Profitability and Productivity of Catfish Production in Ede South Local Government Area of Osun State, Nigeria.

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ABSTRACT

The study investigated the profitability of catfish enterprises in Ede South Local government area of Osun State, Nigeria. A total of 59 small scale catfish farmers were purposively sampled in this study. Descriptive analysis was used to analyse the socio-economic characteristics, while budgetary analysis was used to determine the profitability, and multiple regression analysis was the inferential statistic used. The result of the survey revealed that 54.24 percent of the fish farmers were male. About 81.3 percent of the fish farmers were married. 59.81% of the farmers fall between the ages of 31-40years. About 62.71 percent of the farmers had tertiary educational qualifications.Most of the fish farmer (39.1%) produced between 5,400 -10,500kg. The mean production of fish farmer was 5,750.85kg.The total variable cost was ₦24,623,997. The revenue was ₦252,000,000 per annum. The gross margin was ₦227,376,003 per annum and the net farm income was ₦189,589,795. The analysis of the benefit cost ratio (BCR) and the rate of returns revealed that catfish enterprise is profitable in the study area. The factors that significantly affect fish per annum output in the study area include: quantity of feed, quantity of labour, quantity of fingerlings, total pond size.

Introduction

Fish farming started in Nigeria over 40 years ago. The Nigerian government has recognized the importance of the fishery sub-sector and it has made several attempts over the years to increase their productivity through institutional reforms and the various economic measures. Some of these measures provided subsidy for inputs and exemption from tax for fishermen (Ekwegh, 2005). Despite the efforts of government, there is still a deficit in the supply and demand for fish by the population (Dada, 2004).

Most of the fish farming in Nigeria is carried out by small scale operators in small fresh water ponds. Despite the abundance fisheries resources and the relatively high consumption of fish in Nigeria that is the largest simple consumer of fish products in Africa (FDF, 2005; 2008), its domestic output of 0.62 million metric tonnes still falls short of demand of 2.66 million metric tonnes (FDF, 2008). A supply of deficit of 2.04 million metric tonnes is required to meet the ever increasing demand for fish in Nigeria. This large deficit between the demand and supply of fish is augmented by massive importation of frozen fish and consequently effect on the exchange earnings of the national economy as well as caput consumption 9.68kg/ head/year (FDF, 2008).

Nigeria is now a large importer of fish with official records indicating 681,000 metric tonnes while export in 2008 was 0.065 million metric tonnes and valued at US$40.5 million. The local supply consists of productions from the artisanal (89.5% - 85.5%), industrial (5% - 2.5%), and aquaculture (5.5% - 12.0%) sub-sectors (FDF, 2009).

The economically and nutritionally vital roles that fish farming play in the economy of Nigeria is expected to fuel researches in the areas of knowing the determinants of its yield performance. Though fish farming is a profitable venture with capacity for rapid expansion, its sustainability depends on careful planning and management (Raufu et. al,2009).Thus, the main objective of the study is to estimate the profitability of small scale catfish farmers in the study area. The specific objectives are to: describe the socio-economic characteristics of the small scale farmers in the study area; estimate the costs incurred and the revenue accruable to small scale fish farmers in the study area; analyse factors affecting the yield performance in small scale fish farming in the study area; identify the various constraints to small scale fish farming in the study area.

Literature Review

Fish culture is an efficient means of animal protein production. It provides essential nutrition for over one billion people, including at least 50 percent of animal protein for 400 million people from the poorest countries. The most reliable source of protein for many people in the developing economies is and must continue to be fish. Fish farming provides important services including supporting nutritional well-being, providing feedstock for the industrial sector, making contributions to rural development, increasing export opportunities, more effective administration of natural resources and conservation of biological diversity(WBG, 2011).

Greenfacts(2004) reported that fish farming is the fastest-growing animal based food production sector, particularly in the developing countries – mainly from China

and other Asian countries. Nigeria being one of the countries in Sub-Saharan Africa is endowed with great potential to attain sustainable fish production, viz-a-viz massive investment in aquaculture considering its extensive mangrove ecosystem (FAO, 2005). Fish farming provides important services including supporting nutritional well-being, providing feedstock for the industrial sector, making contributions to rural development, increasing export opportunities, more effective administration of natural resources and conservation of biological diversity (Dağtekin *et al.,* 2007).

According to Amiengheme (2005), the importance of fish as follows: Food fish has a nutrient profile superior to all terrestrial meats being an excellent source of high quality animal protein and highly digestible energy; Fish is a good source of sulphur & essential amino acids such as lysine, leucine, valine & arginine; It is highly suitable for supplementing diets of high carbohydrate content; It reduces the risk of sudden death from heart attacks and reduces rheumatism; It is highly recommended for adults; It decreases the risk of bowel cancer and reduces insulin resistance in skeletal muscles.

Methodology

Ede South is a Local Government Area in Osun State, Nigeria with its headquarters in Ede town. It has an area of 219 km² and a population of 76,035 at the 2006 census. The local government has an average annual rainfall of about 1000mm. Rainy season extend from 7-9 months, rain starts around March. The primary data collected for this study was input-output data collected from the study area comprising such information as socio– economic characteristics as well as on the input and output data of the respondents. Purposive sampling technique was used to select fish farmers from the list of the members of the fish farmers Association in Ede South Local Government Area of Osun State. The analytical tools that used to analyze the data are; Descriptive analysis to analyze the socio-economic characteristics of the respondent; Budgetary analysis was used to determine the profitability of the enterprise. It was done by estimating the total variable and fixed cost as well as total revenues to determine the net profit of an average small scale fish farmer; Multiple regression analysis used to analyse and explain the relationship between the dependent variable (fish yield) and the independent variables so as to obtain the major yield determinants.

The multiple regression analysis is stated in an implicit form as:

$Y=f(X_1, X_2, X_3, X_4, X_5)$

Where Y= yield (kg); X_1 = number of fingerlings; X_2 =labour quantity (in manday); X_3 = feed quantity; X_4 = pond size (m²)

Gross Margin Analysis

The Gross Margin (GM) was employed to estimate the overall gross margin per hectare of land and net farm income per hectare on the fish farms of the small scale fish farmers. The GM is specified as shown below:

$$GM_i = TR - TVC_i \qquad \dots\dots\dots\dots\dots\dots\dots\dots(1)$$
$$GM = PQ - \Sigma C_i X_i \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

Where, GM=Gross Margin; P=Price of fish / Kg; Q=Output of fish (Kg);
C_1=Price of fingerling (Naira); C_2= Cost of labour ;C_3=Cost of feed; C_4=Cost of pond

In order to calculate the GM for this study, inputs costs was valued at prices paid by the farmers or village market prices.

$$NFI = GM - TFC \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots(3.)$$

Where GM = Gross Margin, TR = Total Revenue, TVC = Total Variable Cost,

Results and Discussions
Socio-Economic characteristics of respondents
Sex

54.24 percent of the fish farmers were male while 45.76 percent were female. This implies that the fish enterprise is male dominated.

Age

81.84% of the catfish farmers were about 40 years of age while the rest 19.16% of them were above 41-50 years of age. This age bracket is a productive age which portends better future to fish production adoption.

Marital status

72.34 percent of the catfish farmers were married. This shows that most of the small scale fish farmers are settled family men and women with responsibilities. These responsibilities would likely make them willing to seek innovations so as to increase their income earning capacity and improve their standard of living.

Education Status

62.71 percent of the catfish farmers had tertiary education (HND/B. Sc holders and OND/NCE), 10.17 percent of them have secondary qualification which was regarded as an adequate level of education for an individual to read, write and understand agricultural instructions including extension services, management and technology adoption constraints.

Farm Household Size

Close examination of the variables related to household level showed that 17percent of the respondents a family size below 5, and 83percent of the respondents have a family size above 30. It observed here that the farmers have big family size and which could result to poverty.

Farm Experience

61.02 percent of the respondents were observed to have fish farming experience of between 3-4 years, while few (16.93%) of them had 5-8 years' experience. This implies that the farmers in the study area had experience in fish farming but there was indication that the technologies were very new in the last 7-10 years. The farmers are reasonably experienced in fish farming, this is evident in their 6.27 mean years of experience as fish farmers.

Type of Pond Used

66.10 percent of the respondents practice semi-intensive (concrete pond) culture system while only 33.90 percent practice extensive culture system. Thus, it could be said that the fishing systems in the study area are gradually moving away from the extensive (low production rate) culture system into more productive systems (semi-intensive system).

Species of Fish Cultured

91.53 percent of the farmers were practice monocultural farming their fish for an average period of six months.

Water Source

42.37 and 33.90 percent of the respondents sourced water from borehole and well water respectively. Only 1.69 percent of the respondents in the study area sourced water from streams/rivers. This may be due to the fact that Osun State is a city that is highly congested and most of the inhabitants dug well and drilled boreholes while some get water from government sources (Water Corporation).

Stocking rate

5.08 percent of the fish farmers stock below 120, 25.42 percent and 49.18percent of them stocks between 500-1000

and 1500-3000 respectively while 20.32percent stocks above 3500.

Primary Occupation

47.5% of the fish farmers interviewed claimed that farming was their primary occupation, which was in line with empirical evidence that majority of the rural dwellers engaged in agricultural production.

Quantity produced

16.9% of the respondents produce between 350kg – 2000kg per cultured period, (35.7%) of the respondent produce between 2500kg -5,000kg per cultured period, (39.1%) of respondent produced between 5400 -10500 while only (8.3%) percent produce 12,000kg -26000kg per cultured period. The mean production of the respondent was 5,150.75kg.

Analysis of Cost and Return

The result reveals that the cost of fingerlings accounted for the largest proportion (34.04%) of the total cost of fish production. This is followed by cost of feeds (86.24%).The lime cost and labour cost accounted for 0.79% and 0.72% of the total cost respectively. This clearly shows that large amount of money is spent by fish farmers in the study area for the purchase of fingerlings and feeds. The fixed cost of production consists of cost of fixed assets such as pump, vehicles, aerators and pond which accounted for 46.17% of total production cost. The total variable cost was ₦34,779.66. The revenue was ₦355,932.20. The gross margin was ₦321,152.55. Meanwhile, the net farm income was ₦267,782.20.

Analysis of Profitability Ratio

The rate of returns, 3.04, implies that for every one naira invested, ₦3.04 was gained and a gross revenue ratio of 0.25 indicates that for every N1.00 returns to fish farming enterprise, 25 kobo is being spent. Also, the expense structure ratio 0.61 shows that 61 percent of the total cost of small fish farming was made up of fixed cost items and a gross margin ratio of 1.41 further confirm that the business is profitable.

Regression Analysis

The regression analysis was carried out to examine the determinants of factors effecting fish output in the study area. Based on the econometric and statistical criterion, the Cobb-Douglas function was chosen as the lead equation. From the result, an adjusted R^2 values of 0. 9207 indicates that 92.07% of the explained variation in the quantity of fish output is explained by pond size, quantity of labour used, quantity of feed, and quantity of fingerlings while the rest 7.93% unexplained variation in the output of catfish is determined by other factors not considered. The result revealed that fish output is significantly and positively influenced by total pond sizes (at 5%), quantity labour used (at 1%), and quantity of fingerlings (at 1%). Though feed was not significant at any known levels of significance, it still had a positive relationship with the fish output and the reason for this is that as the fingerlings grows or matures the quantity of feed intake reduces as they reach the maturity threshold. The signs of coefficients of the independent variables are in line with the *a priori* expectation. Hence, the more the amount expended on labour, and feeds, the more the amount that will be realized from fish farms in the study area. The positive relationship between value of fish and pond size indicates that with increase in the size of fish pond, more fish will be produced. This is not surprising because all things being equal the quantity of fish produced is directly proportional to the pond size. Based on the significance of labour used at 5%, the null hypothesis that the fish output is not affected by the quantity of labour used is rejected and the alternative is accepted. The study revealed that there is a significant relationship between fish output and factor affecting fish production in the study area.

Table1. Descriptive Statistics of Socio-Economics of the Fish Farmers.

Characteristics	Frequency	%
Sex		
Male	32	54.24
Female	27	45.76
Age		
≤ 30	13	22.03
31- 40	30	59.81
41- 50	16	19.16
Marital Status		
Single	12	20.34
Married	43	72.34
Widowed	2	3.39
Divorced	2	3.39
Educational Status		
Non-formal	11	18.83
Education		
Primary	5	8.47
Secondary	6	10.17
Tertiary	37	62.71
Household Size		
≤ 5	10	17
6 - 10	49	83
Years of Experience		
3- 4	36	61.02
5-8	10	16.93
9- 10	13	22.02
Pond Type		
Concrete	20	33.90
Earthen	39	66.10
Fish Culture		
Monoculture	54	91.53
Polyculture	5	8.47
Water Source		
Tap	8	13.56
Borehole	25	42.37
Public water	5	8.47
Natural (river)	1	1.69
Well	20	33.90
Average Stocking Rate Per Pond		
≤ 1000	15	30.50
1001 – 3000	32	49.18
≥ 3001	12	20.32
Primary Occupation		
Farming	28	47.5
Civil Service	23	39
Trading	8	13.6
Quantity of Fish Produced		
350-2000	10	16.9
2500-5000	12	35.7
5400-10500	23	39.1
12000-26000	14	8.3

Constraints affecting small scale catfish farming

The various factors affecting output of catfish farming in Ede south local government in Osun State, according to their degree of severity are discussed here. 13%of the catfish farmers reported that access to appropriate farming land was a problem.

15.3% of the catfish farmers said that lack of market was a serious problem. 55.9% of the catfish farmers considered non-availability of credit facilities such as micro-credits for the purchase of inputs as a serious problem. This implies that getting credits for catfish farming business was difficult making farmers to join cooperative society. 72.9% of the catfish farmers reported that fisheries infrastructural were not adequate established fish farming system. 55.9% and 54.2% of the catfish farmers reported that inadequate follow up of extension advice on establishment of storage facilities and distance of the extension workers' office in term of road network (to the farm locations was a not a very serious problem hindering output yield of fishing farm in the study area. This implies that the farmers were early improved in the production of their fishing farm. 72.9% of the catfish farmers reported that lacks of infrastructural facilities was a very 59.3% of them reported lack of experience as not a serious constraint in catfish production in the study serious factors affecting the output yield of fish farming in the study area. 45.8% of the catfish farmer considered environmental pollution as a not very serious a problem and area.

Table 2. Average cost and return of fish production.

Variable(Annual)	Amount (#)	% of total cost
Revenue		
Fish	355,932.20	
Feeds	26,795.90	86.24
Lime	121.33	0.79
Fingerlings	2,722.99	34.04
Labour(manday)	1,216.10	0.72
Transport	340.84	
Total variable cost	34,779.66	
Fixed inputs(pond and equipment)	52,403.96	
Depreciation (pond and equipment)	1966.40	
Total Fixed cost	54,370.35	
Total cost	89,150.00	
Gross margin	321,152.54	
Net Farm Income	266,782.20	
Profit	266,782.20	

Source: Data Analysis, 2014

Table 3.Profitability Ratio.

Ratio	Value
Benefit Cost Ratio	4.04
Rate of Return	3.04
Expense Structure Ratio	0.61
Gross Revenue Ratio	0.25
Gross Margin Ratio	1.41

Table 4.The regression result of the determinants of fish output in the study area.

Variable	Coefficient	Beta	T	Significant
Constant	22592.87	0.232	-11.84	0.000
LnFeedqty	341.73	141.21	1.21	0.232
LnLabourqty	2330.28	1401.19	5.03	0.000*
LnFingerlingqty	1504.14	790.77	4.23	0.001*
LnPond size	560.71	121.22	2.56	0.013**

Adjusted R^2 = 92.07percent

* and **: statistically significant at 1 and 5 percent levels of Significance respectively.

Summary,conclusions and recommendations

The result of the survey revealed that the fish enterprise in the study area is male dominated. A greater proportion of the fish farmers were married, within the active productive age range and with high literacy level. The fish farmers were small-scale based on their production outputs.

Table 5. Constraint To Small Scale Fish Farming .

Problem Encountered	Severity					
	Serious Freq %		Mild Freq %		Not a constraint Freq %	
Land availability	13	22	6	10.2	40	67.8
Lack of funds/credit	33	55.9	20	33.9	6	10.2
poor storage facilities	17	28.8	33	55.9	9	15.3
poor road network	21	35.6	32	54.2	6	10.2
Lack of market	9	15.3	22	37.3	28	47.5
Lack of technical knowledge	10	16.9	20	33.9	29	49.2
Lack of experience	5	8.5	19	32.2	35	59.3
Inadequate of infrastructural	6	10.2	43	72.3	10	16.9
Environmental pollution	14	23.7	27	45.8	18	30.5

Source: Data Analysis, 2014

The system of fishing here is semi-intensive culture system with many of them sourcing for water from borehole and well water respectively. Fish farming is a predominant occupation in the study area, being a sustainable means of livelihood.Fish farming is profitable in the study area. The determinants of yield performance of fish in the study area include feed quantity, labour quantity, fingerlings quantity, total pond size. Feed quantity, labour quantity, fingerlings quantity and total pond size were all significant at one percent level of significance, and had positive relationship with output of fish.

It is therefore recommended that females be encouraged to participate in fish farming in the area as a means of augmenting their income and improve their standard of living. Fish farmers should be organized into formidable groups such as cooperative to enjoy economies of scale in the purchase of inputs and sale of output. The formation of the cooperative should also be done towards ensuring labour availability.

References

Amienghem P. The importance of fish in human nutrition. A paper delivered at a fish Culture forum, Federal Department of fish farmers Abuja.2005.

Article base. Fishing an Nigeria's 2020goals. 2011 http:// wwwarticlebase.com/enterprenurslisp.articles/fishing-and-nigeria's-2020-goals 3015104.html.articlebaseSC#30155104

Dada R.V."Profitability of Artisanal Fish Farming in Badagry Local Government Area of Lagos State."Unpublished B.Tech.Thesis, Ladoke Akintola University of Technology, Ogbomosho, Oyo State.2004.

Dağtekin M., Ak, O.,Emeksiz F. Socio-economic analysis and marketing patterns of the fish farming industry Trabzon in,Turkey.2007 www.fao.org/docrep/012/i1373e92.pdf.

EkweghK.R.."Fish for all."A Report of a Study for New Pond Journal.2005: 6-7.

FDF. Fisheries Statistics of Nigeria. Fourth edition, 1995-2007, Nigeria.2008: 48pp.

FDF. Fisheries Development in Nigeria; the Current Challenges. Paper presented by the Honourable of State for Agriculture to the Fisheries Society of Nigeria (FISON), Lagos State. 2009: 23pp

Food and Agricultural Organisation. Fisheries management in the Federal Republic of Nigeria. 2006. www.fao.org/fi/fcp/en/NGA/body, retrieved on January 13, 2006.

Food and Agricultural Organisation: Increasing the contribution of small scale fisheries to poverty allocation.2005

Green facts. World fisheries production.2004. www.greenfacts.org/fisheries/o4-utilization.htm,

Raufu M.O., Adepoju A.A., Salau A.S., Adebiyi O.A. Determinant of Yield Performance in Small Scale Farming in Alimosho L.G.A of Lagos State.2009.

WBG. The Global Program on Fisheries: Strategic Vision for Fisheries and Aquaculture.

Agricultural and Rural Development Department, the World Bank Group. Washington DC. 2011.