Yield Determinants among Catfish Farmers in Epe Local Government Area of Lagos State, Nigeria

Adeleke, H.M., Adeleke, O.A., Fajobi, O.D., and Ejiniran, T.

Department of Agricultural Economics, Ladoke Akintola University of Technology, P.M.B 4000, Ogbomoso, Oyo State.

ABSTRACT

This paper investigated yield determinants among catfish farmers in Epe Local Government Area of Lagos State. A total of 65 catfish farmers were purposively selected for the study. The analytical technique employed include: Descriptive Analysis, Budgetary Analysis and Multiple Regression Analysis. Descriptive analysis was used to analyse the socio-economic characteristics; Budgetary Analysis was used to determine the profitability of the enterprise; and Multiple Regression Analysis was used to analyse the determinants of catfish yield in the study area. The various profitability ratios such as Expense Structure Ratio (0.76), Benefit Cost Ratio (3.13), Gross Revenue Ratio (0.45)and Rate of Return (0.96)indicated that catfish farming enterprise is profitable in the study area. The factors that significantly affect catfish output in the study area are: quantity of feed, quantity of labour, quantity of fingerlings and total pond size. Quantity of labour, quantity of fingerlings and total pond size had positive relationship with output of fish, while quantity of feed had an inverse relationship with yield output of catfish.

Introduction

Fish accounts for about one fifth of the world total supply of annual protein and thus has risen five folds over the last forty years from 20 million metric tonnes to 150 million metric tonnes (FAO,2006). Anthonio and Akinwumi (2002) declared that 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. Fisheries products represented a major source of export revenue for developing countries, amounting to over US $ 20 billion per annum in late 1990s.This estimate exceeded the values obtained from the combined exports of meat, dairy, cereals, vegetables, fruit, sugar, coffee, tobacco and oilseeds in 1997 from the developing countries (International Trade Centre, 2002, FAO,2002).

According to Anoop *et al*., (2009), fish farming provides food for thepopulace, it allows for improved protein nutrition because it has a high biological value in terms high protein retention inthe body, higher protein assimilation as compared to other protein sources, low cholesterol content and one of the safestsources of animal protein.Many species of fish are farm produced all over the world, but Catfish is taking the lead because of its uniqueness.

Vanguard(2009) reported that the demand for Catfish in Nigeria is unprecedented so much so that no matter the quantity supplied into the market, itwould be consumed by ready buyers. This is so because of its low caloric value, low carbohydrate content, high in protein, low in fat, it is quick and easy to prepare and above all, it tastes great.

In Nigeria, the interest in fish farming has significantly increased over the years due to the awareness of its importance as a sustainable means of livelihood to individuals and the economy at large, as well as its nutritional and dietary advantages being a good source of animal protein.Despite the efforts of government, there is still a deficit in the supply and demand for fish by the population (Dada, 2004). Currently, domestic fish production is put at 551,700 metric tonnes as against the present national demand of about 1.5 million metric tonnes estimated for 2007 (Osawe, 2007). The shortfall is said to be bridged by the importation of 680,000 metric tonnes annually consuming about N 50 billion in foreign exchange (Odukwe, 2007). It has been asserted by Adediran (2002) and Ugwumba (2005) that the only way of boosting fish production and thereby move the country towards self-sufficiency in fish production is by embarking on fish farming. Thus, the main objective of the study is to investigate the determinants of yield in catfishfarming in Epe local government area of Lagos state. To achieve the general objective, the following specific objectives were considered: (1) Describe the socio-economic characteristics of the catfish farmers in the study area; (2) Estimate the costs incurred and the revenue accruable to catfishfish farmers in the study area; (3) Analyse factors affecting the yield in catfishfarming in the study area.

Literature review

It has been reported that global expansion in aquaculture production is a possible panacea to dwindling catches from the over-tasked wild fisheries sector (Mafimisebi and Okunmadewa,2006a).

Dada(2003) stated that Nigeria's total fish production from all sources is at present put at 0.55 million metric tons (mt) annually while the current fish demand is about 1.5 million metric tons (mt) per annum leaving a deficit of about 1million metric tons (mt) which will cost about $1.6 billion annually to import.

The report of Musa et. al., 2005; FAO, 2007; and Ajani and Nwanna, 2010 revealed that Nigeria has extensive areas of both mangrove and freshwater grounds suitable for raising fish. It has been estimated that if only 30-35% of the available mangrove areas suitable for aquaculture is fully harnessed, there is the potential to produce 2.5 million metric tons (mt) of fish annually which will both satisfy domestic demand and make Nigeria a fish exporting nation. Delgado et. al, (2003)and Mafimisebi, 2007 further noted that farm-raised fish now accounts for a considerable and rising proportion of total fish consumed in Nigeria and other developing countries. Musa et. al.(2005)and Mafimisebi(2007) attested that in Nigeria, the proportion of domestic fish production emanating from aquaculture has moved from about 0.5% in the 1980s to 2.5% in the 1990s and to 6.0% by year 2004.

An estimated ninety per cent (90%) of the 38 million people recorded by FAO globally as fishers and fish farmers are classified as small – scale fish farmers. An additional more than 100 million people are estimated to be employed in other fisheries associated occupations, particularly in processing and trading, bringing the total estimated directly or indirectly employed in small – scale fisheries and aquaculture about 135 million in 2002 (FAO, 2004).Fish culture in Nigeria is still at infancy and fish farming from the small scale sector has not reached its potential (Ilawole,2005). The involvement of small scale aquaculture projects in the towns and villages will create employment and thereby alleviate poverty among our youths.

Emokaroet. al, (2010) reported that catfish production is important to the Nigerian economy since it serves as a source of income, reduces the rate of unemployment in the economy as well as increases the nation's Gross Domestic Product (GDP). In most countries it fetches a higherprice than tilapia as it can be sold live at the market as it has a market value that is twice or thrice the price of tilapia (Adebayo and Daramola, 2013). According to Olagunju, *et al.*, (2007), it requires less space, time, money and has a higher feedconserving rate.The importance of catfish itself cannot be overemphasized.

Materials and methods

The study was carried out in Epe Local Government area of Lagos state. The study area is located on a little island 30 to 60 meters high above the sea level. The economy of Epe since the earlier period expends on three factors, which are, agricultural production, fishing and some manufacturing industries. 70% of people in Epe are either farmers or fishermen. Purposive sampling technique was used to select catfish farmers in the study area. The sample frame rate was obtained from the fish farmers Association. In all 65 fish farmers were randomly selected. The data was collected through the use of structured questionnaire. Information collected were input – output data as well as those on the socioeconomic characteristics of the farmers. These include fish farming experience, age and formal education level of respondents, primary occupation, and family size of the respondents, years of experience, yield output of catfish, variable input costs and output prices, fixed inputs,

constraints faced in fish farming, among others. The data were analysed using Descriptive Statistics, Gross Margin Analysis and Multiple Regression Analysis. The Gross Margin Analysiswas used estimate the costs and return to the catfish farmers and to estimate the profitability of the enterprise. The GM was specified as shown below:

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

Where, GM=Gross Margin; TR = Total Revenue;

TVC =Total Variable cost;

P=Price of fish (Naira); Q=Output/Quantity of fish (Kg); C_1= Cost of feed/kg;C_2= Cost of labour/ manday; C_3= Cost of fuel; C_4= Cost of transportation; C_5= Cost of fingerlings

In order to calculate the Gross margin inputs costs were valued at the average market prices. The Net farm income was also calculated using;

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

Where GM = Gross Margin, NFI = Net Farm Income, TFC = Total Fixed Cost.

Multiple regression analysis was used to analyse the relationship between the output of catfishproduced and the factors affecting fish production in the study area.

The Cobb Douglas functional form employed is specified as:

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4$$

Where

X_1= quantity of feed (kg)

X_2 = quantity of labour (manday)

X_3 = quantity of fingerlings (kg)

X_4 = total pond size (sqm)

Results and discussions

Sex

most (78.46%) of the catfish farmers were male while the rest 21.54% were female. By implication, fish farming enterprise is male dominated and this may be due to easy access to land and other inputs, as well as loans from micro-finance banks.

Age

Most (77.47%) of the catfish farmers were about 50 years of age. The productive age of the catfish farmers is between 41-50 years of age. Most of the catfish farmers were still in their productive age, they will be able to dissipate their human energies on their catfish farms, hence better supervision of their catfish enterprises as well as better outputs.

Marital status

Majority (69.23%) of the catfish farmers in the study area were married; 7.69% were singles; 15.38% were divorced; 7.69% were widowed. Most of the households will enjoy the luxury of family labour and reduce costs incurred on hired labour hence better profit margin.

Family size

Most (81.54%) of the catfish farmers had household size of more than 5 members; hence there will be adequate supply of family labour and efficiency of farm operations over those with smaller household sizes.

Primary occupation

Majority (98.46%) of the catfish farmers were primarily into other activities apart from catfish farming, this could be as a result of economic situations and government policies that does not encourage small scale fish farming.

Educational level

Most (93.84%) of the catfish farmers had one form of education or the other, It can be seen that the literacy level of

the farmers in the study area is very high. Hence they will be able to understand and adopt innovations as well as viable agricultural practices.

Fish farming experience

Most of the catfish farmers (56.93%) had farming experience of more than 6 years. This revealed that most of the farmers in the area are well experienced in fish farming and as such they will be able to manage the items of risks and uncertainties that may attend their ways while in produc

Source of water

32.31% of the catfish farmers sourced water from boreholes while the majority (67.69) sourced from natural sources. This may be due to the fact that Lagos State is a city surrounded with water and Epe especially has natural water sources in abundance.

Labour utilization

50.77% of the catfish farmers make use of family labour, 23.08% employed hired labour on the farm while 26.15% use both family and hired labour. This could be due to the fact that family labour is cheaper when compared to hired labour.

Pond size

Most of the catfish farmers have pond sizes of more than 100 sqm. This depends on the stocking rate of each farmer.

Variable costs

The cost of variable inputs incurred by most catfish farmers in the study area is more than ₦200,000, but is expected that the cost incurred depends on the quantity of fish produced by each farmer, as well as maximization of profit.

Total fixed cost

About 47.74% of the catfish farmers in the study area spend more than ₦10,000 on fixed cost, it is observed that construction of pond accounted for the highest fixed cost and due to the low useful life of other fixed assets.

Table1.Descriptive Statistics of Socio-Economic Characteristics of the Catfish Farmers.

Characteristics	Frequency	%
Sex		
Male	51	78.46
Female	14	21.54
Age		
20-40	31	47.69
41-50	20	30.78
51-60	12	18.48
≥61	2	3.08
Marital status		
Single	5	7.69
Married	45	69.23
Divorced	10	15.38
Widower	5	7.69
Household size		
≤5	11	16.93
6-10	53	81.54
≥11	1	1.54
Primary occupation		
Fishing	1	1.54
Civil servant	21	32.31
Trading	15	23.08
Others	28	43.08
Farming experience		
≤10	50	76.93
11-15	11	16.92
≥16	4	6.16
Educational level		
No formal education	4	6.15
Primary education	12	18.46
Secondary education	30	46.15
Tertiary education	19	29.23
Labour source		
Family	33	50.77
Hired	15	23.08
Both	17	26.15
Revenue (₦)		
500000	4	6.16
500001-1000000	9	13.86
≥1000001	52	80.08
Variable costs (₦)		
≤100,000	3	4.62
100100-200000	18	27.72
200001-300000	24	36.92
300001-400000	5	7.7
400001-500000	4	6.16
≥500001	11	16.93
Pond size(sqm)		
≤100	21	32.30
≥101	44	67.70

The profitability of catfish enterprise in the study area has been estimated with the use of ratio analysis such as:

Expense Structure ratio = Fixed cost/Total cost
=24,493.53/320,558.50 = 0.076

Benefit cost ratio (BCR) = Total revenue/ Total cost
=1,005,273.10/320,558.50 = 3.13

Gross Revenue Ratio(GRR)=TFE/GI
=320,558.50/709,208.13 = 0.45

Where, TFE = Total farm expenses and GI = Gross income.

Rate of Return = Net return/ Total cost =
684,714.6/ 709,208.13 = 0.96

Table 2.Budgetary Analysis.

Variable	Amount (₦)
Total variable cost	296,064.97
Total fixed cost	24,493.53
Total cost	320,558.50
Total revenue	1,005,273.1
Gross margin	709,208.13
Net farm income	684,714.6

Source: Field survey, 2014

Profitability ratios

Expense Structure Ratio (ESR): The ESR value is 0.076 which means that the fixed cost accounted for 7.6% of the total cost incurred.

Benefit Cost Ratio (BCR): The BCR Value of 3.13 shows that catfish production is profitable and worth venturing into. The value of 3.13 simply means that every ₦1.00 invested in catfish enterprise will yield ₦ 3.13.

Gross Revenue Ratio: The ratio 0.45 implies that from every ₦1.00 returns to the enterprise, 45k is spent.

Rate of Return (ROR): The rate of returns in fish production in the study area is 0.96. This shows that for every N1.00invested, 96 kobo is gained by the respondent.

Thus based on the profitability ratios calculated above, catfish farming is profitable in the study area.

The regression result from based on the Cobb Douglas function, which was chosen as the lead equation, is stated as follows:

$LnY=0.9246-0.1766LnX_1{}^{**}+0.4300^*+0.6822LnX_3{}^*+0.1885 LnX_4{}^*$
 (-2.56)   (4.03)   (7.96)   (3.68)

Where * = 1% level of significance

**=5% level of significance Adjusted, R^2 = 93.09%

The adjusted R square of 0.9309, it indicates that 93.09 percent of the explained variation in the output of catfish is

due to the joint effects of all the production variables included in the model while the remaining 6.91% unexplained variation in the output of catfish may be due to certain variables of interest not specified in the model, but are present in the error term.Some of the parameter estimates were significant at different levels. Labour quantity, fingerlings quantity and total pond size were all significant at 1% level of significance and had direct (positive) relationship with the output of fish while quantity of feed was significant at 5% level of significance and had an inverse (negative) relationship with the output of fish produced in the study area. The negative but significant relationship of feed quantity with the output of catfish may be due to the feeding pattern of catfish which tends to show a fall in quantity of feed intake as they mature to market weight and size.

Summary, conclusions and recommendations

In conclusion, catfish farming enterprise in the study area is male dominated. 77.47% of the catfishfarmers were about 50 years of age and the productive age of the catfishfarmers is between 41-50 years of age. 69.23% of the catfish farmers in the study area were married. 81.54% of the catfishfarmers had household size of more than 5 members. 32.31% of the catfish farmers sourced water from boreholes while 67.69 % of them sourced from natural sources. 50.77% of the catfish farmers make use of family labour, 23.08% employed hired labour on the farm while 26.15% use both family and hired labour. Most of the catfishfish farmers have pond sizes of more than 100 sqm depending on the stocking rate of the farmers.

The cost of variable inputs incurred by most catfish farmers in the study area is more than ₦200,000. About 47.74% of the catfish farmers in the study area spend more than ₦10,000 on fixed cost.The total variable cost and total fixed cost represent 92.5 percent and 7.5 percent of the total cost of production respectively in the catfish enterprise in the study area.The gross margin of ₦709,208.13 and a net farm income of ₦684,714.60 indicate that catfish farming is profitable in the study area. 93.09 percent of the explained variation in the output of catfish is due to the joint effects of all the production variables included in the model. Some of the parameter estimates were significant at different levels. The factors that significantly affect catfish output in the study area are: quantity of feed, quantity of labour, quantity of fingerlings and total pond size. Quantity of labour, quantity of fingerlings and total pond size had positive relationship with output of fish, while quantity of feed had an inverse relationship with yield output of catfish.

The recommendations based on the major findings of the study include:
- Female should be encouraged to come into catfish production in the study area as a way to supplement their open sea fishing activities.
- Catfish farmers should increase their scale of production by sourcing for capital from micro-finance and commercial banks that loan money to small and medium scale enterprises.
- The catfish farmers through their association should develop a plan to source for their production inputs in bulk as a way to reduce their variable cost of production.

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