
SOCIO-ECONOMIC VIABILITY OF CATFISH, *CLARIAS GARIEPINUS* PRODUCTION IN LAGOS, NIGERIA***Emmanuel, B.E. and Omotoriogun, W.M.***Department of Marine Sciences, Faculty of Science, University of Lagos, Akoka – Yaba, Lagos.*monetemi@yahoo.com

ABSTRACT: The socio-economic viability of catfish, *Clarias gariepinus* culture was investigated in some farms in Lagos State between October, 2006 and March, 2007. Two of the farms operated earthen ponds while other used concrete ponds. The market fish price (N400 – N1, 200), revealed that fish business is more viable for fish mongers than the growers (farmers). The debt/asset ratio of the farms was less than one indicates a solvent business. The net worth of the farms indicated that the farms were growing. The equity/asset ratio of the farms was equal to 1. The financial outcome of the farm ranged between N48, 210 (USD 401.75) and N1, 841,002 (USD 15,341.68) depending on the size of the farm. The larger the farm, the higher the profit catfish culture is economically viable in Lagos State. [Report and Opinion. 2010;2(1):63-73]. (ISSN: 1553-9873).

Keywords: Socio – economic, pond, fish mongers, catfish

INTRODUCTION

Fishing like other hunting has been a major source of food for human race and has put an end to the unsavory outbreak of anemia Kwashiorkor and other ailments for relating to protein deficiency (FAO 1995). It accounts for about one fifth of world total supply of annual protein and this has risen five folds over the last forty years from 20million metric tons to 98million metric tones in 1993 and projected to exceed 150million metric tons by the year 2010 (FAO 1995).

Fish farming activity in Nigeria started about 50years ago, with the establishment of a small experimental station at Onikan Lagos and an industrial farm about 20ha at Panyam in Plateau

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State by Federal Government (Wokoma, 1987). This generated a lot of interest in fish farming with the involvement of other levels of government and some private establishment (Longhurst, 1963 and Olagunju *et al.*, 2007).

As the human population continues to expand, its reliance on farmed fish production as an important source of protein will also increase. Fish allows for protein improved nutrition in that it has a high biological value in terms of high protein retention in the body, higher protein assimilation as compared to other animal protein sources, low cholesterol content and one of the

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safest sources of animal protein (Fagbenro and Arowosoge, 1998).

Fish farming generates employment directly and indirectly in terms of production of fishing output and other allied business, it also generates income for all categories of people involved in fish farming and thus contributes to the national income when compared with livestock, it requires less space, time, money and has a higher feed conversion rate (Olagunju *et al.*, 2007).

Out of 35 grams of animal protein per day per person recommended by food and agricultural organisation, less than 7 grams is consumed on the average (FAO, 1995). Many Nigerians suffer from protein deficiency due to low protein uptake (Moses, 1983).

Nigeria has become one of the largest importers of fish in the developing worlds, importing some 600,000 metric tons annually (Ajana, 1996). To solve the country's high demand for fish, Nigerian must turn to their under utilized inland water for improved fish production and aquaculture. Aquaculture expansion, moreover, has been a slow process, as private sector fish farmers have faced major constraints, including lack of seed and quality feed (Ezenwa, 1978).

The demand for fish and fish product is infinity price inelastic due to short fall in production of other substitutes and import restriction to encourage the development of fish culture (Nwanna, 1998). It was further reported that, the <http://www.sciencepub.net/report>

introduction of exotic species to argue the existing aquacultural stocks will be necessitated.

Simulations with the potential stocked seven fish per square metre show that aquaculture can contribute to close to gap between demand and supply with a production of 420,000 metric tons per annum reduce fish, imports estimated at 70,000 metric tons per year to employment and income and shift the pressure on seawater where upwelling are lacking, it was further reported that aquaculture can be used as a tool for economic development in a context of liberation of the economy (Sounq, 2004). Many fish farming focus on catfish, as they can have a market value of two to three times that of Tilapia (FAO, 1995).

The major constraints to fish farming were identified to be those of environmental impacts of aquaculture operations (water pollution) (Brett, 1979) in adequate supply of fingerlings, in adequate information and feed supply (Ezenwa, 1978). According to Lagos State Agricultural Development Authority (LSADA, 1999), there were over 500 commercial fish farms in the state. Majority of the fish ponds in the state were small scale and over 85% of the farmers practiced integrated fish farming (Ajana, 1996).

Some of the limiting factors in aquaculture sector include, poorly constructed ponds, acute shortage of fingerlings, use of poorly prepared feed ingredients, high level of poaching, lack of credit facilities and inputs, no farm records as well as reportopinion@gmail.com

inadequate extension services in the state were reported by (LSADA, 1999).

Socio-economic farming constraints include markets, infrastructure, community milieu, household dynamics and producers orientations. The educational level of producers directly shapes their ability to search for and utilize new technology and to participate in market processes. Beyond the pond environment, market incentives, consumer preferences, input availability of food organisms, and the influence of naturally occurring substances such as dissolved oxygen, carbondioxide, ammonia, hydrogen sulphate, nitrate, hydrogen ions, temperature as well as the salinity of water are of great importance (Boyd,1998).

In spite of the ever increasing growth witnessed by other major sources of animal protein such as livestock and poultry industries, this problem of protein deficiency has continued unabated (Olagunju *et al.*, 2007). Despite the earthquake in the catfish business little or no information is available on how viable the business is to the state economy. In lieu of this, the study aims at determining the factors that affect catfish production, socio-economic viability, cost and

financial outcome of catfish farming in Lagos State.

MATERIALS AND METHODS

The research was conducted in Lagos metropolis, the most populous state in Nigeria, in six farms (Osigwe integrated fish farm – Oko Oba (Agege), Pete Farm Investment Services Limited at Iyana Ipaja, Sapphire Fish Farm (Agbado), Oyelade Farm (Ikotun), Latunde Farm (Ikorodu) and Bilkis Fish Farm and Agro-Industries (Isolo) (Figure 1).

Various markets around Lagos environ were visited for the financial analysis of the fish. The market women were interviewed on the factors that affect the price fluctuation of catfish and how long they have been into the business. The market and farm survey was done between October 2006 and September 2007. A control system was set-up in the Marine Science Department Fish Culture Complex. One hundred juveniles of *C. gariepinus* were purchased from Agboola Fish farm at Ayobo, stocked and fed with coppens for the period of the study.

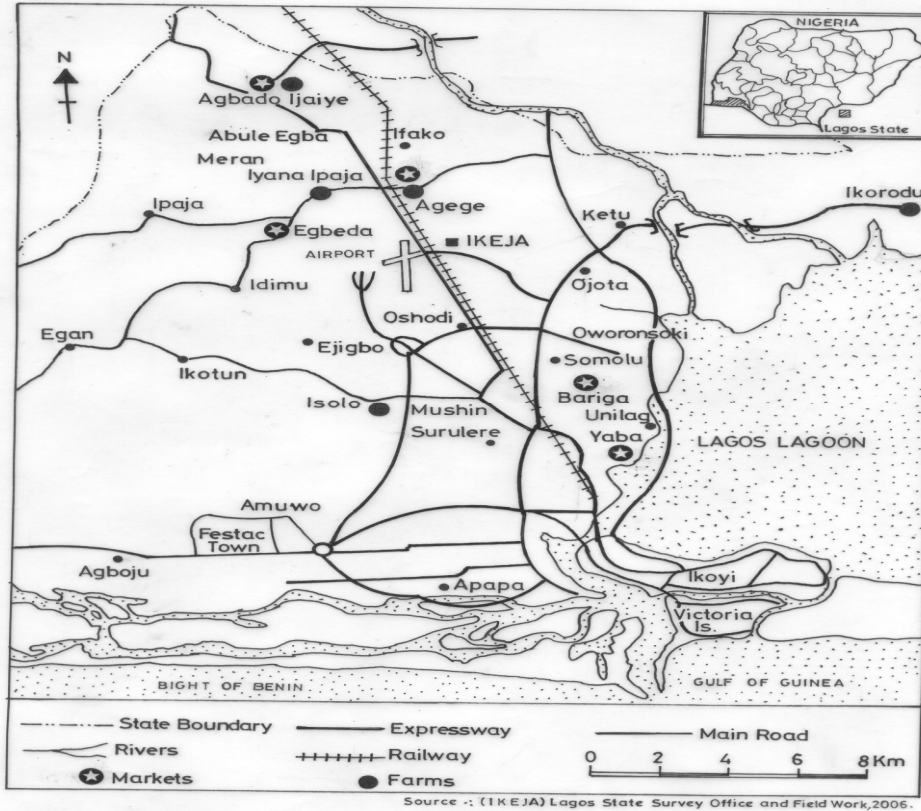


Fig.1: Map of Metropolitan Lagos showing the study areas (● ●)

The variables that we used were measuring the debt/asset ratio, change in net worth, working capital, equity asset ratio, current ratio and debt/equity ratio and debt/equity ratio as described by (4).

Debt/asset ratio analysis is given by equation:

$$\text{Debt/asset ratio} = \frac{\text{Total farm liabilities}}{\text{Total farm asset}} \quad (1)$$

asset

This is a measure of business solvency.

Change in net worth analysis is given by equation:

$$\text{Net worth} = \text{Total assets} - \text{Total Liabilities} \quad (2)$$

This indicates business growth,

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Working capital analysis is given by equation:

This represents excess naira available from current asset after current liabilities have been paid.

The equity/asset ratio analysis given by equation:

$$\text{Equity/asset ratio} = \frac{\text{Total equity}}{\text{Total assets}} \quad (4)$$

If the equity/asset ratio is equal to one, the liabilities then must be 0.

The current ratio analysis is given by equation:

$$\text{Current Ratio} = \frac{\text{Current farm assets}}{\text{Current farm liabilities}} \quad (5)$$

liabilities

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The debt/equity ratio also called the leverage ratio was analysed by equation:

$$\frac{\text{Debt/Equity Ratio}}{\text{Liabilities}} = \frac{\text{Total}}{\text{Total Equity}} \quad (6)$$

This compares the proportion of financing provided by lenders with that provided by the

RESULTS

Farms Price for Catfish in Lagos State

The range (N250 – N350) in the prices (Table 1) of fish from Farm A to Farm E was not significant in the months of October, February and March. There was harmattan in the month of November which resulted in the low

business owner. When the debt/equity ratio = 1, lenders and owners are providing equal amount of financing. The water qualities of the farm studied were collected and analysed for temperature, pH, dissolved oxygen, salinity and carbon dioxide.

production of fish in the farms. The farms experienced loss of fingerlings due to hatching problems. There was a slight increase of fish price during this period (N250 – N400) in the farms to make up for their loss. Also there was an increase in price of fish (N300 – N400) in December.

Table 1: Farm prices of fish (October 2006 – March 2007)

Farms	Oct (₦)	Nov (₦)	Dec (₦)	Jan (₦)	Feb (₦)	Mar (₦)
A	250 – 350	300 – 400	300 – 400	250 – 350	250 – 350	250 – 350
B	250 – 350	290 – 350	300 – 400	290 – 350	-	250 - 350
C	250 – 350	250 – 400	300 – 400	250 – 350	-	-
D	250 – 350	250 – 400	300 – 400	250 – 350	-	250 – 350
E	250 – 350	300 – 400	350 – 400	250 – 350	-	250 – 350
F	250 – 350	280 – 380	350 – 400	-	250 – 350	250 – 350

Structural Organisation of Fish Farm in Lagos State

Farm A had the highest hatchery ponds (22) followed by Farm D with (5) production ponds. Farm E and F had (2) production farms each while Farm B had none (**Table 2**).

Table 2: Production ponds and hatchery distribution in the selected farms

Farm	Number of Production Ponds	Number of Hatchery Tank
A	42	22
B	5	-
C	24	-
D	7	5

E	8	2
F	20	2

Pond type and Distribution in the Farms in Lagos

All the Farms (A – F) had concrete pond with varying sizes. Only Farm A and B had earthen pond. The glass fibre tank recorded in the study was for the control (Marine Sciences fish culture complex).

The Price of Fish in the Markets in Lagos State

Most fish mongers do not use fish scale to measure their fish for sale purpose, they only use

precision. The price range of fish in the market is shown in **Table 4**. The price range of catfish ranged from (N350 to N1, 200) for one depending on the size, the distance of the market from the farm and the season. The highest market price range was recorded at Yaba market (N500 – N1, 200) followed by Bariga market (N500 – N1, 000). The least was recorded for Egbeda market (N350 – N650) (**Table 3**).

Table 3: Market pricing between October and March

Market	Oct (₦)	Nov (₦)	Dec (₦)	Jan (₦)	Feb (₦)	Mar (₦)
Egbeda	350 – 600	400 – 550	500 – 700	450 – 650	350 – 600	350 – 600
Ijaye	300 – 600	350 – 550	450 – 700	450 – 600	300 – 600	300 – 600
Agege	400 – 700	400 – 550	500 – 700	500 – 650	400 – 650	400 – 700
Yaba	500–1,000	500–1,500	500–1,200	500–1,000	500–1,000	500–1,000
Bariga	500 – 800	500–1,000	500–1,000	500 – 800	500 – 800	500 – 800
Oja Oba	450 – 700	400 – 850	450 – 850	350 – 700	350 – 700	350 – 700

Fish Stocking Density of Farms in Lagos State

The farms stocking density was shown in **Table 4**. The highest stocking density was recorded for Farm A (20,000) and the least was recorded for Farm E and F (1,000) each.

Table 4: Stocking density for farms in Lagos State

FARMS	STOCKING DENSITY
A	20,000
B	4,000
C	1,500
D	8,000
E	1,000
F	1,000

Sources of Fingerlings in the Farms in Lagos State

Farms A and D strictly obtain their fingerlings from their hatchery while Farm C and F obtain juvenile from the hatchery and sometimes from other farms. Farms B and E strictly get their fingerlings from individual farms.

Feed Types and Frequency of Feeding for Fish Farms in Lagos State

The fish farms employed different types of feeds. Farm A used compounded feed, animal waste and industrial waste. Farm B used only compounded feed while Farm C employed both compounded feed and home. Farm E and F used only compounded feed. All the six farms claimed to feed their fish two times a day and seven days a week.

Operational Cash Expenses in the Farms

The operational farm expenses and the financial outcome of the farms are shown in **Table 5**. Farm A was a big farm with high expenses compared to Farm C, E and F. Farm A was also into integrated fish farming. The financial outcome was highest in Farm A (N1, 841,002 =

USD15, 341.68) and the least was recorded for Farm C (N48, 210 – USD401.75). The control recorded a deficit of N3, 000 (USD25).

Production efficiency production in the farms measurement of production efficiency in the farm is shown in **Table 6**. The debt/asset ratio of the farms ranged from 0 (A, B, D, E and F) to 0.25 (Farm C). Net worth of the farms varied from N449, 285 (Farm C) to N7, 000,000 (Farm A). The current ratio of the farms ranged from 1.5 (Farm B) to 3.3 (Farm A). The equity asset ratio was uniform in all farms except in Farm C where the least was recorded (0.75). Also zero was recorded for all the farms except for Farm C where 0.3 was recorded for debt-equity ratio.

Socio-Economic Characteristics of the Farmers

The study showed that the fish farms are male and fall within the age of 20 – 50 years. The mean age was 35 years. The educational stand of the farmers revealed that they are not illiterate with minimum of first degree from University.

Table 5: Operational Cash Expenses at the Rate of 350/KG

	6 Months Farm A	5 Months Farm B	6 Months Farm C	6 Months Farm D	6 Months Farm E	6 Months Farm F	6 Months Control Tank
Total kg recovered from each	13,300	3,230	1,140	6,460	760	808	30.1kg
Farm Liability	₦	₦	₦	₦	₦	₦	₦
Feeding	1,999,998	800,000	300,000	1,600,002	199,998	180,000	14,000
Workers Salary	300,000	50,000	-	51,000	-	-	-
Farm Manager	180,000	-	-	150,000	-	-	-
Chicken Feed	24,000	-	-		-	-	-
Pig Feed	30,000	-	-		-	-	-
NEPA Bill	6,000	5,000	5,700	6,000	4,350	5,370	-
Security	60,000	50,000	-	60,000		-	-
General Farm Maintenance	120,000	40,000	30,000	60,000	30,000	30,000	-
Total Liability	2,719,998	945,000	335,790	1,927,002	234,348	215,370	14,000
Other Expenses	11,000	40,000	15,000	5,500	10,000	5,500	1,000
	2,708,998	985,000	350,790	1,932,502	244,348	220,870	
Total money recovered after harvest	4,550,000	1,130,500	399,000	2,261,000	266,000	282,800	12,000
Subtract total expenditure from total money recovered after harvest	1,841,002	145,500	48,210	328,498	21,652	61,930	-3,000

Table 6: Measuring Production Efficiency in the Farms

Farms	Debt/ Asset Ratio	Net Worth (N)	Equity/ Asset Ratio	Working Capital (N)	Current Ratio	Debt/ Equity Ratio
A	0	7,000,000	1	6,132,004	3.3	0
B	0	1,292,500	1	453,000	1.5	0
C	0.25	449,285	0.75	296,705	1.8	0.3
D	0	4,000,000	1	1,395,996	2.2	0
E	0	500,000	1	277,304	2.1	0
F	0	400,000	1	241,060	2.1	0

DISCUSSION

The variation in the farm prices of fish was as a result of the concentration of farms in these locations. This reduced the monopolistic of fish selling in the area. The area with more farms had recorded lowest fish prices. During harmattan fingerlings production was hindered due to incubation problem, this will eventually affect production and consequently increase fish price. This study recorded high farm income during December period. Then it could be said that fish farming business is highly viable during festive period.

Apart from Farm A and B all the other farms had no earthen pond. This was related to the fear of losing their fish to the mud when ready to harvest but the farmers in Farm A and B explained that earthen pond aid the growth of big catfish. None of the farms used plastic tanks because of the difficulty in the maintenance due to the slime that is produced as a result of the feed and the waste from the fish.

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The range in fish prices at the market showed that fish business was more viable to the fish mongers since fish mortality and other farms stresses were not considered as threat to them. The high market price in some of the markets was related to the distance from the farms and transportation expenses. The fish stocking density of the farms was high in Farm A due to the size and fund that was available but Farm F had the lowest stocking density considering the available cash.

The hatchery owed by Farm A and D empowered them to stock income. The farms without hatchery used high amount of money to purchase fingerlings. This agreed with the report of Ogunlana (2002) that majority of fish farms purchase there fingerlings from the wild and other farm in high prices. All the farms used compounded feed though of unknown or low quality while some used agro-industrial by-product such as breweries waste, spent grain, poultry and pig dung. All farmers fed their fish

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twice a day and seven days a week which is the recommended optimum frequency for effective feed utilization in fish farming. This agreed with Ogunlana (2002) that most farmers in Lagos State feed twice daily and seven times a week.

The debt/asset ratios for the farms were less than 1 indicating a solvent business. This agreed with Carole and Neira (2005) that value less than 1 indicates a solvent business and that this indicator should decrease as equity in the business grows. The net worth of the farms indicated that the farms were growing but any reduction in subsequent net worth of operation may not be good for the farmers. The equity/asset ratio of the farms was equal to 1 or less thus indicates zero liability. This agreed with Carole and Neira (2005) that higher values of the equity asset ratio are preferred but the values for this ratio cannot exceed 1.

High current ratio recorded in the farms indicates liquidity (the ability of a business to meet cash flow obligations). The working capital was high for the farms though it was affected by the farms capacities. The debt/equity ratios were below 1. This depicted a good solvency in the farming operations. The farms recorded high profit based on the input but the control experiment recorded a deficit of N3, 000. This may be as a result of the tank size and the number of fingerlings stocked. It could be noted from the above analysis that the catfish farming business is economically viable but this depends on many factors like the sources of fingerlings (fish feeds), feeding types and the size of the farm. It

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was noted that, the larger the farm, the more the profit.

The socio-economic characteristics of the farmers showed that there was no age discrepancy among catfish farmers in the study area, meaning that anybody could practice catfish farming regardless of their age as reported by Olagunju *et al* (2007). The high level of education might be due to the social nature of the study area and its implication is that the farmers will be very receptive to new innovations in their methods of production.

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References

- [1] FAO. The Kyoto declaration and plan of action on the sustainable contribution of Fisheries to security. FAO Rome. 1995.22pp
- [2] Wokoma SA. Modern pond construction and pond engineering technology. In: Aquaculture training programme organized for the Directorate of Food, Road and Rural Infrastructures by the Nigerian Institute for Oceanography and Marine Research, 31st of August, 1987. 1987. 24 -34.
- [3] Longhurst AR. Report on the fisheries of the Nigeria. Federal Fisheries Service,

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- Ministry of Economic Development, Lagos. 1963. 95pp
- [4] Olagunju F I, Adesiyon IO, Ezekiel AA. Economic viability of catfish production in Oyo state, Nigeria. *Journal of Human Ecology*. 2007. 21(2): 121 - 124
- [5] Fagbenro OA, Arowosoge AI. Utilization of Agricultural waste and by- products in the fish feed production in Nigeria. Proceedings of the 6th Annual Conference of the Fisheries Society of Nigeria (FISON). Fisheries Society of Nigeria, Lagos. 1998. 121 – 130.
- [6] Moses BS. *Introduction to tropical fisheries*. Ibadan University Press, Ibadan, Nigeria. 1983. 220pp
- [7] Ajana AM. A diagnostic survey of the status of aquaculture (fish farming) in Lagos state. NIOMR Report for National Agriculture Research Project. 1996. 54pp
- [8] Ezenwa BIO. Studies on the distribution, age and growth of the catfish *Chrysichthys nigrodigitatus* in Nigeria. M.Sc. Thesis. University of Lagos, Nigeria. 1978. 194pp
- [9] Nwanna LC. Economics of new aquaculture species in Nigeria. *Int. Inst. Fish. Econ. Trade (IIFET)*. 1998. (1) 99 – 103
- [10] Soung PNM. Constraints and financial profitability of the exploitation of natural resources: case of aquaculture fish production in Cameroon. In: *What are responsible fisheries?* Matsuda, Y. and Yamamoto, T. (eds). Proceedings of the Twelfth Biennial Conference of the International Institute of Fisheries Economics and Trade (IIFET), July 20 – 30, 2004. Tokyo, Japan. AnnL. Shriver (Comp.) CD-ROM. 2004.
- [11] Brett JR. Environmental factors and growth. In: *Fish Physiology* (Hora, W.S., Randal, D.J. and Brett, J.R eds) Academic Press. New York. 1979. 260pp
- [12] LSADA. Lagos State Agricultural Development Authority Annual Report. 1999. 155pp
- [13] Boyd CE. *Water quality in warm water fish ponds*. Auburn University Press, England. 1998. 36pp
- [14] Ogunlana FF. The structure and management of selected fish farms in Lagos state. M.Sc Dissertation, University of Lagos. 2002. 53pp
- [15] Carole RE, Neira I. *Tilapia farm business management and economics: A training manual*. Aquaculture CRSP Oregon State University, USA. 2005. 41pp
- Huet, M. (1972). *Textbook of fish culture: breeding and cultivation of fish*. Fishing News Books Ltd. England. 635pp

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