Agricultural Journal 5 (6): 318-321, 2010
ISSN: 1816-9155

Economic Analysis of Small-Scale Catfish Farming in Ido Local Government Area of Oyo State, Nigeria

A.J. Oladejo
Department of Agriculture, Economics and Extension,
Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria

Abstract: This study analyzed the economics of small-scale catfish farming in Ido local government area of Oyo State. Sixty small-scale catfish farmers were selected using simple random sampling technique. Structured interview schedule was used to collect information from the respondents. Descriptive analysis revealed that the average age of respondents was 45.07 years. Average year of schooling was 9.5 years and 90% of them use earthen ponds. The major problems faced by the catfish farmers were predators, high cost of inputs and finance. Per harvest cost and returns analysis revealed the gross margin as ₦428, 917.78, net revenue as ₦370,154.40 and the Benefit Cost Ratio (BCR) as 2.173. This result shows that catfish farming is a profitable enterprise. Regression analysis was employed to determine the relationship between cost of production and returns. Adjusted R^2 of 89.6% revealed that rent on land, pond construction cost, cost of fingerlings, feed cost, transportation as well as salary and wages were significant factors affecting total revenue of respondents.

Key words: Economic analysis, small-scale, catfish, gross margin, quality food, Nigeria

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. (Anthonio and Akinwumi, 2002).

Fishing, like any other hunting activities has been a major source of food for human race and has put an end to the unsavory outbreak of anemia, kwashiorkor and so on. It accounts for about one fifth of world total supply of animal protein and this has moved up five folds over the last 40 years from 20-98 million metric ton by the year 1993 and projected to exceed 150 million metric ton by the year 2010. Fish farming also generates employment directly and indirectly in terms of people employed in the production of fishing output other allied business (Slang, 1973). According to Wurts (2004), small-scale and home use catfish farming are significantly more sustainable than intensive production. Because inputs are minimized, small-scale practices can substantially reduce production costs. The savings realized by producing fish for direct consumption reduce the farm family's cost of living and improve their quality of life. Small-scale catfish production offers Kentucky's farm families quality food at wholesale prices, a source of supplemental income and a means of diversifying farm enterprises.

These home-use techniques broaden Kentucky's farm culture and enhance opportunities in rural areas overall. When compared with livestock, it requires less space, time, money and has a higher feed conserving rate. In further production of animal meat and other production in Nigeria and in world at large, the fish serve as an additive and good nutritive supplement (ingredient) for the production of various animal meals and other products (Slang, 1973).

Clarias specie has wide acceptability as a food in Nigeria and because it is a fast growing specie that adapts well to culture environment and also because it can be retailed live and attracts premium price. Channel and blue catfish are both suitable for stocking in ponds. However, channel catfish are more readily available from private hatcheries and tolerate low dissolved oxygen better than blue catfish. Blue catfish grow larger than channel catfish after the second year post-stocking. There is no difference in taste or flesh texture between the two species (Masser *et al*., 1999). Catfish is highly nourishing. It contains lysine as well as vitamins A that are necessary for healthy growth. It also contains some quantities of calcium, phosphorus, fat and other nutrients needed for human growth and health. Catfish is a major source of protein to an average Nigerian home and through small-

scale production, it is expected that there would be an increase in the supply of catfish which directly would mean an increase in the protein supply to an average Nigerian family and this would definitely have a positive effect on the national income as healthy people tend to work harder (Jimmy and Jimmy, 2002).

Most of the past studies in Nigeria focused on large scale fish farming. Some others have their focus on the nutritional aspect. To this end, an economic analysis of small-scale catfish farming which is the focus of this study would serve as a guide for investment decision to both current and potential farmers. Information on the various inputs that contribute significantly to output would be of much benefit to intending catfish farmers.

Objectives of the study: The major objective is to analyze the economics of small-scale cat fish farming in the study area. The specific objectives are to:

- Identify the socio- economic characteristics of catfish farmers in the study area
- Investigate the inputs employed in catfish farming in the study area
- Analyse the costant returns to catfish farming in the study area
- Identify the problems militating against catfish farmers in the study area

Hypothesis of the study: There is no significant relationship between the cost of inputs used and total revenue generated by small-scale cat fish farmers.

MATERIALS AND METHODS

Study area: The study area is Ido local government area of Oyo State. It is one of the local government areas located in Ibadan, the state capital. Ido area is well drained with some rivers which the indigenes of the area used for domestic purpose and fish cultivation. There are two main seasons; the rainy season and dry season. The rainy season is from April to October, the dry season is November to March. The major occupation of residents in the area is farming. Population size of the area is 267,865.

A list of registered catfish farmers was collected from the local government headquarters. The list of small-scale catfish farmers were extracted from the register and a random sampling technique was used to select 60 catfish farmers (40%) from the list.

According to Shaib *et al.* (1997)'s classification, Nigerian farmers fall in to three broad categories, namely, small-scale with 0.10-5.99 ha, medium scale with 6-9.99 ha and large-scale holdings with 10 ha upward. Structured interview schedule was administered to the selected catfish farmers. Information was collected based on the objectives of the study.

Data analysis: Data collected were analyzed using both descriptive and inferential statistics. Cost and returns analysis was also carried out to investigate the profitability of the enterprise. Descriptive analyses involve the use of tables, percentages, frequency and mean. Inferential statistics involve the use of regression analysis to establish the relationship between the dependent variable and independent variables. This is implicitly expressed as:

$$Y = f(x_1 \ldots\ldots\ldots, x_8)$$

where, Y is the total revenue generated by respondents and X includes rent on land (X1), stocking density (X2), pond construction cost (X3), cost of fingerlings (X4), feed cost (X5), cost of veterinary services and drugs (X6), transportation cost (X7), level of education (X8), year of experience (X9), salaries and wages (X10). The a priori expectation of this study is that an inverse relationship exists between revenue and cost of production. Cost and returns analysis investigates the profitability of the business:

$$\text{Total revenue} = \text{Output} \times \text{Unit price}$$

$$\text{Total cost} = \text{Total variable cost} + \text{Total fixed cost}$$

$$\text{Gross margin} = \text{Total revenue} - \text{Total variable cost}$$

$$\text{Profit} = \text{Gross margin} - \text{Total fixed cost (depreciated value)}$$

$$\text{Benefit cost ratio} = \text{Total revenue}/\text{Total cost}$$

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents: Data collected showed that both male and female were involved in catfish production as 78.3% of the respondents were males while 21.7% were females. It revealed that 50% of the respondents were between the age range 41-50 years and they constitute the largest population of the catfish farmers. Mean age for the respondents was 45.07 years.

Education is important in achieving high level of management capabilities. Findings showed that a good number of the farmers in the study area received some level of formal education. About 33% of the respondents claim to acquire tertiary education. On the average, the

respondents spent 9.5 years in school. About 83% of the respondents claimed between 1-6 members within household. The average household size was 6. Finally, the average years of fishing experience by the farmers was 5.88 years.

Inputs employed in catfish farming: Table 1 shows different types of inputs employed by the respondents in there production activities. Most (90%) of the farmers employed earthen ponds while only 10% use catfish tanks. There are variations in pond sizes of respondents. According to them, large ponds are economical but can not be easily managed. Smaller ponds are easily managed and more suitable for those just venturing into the enterprise. Average pond size in the study area was 482 m^2 with an average depth of 3 m. This conforms to Wurts submission that ponds as small as 0.25 acre or as large as 20 acres are suitable. However, ponds in the 1-5 acre range are more practical. Table 1 also shows the stocking schedule of fingerlings by the farmers in the area. Average stocking rate for the respondents was 1640 fingerlings. Fertilizer is an important input to catfish farming in the study area. About 86.7% of respondents claimed to use poultry waste, 10% use cattle dung while 3.3% use NPK in the study area. About 33% of respondents claimed to depend on family labour while 67% use hired labour. Other inputs used by the respondents are: land, water, feed, shovels, fishing nets, veterinary services and drugs. The average land area allotted to fishing activities by respondents was 1.37 ha. This conforms to Slang (1973)'s finding that fish farming requires less land area compared to crop and livestock production. Underground water and rain water are major sources of water for fishing activities in the study area.

Cost and returns analysis per harvest: According to the respondents, harvesting is carried out twice in a year that is 6 months interval. The following analysis is done based on per cropping operation. The average values for the sixty respondents were used. Variable cost components for the respondents include fingerlings cost, fish meal, fertilizer and lime, vetenary services and drugs, transportation, salary and wages:

Table 1: Inputs employed by respondents

Fish pond (type)	Frequency	Percentage
Earthen pond	54	90.0
Concrete tank	6	10.0
Total	60	100.0
Fingerlings (stocking rate)		
1000-2000	36	60.0
2001-3000	24	40.0
Total	60	100.0
Fertilizer and lime		
Poultry waste and lime	52	86.7
Cattle dung and lime	6	10.0
NPK and lime	2	03.3
Total	60	100.0
Labour (type)		
Family	20	33.3
Hired	40	66.7
Total	60	100.0

Field survey, 2009

$$\text{Average variable cost} = \#\ 256{,}930.55$$

Fixed cost components for the respondents include rent on land, pond construction, fishing-net, shovel, etc.

$$\text{Average fixed cost} = \#58{,}763.43$$

$$\begin{aligned}\text{Average total cost} &= \text{Average variable cost} + \text{Average fixed cost}\\ &= \#\ 256{,}930.55 + \#58{,}763.43\\ &= \#315{,}693.98\end{aligned}$$

$$\begin{aligned}\text{Revenue} &= \text{Quantity harvested (kg)} \times \text{price per kg}\\ &= 1{,}558.74 \times \#\ 440\\ &= \#\ 685{,}848.33\end{aligned}$$

Benefit Cost Ratio (BCR) is total revenue divided by total cost i.e., TR/TC:

$$\text{BCR} = \frac{\text{TR}}{\text{TC}} = \frac{685848.33}{315693.98} = 2.173$$

An investment is profitable if the BCR is >1. Gross Margin is calculated as revenue minus variable cost:

$$\begin{aligned}\text{GM} &= \text{R-VC}\\ &= ₦\ 685848.33 - ₦\ 256{,}930.55\\ &= ₦\ 428{,}917.78\ \text{k}\end{aligned}$$

This shows that catfish production is profitable. Profit is the net benefit of doing business:

$$\begin{aligned}\text{Profit} &= \text{Gross margin - FC (i.e., revenue - cost)}\\ &= ₦\ 428{,}917.78 - ₦\ 58{,}763.43\\ &= \#370{,}154.40\ \text{k}\end{aligned}$$

Going by the analysis, a catfish pond of 482 m^2, stocked with 1640 fingerlings within the next 6 months will yield 1,558.74 kg of catfish to give profit of #370,154.40 k to the investor. This finding agrees with Masser and Higginbotham (undated) and Wurts, catfish farming is a profitable enterprise.

Problems faced by catfish farmers in the study area: It is clearly shown in Table 2 that catfish farmers encounter

Table 2: Problems faced by the catfish farmers

Problems	Frequency	*Percentage
High cost of input	47	78
Limited market sales	26	43
Inadequate extension visits	33	55
Flood problem	16	25
Predators	57	95
Finance	44	73

Field survey, 2009, *Percentage >100 due to multiple responses

Table 3: Result of regression analysis

Variables	Coefficient (b)	t-ratio	Significance
Constant	6447.227	0.185	0.854
Rent on land	-0.928	-8.253	0.000
Stocking density	0.315	0.053	0.958
Construction cost (pond)	-1.010	-7.813	0.000
Cost of fingerlings	36.466	99.474	0.000
Feed cost	-0.725	-5.280	0.000
Vet. services and drugs	-0.331	-0.506	0.615
Transportation	-1.133	-5.046	0.000
Level of education	2.884	0.365	0.717
Year of experience	-10.192	-1.240	0.221
Salary and wages	-0.957	-2.304	0.026

Adjusted R^2 = 0. 896; F-value = 83.313 (0.000), Data analysis, 2009

diver problems in the course of their production activities. The major ones include high cost of input, predators and finance. According to the respondents, most of sources of credits demand for collaterals they could not afford while others delay such that it does not meet up with the purpose it was meant for.

Regression analysis: The analysis determined the relationship between dependent and independent variables.

The R^2 of 0.896 indicated that the estimated independent variables explained 89.6% of the variations in revenue to catfish farmers in the study area while the remaining 10.4% are exogenous to the system. From Table 3, the result showed that rent on land, pond construction cost, feed cost, transportation cost as well as salary and wages have negative significant relationship with revenue.

The negativity indicated that the variables and revenue move in opposite directions i.e., the higher the cost of negatively signed variables, the lower the revenue. This agrees with the a priori expectation of the study. However contrary to a priori expectation, cost of fingerlings was found to be proportionally related to revenue. This could be accredited to the fact that high quality fingerlings cost more. But at the end of the day, they produce better yield which results to higher revenue.

CONCLUSION

This study concluded that small-scale catfish farming is a profitable enterprise, especially when there is proper management of inputs, absence of predators and when timely source of loan is available. The study concluded that there is significant negative relationship between cost of production and total revenue made by catfish farmers in the study area.

RECOMMENDATIONS

Based on the findings and conclusion of the study, the following recommendations are made: catfish farmers should form themselves into cooperative groups or association and purchase inputs in bulk for the use of members so as to reduce per head cost of production. The cooperative groups can also provide timely loans to its members at a much reduced interest rate as well as constitute an avenue for the farmers to share improved management information.

REFERENCES

Anthonio, O.R. and J.A. Akinwumi, 2002. Supply and distribution of fish in Nigeria. Geographical J., 14: 16-16.

Jimmy, S. and A. Jimmy, 2002. Construction of Levee Ponds for Commercial Catfish Production. U.S. Department of Agriculture, Washington, D.C.

Masser, M.P., D. Steinbach and B. Higginbotham, 1999. Catfish Ponds for Recreation. Texas Agricultural Extension Service, Corpus Christi, Texas.

Shaib, B., A. Aliyu and J.S. Bakshi, 1997. Nigeria National Agricultural Research Strategy Plan: 1996-2010. Africa Builder Ltd., Nigeria, pp: 22-35.

Slang, V.C., 1973. Comparison on the economic potential of agricultural land, animal husbandry and oceans fisheries, the case of aiwa agriculture. FAO Technical Conference on Aquacultures Kyoto, Japan, pp: 94-97.

Wurts, W.A., 2004. Small-scale and home use channel catfish farming in kentuky. World Aquacult., 35: 8-9.