2004). Therefore, the importance of the fishing industry to the sustainability of animal protein supply in the country cannot be over-emphasized (Ugwumba & Chukwuji, 2010).

Regrettably, the supply of food fish has been on the decline. This is due to consistent declines from the country's major source of food fish, the artisanal fisheries, from 90% in 1990 (Tobor, 1990) down to 40% in 2006 resulting to about 300,000 metric tonnes Global Agriculture Information Network (GAIN), (2007). Because aquaculture is capital intensive and financing is generally needed to construct ponds, buildings, production equipment; feeds and labour which are major variable inputs in the production of catfish and other aquatic species, thus available resources needed to be efficiently utilized to maximize profit. According to (Eyoh & Igben, 2002), knowledge of efficiency of resource use is vital to farmers in agricultural productivity. That, the utilization of land resources is closely guided by the concept of highest and best use for maximum agricultural productivity. Furthermore, profitability analysis could guide investors and would attract investors in committing available funds into catfish production due to its high rate of profitability shown in recent studies such as (Kainga & Adeyemo, 2013; Ugwumba & Chukwuji, 2010; Esu, Asa & Iniedu, 2009). This study therefore examined the socio-economic characteristics of catfish production in Bayelsa State. The specific objectives were to examine the socio-economic characteristics of catfish farmers, ascertain the costs and returns of catfish farmers and to identify constraints associated with catfish farmers in Bayelsa State, Nigeria.

METHODOLOGY

Study Area: The study area is Bayelsa State, Nigeria. Bayelsa State was created on October 1, 1996 out of Rivers State. The state is geographically located within Latitude 04° 15' North, 05° 23' South and longitude 05° 22' West and 06° 45' East. It shares boundaries with Delta State on the North, Rivers State on the East and the Atlantic Ocean on the West and South, National Bureau of Statistics, NBS (2012). Its land area is about

21,110 square kilometres, with a population estimated at 1,703,358, National Population Commission (NPC), (2006). More than three quarters of this area is covered by water, with a moderately low land stretching from Ekeremor to Nembe. The area lies almost entirely below sea level with a maze of meandering creeks and mangrove swamps National Bureau of Statistics (NBS), (2012). The state is divided into three (3) Agricultural zones constituting the eight (8) Local Government Areas (LGAs). The 3 Agricultural Zones includes Brass (3 LGAs), Yenagoa (3 LGAs) and Sagbama (2 LGAs). Brass consists of Nembe, Brass and Ogbia. Yenagoa consist of Yenagoa, Kolokuma/Opokuma and Southern Ijaw. Sagbama consist of Sagbama and Ekeremor.

Sampling Technique: Multi-stage sampling technique was used for this study. Firstly, three (3) Local Government Areas (Yenagoa, Ogbia and Kolokuma-Opokuma) were purposively selected due to the predominance of commercial catfish farmers in these areas. The second stage involves the random selection of five (5) communities each from the three LGAs. Furthermore, eight (8) catfish farmers in each community were randomly selected making a total number of one hundred and twenty (120) catfish farmers.

Method of Data Analysis: Analysis of data was done using descriptive statistics such as frequencies and percentages; and the budgeting technique. The budgeting technique employed was the net farm income. The difference between the gross revenue (GR) and total cost (TC) gives the net revenue (NR), Net farm income (NFI), Net returns on investment (NROI) is expressed as: $NFI = GR – TC$, $NROI = NFI / TC$, NFI = Net Farm Income, NROI = Net returns on investment, $TC = (TVC + TFC) = P_x . X$, $GR = P_y . Y$, GR = Gross Return / Pond, P_y = Unit Price of Output, Y = Quantity of Output, P_x = Unit Price of Input, X = Quality of Input, TC = Total Cost (₦), TFC = Total Fixed Cost (₦), TVC = Total Variable Cost (₦).

RESULTS AND DISCUSSION

Majority (75.0%) of the catfish farmers surveyed fall within the age bracket of 31 – 50 years. The mean age of the respondents was 42 years. The result therefore indicates that most of the farmers are young and energetic, since they are in their active age. The result conforms to the works of Kainga and Adeyemo (2012) who find out that catfish farmer's in Bayelsa had 64.4% respondents between the age brackets of 31-50. Thus, it was observed that more of younger persons were involved in catfish farming. This gives an indication that the youth were becoming gainfully employed and that they are now realizing their potentials, instead of solely depending on "white collar" jobs as in the past. The result also agreed with the findings of Akoroda et al., (2011) who find out that livestock farmers in Bayelsa State, Nigeria had average age of 42 years. In the same vein, the result is in conformity with the works of Onoja and Achike (2011) who revealed that socio-economic factor such as age, having positive relationship with technical efficiency for farmers in Rivers State.

Majority (83.3%) were male while the remaining 16.7% were female. This implies that catfish production in Bayelsa State, Nigerian is mainly dominated by male. The result agrees with the works of Ohen and Abang (2009), who observed that 88% of male

farmers were involved in catfish farming in Rivers State while the women and children were mostly used in daily farm routines. That is, the men were considered the major investors while the women assist them. The result also agreed with the findings of Nwosu and Onyeneke (2013) that Majority (62.50%) of the fish farmers were males, indicating that males dominate the enterprise in Imo State, Nigeria.

The result further indicates that 79.2% of the catfish farmers were married. About 16.7% were single while 4.2% were divorced respectively. An average of 2 married farmers was recorded. This could be to the fact that family men and women required family income to carter for their families. Thus, with increase in family income, it will lead to increase in output, and in turn improve their standard of living.

Majority of catfish farmers (91.7%) have family size of 1 – 10 people in their household while 8.3% have 11 – 15 people in their household. The mean of the family size is 7 people. From the result, it is realized that the respondents' has large family size and this is above the recommended average size of 4 per family in Nigeria. This could be the fact that family labour is recognized as a major source of labour supply in the area as it determines the labour output. The result agrees with the findings of Esu and Iniedu (2009) that majority of the respondents (catfish farmers in Akwa Ibom State, Nigeria) had an average family size of 7 people. This result also agrees with the work of Olagunju, Adesiyan and Ezekiel (2007) that catfish farmers in Oyo State, Nigeria had 91.6% of respondents with family size 1 – 10 people.

The analysis further showed that 7.5% of the catfish farmers in the study area never attended school, that is, they had no formal education, while 92.5% of the respondents had one form of the formal education or the other. Out of the 92.5% of the respondents that had formal education, about 30% attended primary school, 56.7% attended secondary school while 5.8% attended higher institution at various levels. The mean years of schooling of the catfish farmers in the study area as estimated was about 3 years. This implies that most of the farmers had only primary education; the farmers can therefore be classified as literates. Nevertheless, with the present global computer and internet age, literacy goes beyond the ability to read and write. The result agrees with the findings of Esu and Iniedu (2009) who find out that greater percentage of catfish farmers in Akwa Ibom State, Nigeria only attended primary and secondary school. The result also concurred with the works of kainga and Adeyemo (2012) who find out that catfish farmers' in Bayelsa State, Nigeria only attended primary school.

Majority (87.5%) of the respondents have been cultivating catfish for about 1- 10 years. Only 12.5% have been in the business of catfish production for a period of 11- 20 years. The mean farming experience is 9 years. This implies that farmers in the study area have acquired enough experience in catfish production; therefore, adoption of new innovation will pose no problem. The result is also in line with the works of Onoja and Achike (2011) who reported a positive relationship between farming experience and technical efficiency. Majority (83.3%) of catfish farmers were part-time farmers while 16.7% were full-time. An average farming of 1 year was recorded. This implies that majority of the respondents' argument the business with other activities or enterprise. The result agrees with the works of Kainga and Adeyemo (2013) who observed that 77.8%

were part-time farmers which implies that they augment the business with other sources of fund, in Kolokuma/Opokuma Local Government Area of Bayelsa State.

Majority (58.3%) of the respondents had one contact with an extension agent monthly, 25.0% of the respondents had twice contacts while 16.7% had no contact with an extension agent monthly. An average of 1 contact was recorded in the study area. This result is in conformity with the findings of Akoroda et al., (2011) who find out that majority (57.1%) of livestock farmers in Bayelsa State had contact with extension agent once in a month.

Table 1: Socio- economic characteristics of the respondents (N = 120)

Variable	Categories	Frequency	Percentage	Mean
Age (yrs)	< 30	15	12.4	
	31 – 40	30	25.0	
	41 – 50	60	50.0	
	51 – 60	10	8.3	
	> 60	5	4.2	42.4
Sex	Male	100	83.3	
	Female	20	16.7	0.8
Marital status	Single	20	16.7	
	Married	95	79.2	
	Divorced	5	4.2	1.8
Household size	< 5	30	25.0	
	6 – 10	80	66.7	
	11- 15	10	8.3	
	> 15	0	0.0	7.0
Level of education	None	9	7.5	
	1	36	30.0	
	2	68	56.7	
	3	7	5.8	2.6
Farming experience (yrs)	< 5	40	33.3	
	6 - 10	65	54.2	
	11- 15	10	8.3	
	16 - 20	5	4.2	
	> 20	0	0.0	8.5
Farming status	Full-time	20	16.7	
	Part-time	100	83.3	0.8
Farm size (hectare)	< 1	28	23.3	
	1 – 1.5	52	43.4	
	> 1.5	40	33.3	1.7
Type of labour	Family labour	80	66.7	
	Hired labour	30	25.0	
	Both	10	8.3	0.5
Extension contact (monthly)	None	20	16.7	
	1	70	58.3	
	2	30	25.0	

Source: Field survey, 2014

Table 2 shows the result of estimated costs and returns associated with catfish farmers in the study area. The result indicates that the total variable costs was estimated at ₦3,956,025.01 which represents expenses on fertilizer (0.66%), fingerlings (10.66%), labour (4.25%), harvesting (6.93%), maintenance (1.45%), and feed (58.12%), and net farm income estimated at ₦3,113,183.32 during the production period of six months. The result shows that feed constituted the highest production cost with 58.12%. This result agrees with table 3 were cost of feed (16.8%) was ranked 1st amongst the farmers constraints. This implies that feed is a serious requirement for catfish production in the study area. This result also agrees with the works of Uwumba and Chukwuji (2010) in the economics of catfish production in Anambra State, Nigeria: A Profit Function Approach, that cost of feed (73.56%) constituted highest production costs and feed (3.85%) was also ranked 1st amongst the farmers constraints. This result is also in consonance with the records of Kainga and Adeyemo (2013) in a study of profitability and resource use efficiency in catfish (*Clarias gariepinus*) production in Kolokuma/Opokuma Local Government Area of Bayelsa State, Nigeria. Were input costs constituted 15.59% while farm equipment was 2.63%. The result indicated that the cost of production was ₦4,837,525.01and the total revenue of ₦7,950,708.33 was realized, making a net income of ₦3,113,183.32. Therefore, the analysis indicated that fish production was highly profitable.

The returns on investment was 0.64 for the catfish farmers, indicating that catfish farmers in the study area returned on the ₦0.64 for every ₦1.00 naira invested in the business, thus further confirming the profitability of catfish production in the study area. This result is in agreement with the findings of Kudi and Atala (2008) in a study of economics of catfish production in Kaduna State, Nigeria; find out that catfish production was a profitable enterprise with a net income of ₦5, 282, 393.85.

Table 2: Estimated costs and returns of the catfish farmers

Variable	Total cost of the Production period (₦)	Percentage
A. Fixed cost		
Land (ha)	754,500.00	15.59
Farm equipment	127,000.00	2.63
Total Fixed Cost (TFC)	881,500.00	
B. Variable cost		
Fertilizer (kg)	31,750.00	0.66
Fingerlings (kg)	502,150.00	10.38
Labour (mandays)	205,400.00	4.25
Harvesting	334,766.67	6.92
Maintenance	70,291.67	1.45
Feed (kg)	2,811,666.67	58.12
Total Variable Cost (TVC)	3,956,025.01	
Total Cost = TFC + TVC	4,837,525.01	100
Total Revenue	7,950,708.33	
C. Net Farm Income,		
NFI = TR – (TFC + TVC)	3,113,183.32	
ROI = (NFI/TC)	0.64	

Source: Field survey, 2014

Total 3 shows the distribution of catfish farmers according to the problems they encountered in their fishing activities. All the catfish farmers were of the view that cost of feeds, capital and seed supply was the major problems. The result indicates that 16.8% of the respondents were faced with high cost of feeds. This situation was equally the case in the costs and returns analysis, where cost of feeds constituted 58.12% of total cost of production of the respondents. The importation of most commercial feeds into the country and problems associated with importation and distribution could be the main reasons for the hike in feed prices. These commercial feeds possess floating and high protein qualities and are therefore preferred by fish farmers. The result agrees with the works of Ugwumba and Nnabuife (2008) who identified high cost of feed has a very serious draw-back to profit realizable from catfish farming. The second serious problem was the problem of lack of capital (13.2%). Catfish farming is capital intensive and thus requires large capital investment for reasonable profit to be made. This result agrees with the findings of Kudi and Atala (2008) who indicates inadequate finance (97.7%) to be the lead problem encountered by fish farmers in Kaduna State, Nigeria. Other problems encountered by the fish farmers are lack of credit facilities and poor funding. The credit facilities, which they needed, could aid them to get more of fishing nets, outboard engine and boats. This will improve fishing activities and enable them adopt new technologies.

Also, 11.1% were faced with inadequate seed supply. This was due to inadequate local supplies of catfish seeds attributed to abandoned government hatcheries and few private ones in the study area. Farmers were therefore compelled to import most of their seeds from neighboring States. This result is also in consonance with the records of Ugwumba and Chukwuji (2010).

The result also shows that 10.5% of catfish farmers in the study area lacked accessible and affordable land, ranking the fourth major problem the farmers faced. With respect to market (9.5%) ranked fifth. Farmers indicated that, they faced the problem of lack of organized fish marketing system which resulted in all the farmers selling their live fishes at the farmers' farms. This would increase fish spoilage which will reduce their income. Also, high cost of transportation and lack of modern technology (7.5%) were ranked seventh among the respondents as a fact that there is high cost of transportation in the area and farmers could not afford to use modern farm inputs. Farmers were also faced with the problem of inadequate water supply (6.3%) and high spread of pest and disease (5.3%). Furthermore, fish was sold live and therefore storage/preservation constituted the least problem.

Table 3: Problems associated with catfish farmers

Problems **	Frequency	Percentage	Rank
- High cost of feed	32	16.8	1st
- Inadequate finance	25	13.2	2nd
- Inadequate seed supply	21	11.1	3rd
- Lack of land	20	10.5	4th
- Lack of organized market	18	9.5	5th
- High cost of transportation	17	8.9	6th
- Lack of modern technologies	14	7.4	7th
- High cost of labour	14	7.4	7th
- Inadequate water supply	12	6.3	8th
- High spread of pest and disease	10	5.3	9th
- Inadequate storage facilities	7	3.3	10th
Total	190*	100.0	

Source**:** Field survey, 2014.; ** Rank in descending order; * Multiple responses recorded

CONCLUSION AND RECOMMENDATIONS

Analysis of the result revealed that catfish production is dominated by male who are married and with the age of 31-50 years. Most of the farmers attended one form of education or the other with farming experience of 1-10 years. Catfish production in the study area is a profitable venture. The study also identified high cost of feed, inadequate finance, inadequate seed supply, lack of land, lack of organized market, high cost of transportation, lack of modern technologies, high cost of labour, inadequate water supply, high spread of pest and disease, and inadequate storage facilities were the major problems of catfish farmers. Therefore, it is recommended that there is a need of government support in terms of revitalization and prioritizing funding of extension delivery system of the state owned Agricultural Development Programmes (ADPs). This will help to mobilize and motivate the extension agents to reach the target farmers with relevant information on improved farm management practices. Furthermore, there is need of government and non –government support in terms of improves feed research that will help to reduce the cost of catfish feeds without reducing the efficacy of the feeds.

REFERENCES

Adekoya, B. B. & J. W. Miller (2004). Fish Cage Culture Potential in Nigeria-An Overview. National Cultures. *Agric. Focus*, 15: 10.

Akoroda, L., Olatunji, S. O., Adesope, O. M., C. N. Atoma, & Morgan, C. N. (2011). Assessment of Indigenous Knowledge Application Among Livestock Farmers in Southern Ijaw Local Government Area of Bayelsa State", *Global Approaches to Extension Practice (GAEP)*. *7*(1): 80-90.

Esu, B. B, Asa, U. A & Iniedu, M.O. (2009). Costs and Returns of Fish Production Using Earthen Ponds in Akwa Ibom State, Nigeria. *Journal of Agriculture, Food and Environment 5*(2-4): 26 - 29.

Eyoh E. O & Igben S. I., (2002). *Agricultural Economics: An Introduction to Basic Concepts and Principles*. Best Print Business Press. Uyo Nigeria. 238.

Food and Agriculture Organization (FAO). (2006). State of world fisheries & aquaculture http:/www.fao.org/fi/statist/fisoft/fishplu.asp.

Food and Agriculture Organization (FAO). (1991). Fish for Food and Employment. Food and Agriculture Organization, Rome, Italy.

Global Agriculture Information Network (GAIN). (2007). *Nigeria Fishery Products, Nigeria's Fish Market, 2007,* pp: 5–11. GAIN Report Number N17026. Lagos, Nigeria.

Kainga P. E & Adeyemo A. O (2013). Profitability and Resource Use Efficiency in Catfish (*Clarias gariepinus*) Production in Kolokuma/Opokuma Local Government Area of Bayesa State, Nigeria. *International Journal of Agriculture. Photon* 124: 143 - 49.

Kainga, P. E. & I. T. Seiyabo (2012). Economics of Plantain in Yenagoa Local Government Area of Bayelsa State. *Journal of Agriculture and Social Research (JASR).12*(1):114-123.

Kudi, T. M. Bako F. P. & Atala, T. K. (2008). Economics of Fish Production in Kaduna State. Asian Research Publishing Network (ARPN). *Journal of Agricultural and Biological Science*. *3*(5-6): 17 - 21.

NBS (2012). National Bureau of Statistics Nigeria.

National Population Commission (NPC). (2006). Human Population Figures of Census in Nigeria.

Nwosu, C. S. & Onyeneke, R. U. (2013). Effect of Productive Inputs of Pond Fish Production   on the Output of Fish in Owerri Agricultural Zone of Imo State, Nigeria. *Global   Advanced Research Journal of Agricultural Science (ISSN: 2315-5094)*. *2*(1): 023 - 028.

Ohen, S. B. & S. O. Abang (2007). Economics of Catfish Farming in Rivers State, Nigeria. *Academic Journal of Plant Sciences 2*(1): 56-59.

Ojo, S. O. & Fagbenro, O. A. (2010). Efficient Production of Tilapia: a Panacea for Alleviation   of Nutritional Poverty in Nigeria. Retrieved on 26th May, 2010 fromhttp://ag.arizona.edu/azaqua/ista/ISTA8/Abstracts_Papers/Tilapia%20a%20good%20cadidate.doc.

Olagunji, F. I., Adesiyan, I. O. & Ezekiel, A. A. (2007). Economic Viability of Catfish Production in Oyo State, Nigeria. *J. Hum, Ecol*., 21(2): 121-124.

Onoja, Anthony O. & Achike, A.I. (2011). Resource Productivity in Small-Scale Catfish(Clarias gariepinus) Farming in Rivers State, Nigeria: A translog Model Approach. *Journal of Agriculture and Social Research 11*(2): 201.

Tobor, J. G. (1990). The Fishing Industry in Nigeria – Status and Potential for Self Sufficiency in Fish Production. Nigeria Institute of Oceanography and Marine Research (NIOMR).

Ugwumba C. O. A & Chukuji C. O. (2010). The Economics of Catfish Production in Anambra State, Nigeria: a Profit Function Approach. *Journal of Agriculture and Social Science*. 6: 105-109.

Ugwumba, C. O. A. & E. L. C. Nnabuife, (2008). Comparative Study on the Utilization of   Commertial Feed and Home-made Feed in Catfish Production for Sustainable   Aquaculture. *Multidiscipl. J. Res. Dev.,* 10: 164 -169.