

## **Economic Analysis Of Cat Fish (*Clariasgariepenus*) Production In Karu Local Government Area, Nassarawa State, Nigeria**

**Ebukiba, Samuel Elizabeth and Anthony, Luka.**

*Department of Agricultural Economics, University of Abuja, PMB 117, Abuja, F.C.T, Nigeria*

*Corresponding Author: Anthony, Luka*

*Department of Agricultural Economics, University of Abuja, PMB 117, Abuja, FCT, Nigeria*

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**Abstract:** *The study evaluates economic analysis of cat Fish Production in Karu local government area of Nasarawa State, Nigeria. Primary data was used for this study. Data were obtained using structured questionnaire. The questionnaires were administered to twenty (20) sampled fish farmers using a simple random sampling technique. Data obtained were analyzed using descriptive statistics to describe and categorize the socio-economics characteristics of the respondents; budgetary technique was used to analyze the Profitability of fish production in the study area. The result shows that (35%) of the sampled fish farmers fall within the age bracket of 21 – 30 years, and 31 – 40 years respectively and the average age of the sampled farmers was 41 years; The average farming experience of the sampled farmers was 8 years. Also 55% percent of the respondents depend on borehole for source of water while (5%) depend directly on either stream or river as their major source of water. In terms of holding/rearing structure, 45% percent of the sampled respondents used concrete pond only, while (30%) of the respondents used both concrete and earthen ponds, 25% percent of the respondents used earthen pond only. The result of the profitability analysis shows that a total average cost (TAC) of ₦919, 667.6 was incurred by the sampled fish farmers per cropping season while the total revenue (TR) of ₦1, 296, 894.00 was realized with a returning gross margin (GM) of ₦309, 909.3 in the study area and the rate of return on investment realized was 31% which shows that for every ₦1.00 invested, 31kobo is gained on investment by the respondents. This indicates that fish farming is a profitable venture in the study area. Despite the profitability of fish production in the study area farmers encountered production constraints such as preservation/storage and processing facilities, inadequate motivation from extension officers lack of capital, lack and high cost of feeds, market fluctuation, source of water, fingerlings and technical know-how were identified as major constraint of fish production in the study area. The study recommends that provision should be made for trained extension agents to create awareness about fish production, capital, and source of water, fingerlings and subsidized fish feed.*

**Keywords:** *Economic analysis, fish, profitability, cost, Nasarawa*

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### **I. Introduction**

Fish constitutes about 41% of the total animal protein intake by the average Nigerian; hence, there is great demand for fish in the country. Nigeria requires about 2.66 million metric tons of fish annually to satisfy the dietary requirement of its citizens (estimated at 150 Million). Regrettably, the total aggregate domestic fish supply from all sources (captured and cultured fisheries) is less than 0.7 million metric tons per annum. However, local fish production has been below consumption with imports accounting for about US\$48.8m in 2002 (CBN, 2004). This massive importation of frozen fish in the country has ranked Nigeria the largest importer of frozen fish in Africa. This indicates the large deficit in fish supply in Nigeria (Olopade and Olaokun), (2005). The huge sum of money spent by Nigeria annually in fish importation could be used to invest in fish farming. Nigeria can substitute fish importation with domestic production to create jobs, reduce poverty in rural areas where 70% of the population lives and ease the balance of payments. A review of the various food production systems reveals aquaculture (fish farming) as an important strategy in the global fight against hunger, malnutrition and poverty, particularly in the developing nations including Nigeria. Aquaculture is considered as the provider of the direly needed high quality animal protein and other essential micronutrients because of its affordability to the poorer segments of the community in addition to the provision of employment opportunities and cash income. The Food and Agriculture Organization of the United Nations (FAO, 2008) classified aquaculture as the world's fastest growing food production sector for nearly two decades globally; the sector has shown an overall average growth rate of 11.0% per year since 1984, compared with 3.1% for terrestrial farm animal meat production. Nigeria has the capacity to attain the desired fish self-sufficiency within a short of time if the numerous aquaculture potentials (land 1.7 million Ha and water, 14 million ha), which

abound the nation is adequately utilized. These potentials are estimated at about 2.5 million metric tons of fish annually. The performance of the fisheries sector in Nigeria is below expectation with low supply. This is evident in the fact that Nigeria still imports fish into the country to supplement fish production. According to the proceedings of the fisheries society of Nigeria (FISON), about 50% deficit supply of requirement is met through importation, which constitutes a huge avoidable drain of Nigeria's scarce foreign exchange (Anko and Eyo, 2001). The contribution of domestic fish production to the country's fish sector cannot be over emphasized. Fish farming has the potential of contributing to domestic fish production and reducing the amount of money spent on fish importation. Most of the fish farming in Nigeria is carried out by small scale operators in small fresh water ponds (UNDP). Nigeria has a population of over one hundred million people and has her national fish demand at over 1.5 million metric tonnes. The current annual aquaculture production hovers around 500,000 metric tonnes. These combined with ever decreasing catch (due to over exploitation) from the capture fisheries have not been able to meet the ever-increasing protein demand of the country. Thus the challenge to increase protein consumption in Nigeria appears to be more urgent now than ever (Mbanasor, 2002). Poor people are facing new barriers in both their production and returns on fish. Even by the standards of developing countries, artisanal fishers and fish workers are often among the poorest people and they generally operate on a small scale and use traditional fishing practices yet new technologies and environment requirement favour large scale capital intensive operation at the expense of traditional and small scale commercial fishing (Delgado *et al*, 2003). The importance of fish production for protein cannot be over-emphasized. As indicated at the background information of this chapter, fish production has suffered many set back, among which inefficient use of available resources, lack of technical efficiency such as labour, capital and feed efficiency has resulted to poor profit. It is quite unfortunate that the decline in the growth of fish industry has continued at full strength. It is against this background that this study was undertaken to examine whether or not the profitability level of fish industry is enough to generate income and increase the protein consumption of people in the study area with influx of population due to its proximity to the Federal Capital Territory (FCT), Abuja. Therefore, this study is carried out to provide answers to the following research questions:

- I. What are the socio-economic characteristics of cat fish farmers?
- II. What are the Cost and returns of fish production in the Study Area?
- III. What are the problems militating against fish farming in the Study Area?

The broad objective of this study is to determine the Economic Analysis of Cat Fish Production in Karu Local Government of Nasarawa State Nigeria.

The specific objective was to;

- (i) examine the socio-economic Characteristics of fish Farmers in the study Area
- (ii) Estimate Profitability Analysis of cat fish Production in the Study Area
- (iii) Identify the problems militating against fish farming in the Study Area.

## **II. Materials and Method**

### **The Study Area**

The Study was carried out in Karu local government Area of Nassarawa State, Nigeria. Nasarawa State is made up of thirteen local government areas, and is bounded in the north by Kaduna state, in the west by the Federal Capital Territory, Abuja, in the south by Kogi and Benue States and in the east by Taraba and Plateau States. The state has agriculture as the mainstay of its economy with the production of varieties of cash crops throughout the year. It is also blessed with solid minerals notably salt and bauxite. Karu is a Local Government Area in Nassarawa State, central Nigeria. It is close in proximity to the Federal Capital Territory of Nigeria. Karu Local Government Area of Nasarawa State is located between latitudes 8° 5' N and 10° 42' N and longitudes 9° 25' E and 7° 54' E of the Greenwich Meridian. It lies on latitude 07° 30' N and longitude 08° 50' E with an area of 2,640 km<sup>2</sup>. It shares its western boundary with the Federal Capital Territory (FCT) of Nigeria, its southern boundary with the Nassarawa Local Government area, its eastern boundary with the Keffi Local Government and its northern boundary with Kaduna State. Karu local government has its headquarters in New Karu town. According to the 2006 census, the population of mainly New Karu town was 205,477. Karu is the second most populous Local Government Area in Nasarawa state after Lafia. Karu and consists of five districts namely: Aso, Gurku, Kabusu, Karu and Kodope.

### **Sampling Technique and Sample Size**

A random sampling technique was employed in selecting the wards for this study. A Simple random Sampling was applied to select five (5) respondents from each of the four wards selected out of the thirteen wards in Karu Local Government Area making the total sample size of (20) fish farmers.

### **Method of Data Collection**

The data was obtained from primary source. The primary data was collected with the aid of structured questionnaires administered to the respondents. Data were collected based on the socio-economic variables such as gender, age, farming experiences, educational status, household size and income level of the respondent, as well as profitability variables in the study area. The following tools of analysis were employed to achieve the stated objectives:

- (1) Descriptive Statistics. (Objective 1 and 3)
- (2) Farm Budgeting Technique(objective 2)

### **Descriptive Statistics.**

This tool was used to estimate summary description of the data collected. It involved the use of percentages, means and frequency distributions which affect the productivity of the respondent in the study Area. This was used to achieve specific objective one (1) & (3)

### **Budgeting Techniques**

The budgeting tool is that was used in the study was the Gross Margin Analysis (GMA). Gross Margin (GM) measured as the difference between the Gross Revenue (TR) and the Total Variable Cost (TVC). The Gross Revenue (TR) is the Total output multiplied by the unit price of fish. This gives a measure of the value of the enterprise. The total variable cost measures those costs that vary more or less in direct proportion to the level of production. The component involves costs of such inputs as, fertilizers, transportation costs, and the cost of labour input (₦) the cost of feeds (₦) the cost of other raw materials like fingerlings, etc. (₦)

The Model is expressed as follows: -

$$GM = TR - TC$$

Where,

GM = Gross Margin (₦)

TR = Total Revenue (₦)

TC = TFC + TVC

TC = Total Cost

TFC = Total Fixed Cost

TVC = Total Variable Cost (₦)

GR = P × Q;

P = Cost of fish per (kg) and;

Q = Quantity of fish produced in (kg)

### **Rate of Return on Investment**

$$\text{(RORI)} = \frac{\Pi}{TC}$$

Where,

Π = Profit (₦)

TC = Total Cost (₦)

This tool was used to achieve specific objective two (2).

## **III. Result and Discussion**

### **Socio-economic Characteristics of the sampled Cat Fish Farmers in the Study Area**

Table 1 shows the distribution of fish farmers with respect to their socio economic characteristics. Majority (35%) of the sampled fish farmers in the study area fall within the age bracket of 21 – 30 years, while 35 percent also fall within 31 – 40 years, This age bracket is a productive age which portends better future for catfish production it is considered as economically active age this is in line with findings of (Olowosegun et al., 2004). This indicates that very few old people are involved in fish farming in the study area. This is because fish farming requires adequate attention and a lot of sense of responsibility. Sex plays a very important role in fish farming and agriculture, in terms of property acquisition, for example, fixed assets like land and machines. Majority (65%) of the fish farmers were male while 35 percent were female. This result can be justified by the assertion of Brummett et al., (2010) that fisheries activities are mostly dominated by men. In this study, it was discovered that majority (45%) of the farmers were married while 45% were also single, 10% were widowed and separated. Respondents without formal education among the sampled farmers were 0% percent while 60 percent had tertiary education. This means that fish farming is dominated by the educated class and mostly by those armed with high level of education. This is so because fish farming requires a lot of technical and scientific knowledge to be successfully undertake. The mean household size was found to be 8 people per household, this was an indication that the more educated and urban-based an individual is, the less family-size that individual

will keep this is consistent with findings of (Yarhere, 2004). Based on the sampled farmer's response during field survey, it was discovered that some of the respondents engaged in other occupation apart from fish farming. Occupation remains valid in our society as people have one or two things they engaged in which gives them sense of satisfaction and belonging in the society. Assessing the occupational status of the respondent, majority (60 %) of the fish farmers engaged more in other farming actives apart from fish farming than any other occupation. It revealed that 45 percent had fish farming experience ranging between 1 – 5 years, while 50 percent had between 6 – 10 years of experience. As a result, the respondents with the highest number of years of experience should have good skill and better approaches to fish farming business. The respondents with longer years of experience were also able to forecast market situation in which they sell their products at higher prices. Those with less years of experience, especially with less than 5 years faced many risks in the early days of their fish farming business. (25%) of the respondents purchased the land they are using for fish farming, while 30% rented the land, while 30% and 15% got the land through inheritance and gift respectively. Source and quantity of water available are one of the most important factors to be considered when selecting a site for aquaculture practice. The quantity of water needed for commercial aquaculture varies with the production method employed, type of aquaculture chosen, scale of operation, and species cultured. Most 55 percent depend on borehole (5%) of the respondents depend directly on either stream or river as their major source of water. 40 percent depend on deep well as source of water. In terms of holding/rearing structure, majority 45 percent of the respondents used concrete pond only, 30%) of the respondents used both concrete and earthen ponds, 25% percent of the respondents used earthen pond only, while 5 percent used fish trough/ holding/rearing structure. Fish farmers' in the study area preferred monoculture to polyculture system. This may be as a result of poor market price for tilapia. Majority (60%) of fish farmers adopt monoculture of African Catfish (*Clariasgariepinus*). This was also supported by Fakayode (2000) who observed that fishes grow better when cultured individually under monoculture system and also help the specie to grow to its biggest size. Based on the types of species cultured, majority (95%) of the fish farmers in the study area culture mainly *Clarias* spp. under the influence of high market price, greater demand preferences, hardiness of the stock, fast growth, high feed conversion ratio high survival rate under captivity. This may be due to the fact that cat fish appears to be hardy and generally accepted by people. Majority (100%) of the respondents get their fish seed from fish hatcheries. Cooperative society is a social participation that helps farmers to pool their resources in order to have access to fisheries inputs and to have insights in their fishing issues. Membership of cooperatives is also a factor that influences the adoption of improved fisheries technologies and poverty alleviation. This shows that majority (100%) of the sampled respondents in the study areas do not belong to any registered or unregistered society which may be as a result of lack of awareness and interest. Hence, being a member of association group could create peer pressure for farmers to adopt new technologies. This is in line with the findings of Ekong, (2004) who observed that groups ensure that members derive benefits from the groups in which they cannot derive individually if they were acting alone. More than one quarter of the farmers did not have group status so they operated as ordinary members and this may have effect on their access to credit facilities and adoption of technologies, as it is easier to pass information to a group than individual farmers. The status of fishers' group had significant differences between the study areas. And also the majority 100% does not have access to capital while 80% used their own personal savings as investment capital in the study area.

**Table1; Socioeconomic Characteristics of Fish Farmers in the Study Area**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age</b>		
≤20	-	-
21-30	7	35
31-40	7	35
41-50	5	25
51-60	1	5
61 and above	-	-
<b>Gender</b>		
Male	13	65
Female	7	35
<b>Marital Status</b>		
Single	9	45
Married	9	45
Widowed	1	5
Separated	1	5
Widower	-	-
<b>Education Level</b>		

No Formal Education	-	-
Adult Education	1	5
Primary School	-	-
Secondary School	12	60
Tertiary Education	7	35

**Table1 continued**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Household Size</b>		
1-5	6	30
6-10	13	65
11-15	1	5
16 and above	-	-
<b>Experience</b>		
1-5	9	45
6-10	10	50
11-15	1	5
16 and above	-	-
<b>Mode of land acquisition</b>		
Purchase	5	25
Lease/Rent	6	30
Inheritance	6	30
Gift	3	15
<b>Extension Services</b>		
Yes	-	-
No	<b>20</b>	<b>100</b>
<b>Source of Water</b>		
Stream/River	1	5
Borehole	11	55
Deep well	8	40

**Table1 continued**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Types of Pond/ Structure</b>		
Earth/Concrete pond	6	30
Concrete pond only	9	45
Earthen pond only	5	25
Fish Trough	-	-
<b>Types of Culture</b>		
Monoculture	8	40
Polyculture	12	60
Integrated	-	-
<b>Type of culture Specie</b>		
Clariasspp/catfish	9	45
Clarias and Tilapia	10	50
Heterobranchusspp	1	5
<b>Source of Fingerling</b>		
Own Fish farm/Self-Breeding	-	-
Fish hatchery	20	100
<b>Pond Size</b>		
100-100m <sup>2</sup>	14	70
1001-200m <sup>2</sup>	4	20
2001-3000m <sup>2</sup>	2	10
<b>No of Ponds</b>		
1-5	14	70
6-10	5	25
1-15	1	5

Table1 continued

Variable	Frequency	Percentage
<b>Stocking Density</b>		
700-999	12	60
1000-1500	8	40
1501 and above	-	-
<b>Source of Feed</b>		
Local feed/self-prepared	-	-
Formulated Feed	20	100
<b>Cooperatives</b>		
Yes	-	-
No	20	10
<b>Access to Capital/Credit</b>		
Yes	-	-
No	20	20
<b>Source of Finance</b>		
Personal Savings	16	80
Friends and Relatives	3	15
Cooperative Society		
Bank loan	1	5
<b>Total</b>	<b>20</b>	<b>100</b>

#### Profitability Analysis of Fish Production in the Study Area

Table2 shows the estimate of cost and return analysis made from fish farming using average cost (Fixed and Variable) and yield data generated by each of the sampled fish farmers per season. The cost and return analysis reveals that the variable cost accounted for the smallest proportion (6.8%) of the total cost of fish farming in the study area. This shows the amount of money spend by fish farmers on variablecostin the study areafor purchase of fish feeds, fingerlings, labourand costs of other materials. The fixed cost of production consists of fixed assets, cost of land purchase/rent, water pump, concrete tanks, earthen pond, deep well, generator building/shed, drag net, wheel barrow etc. which accounted for the largest proportion(93.2%)of the total cost. This is in line and consistent with the finding of Ashaolu et al, (2005) from their studies on profitability on fish farming. Also, the result shows that an average total cost (TC) of ₦919667.6 was incurred by therespondent per cropping season while total revenue (TR) of 1296894 was realized with a returning gross margin (GM) of ₦3099,09.3 and the rate of return on investment of 31%. This shows that for every ₦1.00 invested, 31kobo is gained by the respondent in the study area. This indicates that fish farming in the study area was profitable. The rate of return per capital invested (RORI) is the ratio of profit to total cost of production.It indicates what is earned by the business by capital outlay .This result is consistent with the finding of Ashaolu et al,(2006) that fish farming is profitable venture to invest in and also confirmed in table 2 (**RORI**).

Table2; Profitability/Cost and Return Analysis of Fish Production in the Study Area

Variable	Value	Percentage
<b>A.Total Revenue</b>	<b>1296894</b>	
<b>B. Variable cost</b>		
Fish feed	8347	12.4
Fish seed/Fingerlings	4501.1	6.7
Lime/fertilizer	1634	2.4
Labour	5335	7.9
Fuel	39895	59.3
Others	7605	11
<b>Total Variable Cost</b>	<b>67317.1</b>	<b>6.8</b>
<b>C.Fixed cost</b>		
Land purchase/Rent	637500	69
Water pump	38945	4.2
Concrete Tank	51650	5.6
Deep well	36600.6	3.9
Earthen pond	30950	3.4
Plumbing Materials	27055	2.9
Building/shed	32190	3.5
Generator	44300	4.8

Dragnet/scale/cutlass	20555	2.2
Well Barrow/shovel/ head pan/bowl	28415	3.1
Others	3475	0.3
<b>Total Fixed Cost</b>	<b>919667.6</b>	<b>93.2</b>
<b>D. Total Cost</b>	<b>986984.7</b>	
<b>E. Gross Margin</b>	<b>309909.3</b>	
<b>Rate of Return</b>	<b>0.313</b>	

#### **Problems Encountered by the Respondents in the Study Area**

Table3 shows that the majority 80% of the sampled fish farmers in the study area were faced with challenges of access to land while 80% was also faced with constraint of insufficient labour. The analysis also revealed that 65% of the respondent was faced with problems of security table 3also indicate that 100% of the sampled farmers was faced with the constraints of preservation/storage and processing facilities while 100% of the respondent encountered inadequate motivation from extension officer all of the sampled respondent could not have access to extension agents. Also 100% of the respondents were faced with constraint of the absence of strong cooperative society and lack of finance and capital. The study also reveals that high cost of quality feeds, market fluctuation, high cost and lack of pond construction equipment, source of water, pest and disease infestation and lack of technical know-how were identified as the major constraint militating against fish production in the study area.

**Table3; Problems Encountered by Fish Farmers in the Study Area**

<b>Problems/Constraint</b>	<b>Frequency</b>	<b>Percentage</b>
Access to Land	16	80
Insufficient Labour	16	80
Security	13	65
Preservation/Storage/Processing	20	100
Inadequate Extension Services	20	100
Absence of Strong Cooperative Society	20	100
Lack of Finance/Capital	19	95
High Cost of quality fish feed/fingerlings	20	100
High cost and lack of Construction Equipment	19	95
Market Price Fluctuation	19	95
Source of Water	17	85
Disease and pest infestation	18	90
Lack of Technical Knowhow	17	85

#### **IV. Conclusion and Recommendations**

The Study shows that fish production is profitable in the study area. Based on this, we draw the following conclusions from the study: first, aquaculture production is a profitable investment considering the size of rate of return on investment obtained from the study. Secondly, the farms were fairly efficient in use of their resources considering the size of technical efficiency obtained. Thirdly, it is evident that fish farming is capable of creating employment, augmenting income and improving the standard of living of the people. However, feeds were found to be the major factor (input) affecting the output of fish farming in the study area. Lastly, significant level of profit observed among the farms is synonymous to improve efficiency environment among the farmers from the study area. Despite the profitability of fish production in the study area farmers encountered production constraints such as preservation/storage and processing facilities, inadequate motivation from extension officers, lack of capital, lack and high cost of feeds, market fluctuation, source of water, fingerlings and technical know-how were identified as major constraints the study recommends that the extension agent-farmer coverage needs to be improved upon, in order to intensify their awareness and adoption of improved technology, seminars and trainings should be held at intervals so as to update small scale fish farmers' knowledge on fish farming procedures and practice. Farmers should be taught how to produce their own high-quality fish feed from local and easily available ingredients. Local feed mills and local hatcheries should be promoted to reduce transport costs for important fish farm inputs and high mortality rates of fingerlings. The development of a suitable model for fish marketing mechanisms is necessary. This includes certain infrastructural facilities such as the availability of storage and cooling facilities and an improved road network. Educate fish farmers on the use of loans and instruct commercial agricultural lenders to invest in the aquaculture enterprise. More large-scale intensive fish farming systems need to be developed to keep up with continuously increasing needs for fish. The model for large-scale commercial aquaculture systems in Nasarawa needs to be

critically assessed in terms of equity and (environmental) sustainability in order to avoid social disruption and environmental degradation. Environmental regulations need to be monitored.

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