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Production Analysis of Catfish Farming In Epe Local Government Area of Lagos State, Nigeria

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Abstract

Production of fish has not been able to meet the ever increasing demand. This study examined the productivity of small-scale catfish production in Epe LGA Lagos State, Nigeria. Primary data were obtained from 50 respondents drawn from five communities using simple random technique. Data were analysed using descriptive statistics, elasticity of and multiple regression technique. Regression analysis was employed to determine the relationship between output and input. Using the data obtained, four functional forms was tried and the semi-logged functional form best fit the data based on F-value, R^2 and the number of significant variables is statistically significant at 1% and the result of the adjusted R^2shows that 83% of the variation in output was explained by the independent variables included in the model. The t-statistics indicated that rent on land, stocking density, cost of fingerlings and transportation costs were significant in influencing output, although salaries and wages showed a negative significant relationship. However, despite high cost of feed, it influenced on output was not statistically significant, which was as a result of using local feeds in addition to manufactured fish feeds in order to reduce cost of feeding. Farmers should reduce the cost incurred on salary and wages by reducing the number of labourer on the farm.

***Key words**: Catfish, Profitability, Productivity*

Introduction

Fish is man's most important single source of high quality protein (Ohen and Abang, 2007), providing about 16% of animal protein consumed by the world's population (Food and Agriculture Organization, FAO, 1997). It provides 40% of the dietary intake of animal protein of the average Nigerian (Federal Department of Fisheries, FDF, 1997). Fisheries occupy a unique position in the agricultural sector of the Nigerian economy (Kudi *et al*., 2008). The contribution of the fishery sub-sector to the Gross Domestic Product (GDP) of Nigeria at 2001 current factor cost rose from 76.76 billion Naira to 162.61 billion Naira in 2005 (Central Bank of Nigeria, CBN, 2005). Catfish is highly nourishing. It contains lysine as well as vitamin A that is necessary for healthy growth. It contains some quantities of calcium, phosphorus, fat and other nutrients needed for human growth and health (FAO, 2003). Catfish is 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 supply of catfish. This 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)

The production of this fish as an economic resource is undertaken by a large number of people especially the small-scale farmers in Nigeria (Oladejo *et al*., 2010). Presently, Nigeria produces 1.7m metric tonnes of fish annually (Abba, 2012). Regrettably, Nigeria has been one of the largest importers of fish in the developing world, importing some 600,000 metric ton annually to solve the country's high demand for fish (Olagunju *et al.*, 2007).

Therefore, increasing fish production in Nigeria requires embarking on pond fish farming. This has prompted the Federal Government of Nigeria to package the Presidential Initiative on fisheries and aquaculture development in 2003 to provide financial and technical assistance to government programmes and projects encouraging fish production (Ugwumba and Chukwuji, 2010). Regardless these efforts of Government, fish production has remained low in Nigeria (Ugwumba and Chukwuji, 2010). This has been attributed to inadequate supplies from the local fish farmers due to the use of poor quality fish seeds, inadequate information, high cost of feeds, traditional techniques, small size of holdings, inefficiency in resource use, poor infrastructural facilities, lack of credit, high cost of industrial feed, lack of extension agents, lack of veterinary doctors and lack of fish production equipment and low capital investment (Adeogun *et al.*, 2007; Inoni, 2007; Ugwumba and Nnabuife, 2008; Adinya and Ikpi, 2008; Ugwumba and Chukwuji, 2010; Adinya *et al.*, 2011; Madubuike, 2012). Based on the foregoing this study examined the profitability and productivity of small scale catfish farming in Epe Local government area of Lagos State.The specific objectives are to:

1. describe the socio economic characteristics of catfish farmers in the study area
2. estimate factors affecting the output of catfish in the study area.
3. estimate productivity in catfish production in the study area
4. identify the challenges faced by catfish farmers in the area

Methodology

Area of study

The study was conducted in Epe Local government area of Lagos. It lies approximately 40km north of Lagos State and it is located longitude 20^0 0^1 and 40^0 30^1 and latitude 6^0 20^1 and 6^0 40^1 of the equator. Epe town and port in Lagos State, south-western Nigeria lies in the north bank of the Lagos lagoon and has road connection to Ijebu Ode and Ikorodu. A traditional settlement of the Ijebu people (a sub group of the Yoruba). It was established by the 18^{th} century as the chief port. Fishing is the occupation.2006 population census estimated them to be 181,409. Conveniently, it can be concluded that Epe local government Area of Lagos state is one of the major areas where Lagos state

get her food supply due to different agricultural practices like crop production, livestock production and fisheries which are the order of the day in the local government area.

Method of data collection

Primary data was used for this study. Multistage sampling technique was adopted in choosing respondents for the study. The first stage involved the purposive selection of Epe Local Government Area (LGA) because of the preponderance of catfish production enterprises in the area. The second stage involves random sampling of five (5) communities from the (LGA) and the third stage; ten respondents were randomly selected from each of the villages, giving a total of 50 respondents (i.e 5× 10).

Method of data analysis Descriptive statistics, including frequency counts, mean and percentages were used to describe the socio economic characteristics (age, family size, farm size), and the challenges faced by selected cat fish farmers in the study area. The Ordinary Least Square (OLS) multiple regression technique was used to identify factors affecting output.

The Regression Model

The implicit form of the regression model for this analysis was given as:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 X_{10} e_1)$----------(1)

Four functional forms were fitted to the data and the one adjudged to be the best based on the normal economic, econometric and statistical criteria were used for further analysis.

The explicit form of the models to be fitted to the data are specified as follows

(1) Linear

$Y = bo + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 b_{10}X_{10} + e$----------(2)

(2) Cobb Douglas (double – log)

$\ln Y = \ln bo + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + b_8 \ln X_8 + b_9 \ln X_9 + b_{10} \ln X_{10} + e$---------- (3)

(3) Exponential

$\ln Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + e$----------(4)

(4)Semi logarithmic

$= \ln b_0 + b \ln X1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + b_8 \ln X_8 + b_9 \ln X_9 + b_{10} \ln X_{10} + e$-- (5)

Y=output of fish in (kg)

X_1=Rent on land (₦) ; X_2=Stocking density (No of fish in/m^2)

X_3=Pond size (m^2) ; X_4=Cost of fingerlings (₦); X_5=Feed cost (₦)

X_6=Cost of veterinary services and drugs (₦); X_7=Transportation cost (₦)

X_8=Level of education (No of years spent in school);

X_9=Years of experience (Number); X_{10}=Salaries and wages (₦)
Furthermore, elasticity of production (Ep) and return to scale was estimated using

$$\sum^{k} Epx_i = RTS$$

Results and Discussion

Table 1: Socio- economic Characteristics of Respondents

Characteristics	Frequency	Percentage
Gender		
Male	45	90
Female	5	10
Age		
20-30	18	36.0
31-40	23	46.0
41-50	9	18.0
Mean =34		
Marital Status		
Single	12	24.0
Married	38	76.0
Household Size		
1-3	16	32.0
4-6	27	54.0
7-9	7	14.0
Total	50	100.0
Mean=2.00		
Educational Level		
No formal education	13	26.6
Primary	10	20.0
Secondary	17	34.0
Tertiary	10	20.0
Mode of Fishing		
Part time	31	62.0
Full time	19	38.0
Total	**50**	**100.0**

Source: Field Survey 2013

The results from table 1 revealed that majority (90%) of the catfish farmers are male, this is in agreement with the findings Ezike and Adedeji (2010) and Ume et al; (2013 in which they found that majority of catfish farmers in Ondo and Anambra States respectively were male. The mean age of catfish farmers was 34years, this means that

they are young and could easily adapt to new techniques for production. Majority (76%) are married with household size of 4-6 persons. The table further revealed that majority (73.4%) have formal education at different levels. Majority of them (62%) are part time fish farmers, which implies that they have other means of livelihood.

Table 2: Regression Estimates Showing Factors Affecting Output of Catfish.

Variable	Linear	Double Log	Semilog	Exponential
Constant	-36.948	-3.504	-20861.493	6.600
	(-0.086)	(-1.208)	(-4.451)***	(12.488)***
Rent on Land	0.028	0.089	219.008	1.279E-5
	(1.446)	(1.280)	(1.940)*	(0.536)
Stocking density	0.640	0.387	1951.242	5.341E-5
	(6.982)***	1.697*	(5.296)***	(0.476)
Pond rent cost	-0.12	-0.134	-515000	6.693E-5
	(-0.50)	(-0.378)	(-0.897)	(0.230)
Cost of fingerlings	0.007	0.569	335.298	1.093E-5
	(1.586)	(4.575)***	(1.670)*	(2.174)**
Feed Cost	0.001	0.132	316.502	8.051E-7
	(2.295)**	(0.700)	(1.040)	(0.843)
Cost of drugs	0.019	0.013	55.564	5.769E-6
	(0.412)	(0.255)	(0.697)	(0.101)
Transportation cost	0.037	0.150	507.016	1.582E-5
	(2.439)**	(1.438)	(3.008)***	(0.843)
Level of Education	-121.075	0.019	-2.319	- 0.090
	(-1.427)	(0.113)	(0.009)**	(-0.871)
Years of experience	-47.144	(0.450)	19.705	-0.10
	(-0.619)	-0.87	(0.067)	(-0.110)
Salaries and wages	-0.108	-0.087	-288.800	-7.665E-5
	(-0.108)	(-1.119)	(-2.294)*	(0.276)
R^2	0.940	0.775	0.865	0.607
R^2adj	0.924	0.717	0.830	0.507
F-ratio	60.602***	13.415***	24.907***	6.032***

Source: Field survey 2013
Note*,** and ***implies statistically significant at 1%,5% and 10% respectively
Figures in parenthesis are the respective t-values

Result presented on Table 2 indicates that the lead equation is the semi-log functional form based on the normal statistical criteria. The semi-log function was therefore used for further discussion. It has an R^2 value of 0.830 which implies that about 83% of the variation in output of fish (Y) is explained by variables X_1-X_{10} included in the model while the remaining 17% is as a result of non- inclusion of some important explanatory

variables as well as errors in the estimation. The F-ratio (24.907) is statistically significant at 1%, this implies that the explanatory variables adequately explained the model.

Out of the 10 variables included in the model, only 5 namely rent on land, stocking density, cost of fingerlings, transportation cost, and salaries and wages were statistically significant at explaining the output of fish. The rent on land (X_1) has an estimated regression coefficient of 219.008 which is positive and statistically significant at 10%. This implies that the rent on land has a positive and statistically significant relationship with return on catfish. This suggests that as more money is expended on renting more land for catfish production, the more the output of fish in the study area.

The stocking density (X_2) is positive and statistically significant at 1% level. It implies that the more fingerlings stocked the more the output and the more returns will be realized. The cost of fingerlings (X_4) has an estimated regression co-efficient is 335.298 which is positive and statistically significant at 10%. This implies that the cost of fingerlings has a positive and statistically significant relationship with receipt/return from catfish production. This suggests that as more money is expended on purchase of fingerlings, the more the output of fish in the study area.

The co-efficient with respect to transportation cost (X_7) is 507.016 which is positive and statistically significant at 5% level. It implies that there is a positive statistical significant relationship between transportation cost and output. As more money is spent to transport catfish, more returns are realized.

The salaries and wages (X_{10}) have an estimated regression coefficient of -288.800 which is negative and statistically significant at 10%. This implies that the salaries and wages have a negative and statistically significant relationship with receipt/returns on catfish. This suggests that if more money is expended on salaries and wages for catfish production, it reduces the output of catfish in the study area.

Table 3: Marginal Value Product, Unit Cost of Each Resource, Elasticity of Production and Return to Scale (RTS)

Resource	MPP	Unit price of input(₦)	MVP	MFC	Elasticities
Rent on land	0.0199	18,333	364.826	18,333	0.684
Stocking Density	1.5196	1284	1951.1664	1,284	6.099
Cost of fingerlings	26.07	12.86	335.260	12.86	1.048
Transportation	0.059	8528.57	503.185	8528.57	1.584
Salaries and Wages	-0.33	872.2	-287.826	872.2	-0.902
Return to scale					8.5131

Source: Field survey 2013

The result in Table 3 shows that rent on land has a positive but less than unity elasticity indicating a decreasing positive returns to each of the factors. It is therefore efficiently utilized and hence its use is in stage II (i.e the rational zone) of the production function. Stocking density, cost of fingerlings, transportation, have positive but more than unity elasticity indicating an increasing positive returns to each of the factors. It is therefore not efficiently utilized and hence in its stage I of the production function. However, salaries and wages have a negative and less than unity elasticity indicating that it is in stage III of the production function. The return to scale (RTS) estimated 8.5131 shows that catfish farming is in stage I of the production function, an indication that if all inputs are efficiently utilized more output could be realised.

Challenges of small Scale Catfish Farming

Table 4: Challenges Faced by Small Scale Catfish Farmers

Challenges	Frequency*	Percentage
High cost of feed	50	100
Lack of modern technology	50	100
Lack of capital	34	68
High cost of transportation	34	68
Scarcity of seeds(fingerlings)	26	52
Lack of Land	17	34
Poaching	15	30
Mortality of fish	11	22
Poor storage facilities	11	22
High cost of labour	7	14
Total	255*	510

Note * implies that multiple responses

The more pressing challenge militating against small-scale catfish farming is high cost of feed and lack of modern production facilities. Other challenges are lack of capital, high cost of transportation, while high cost of labour is the least challenge the farmers encounter.

Conclusion/Recommendations

The study shows that catfish farming is male dominated and carried out by the youths. The study further revealed that rent on land, stocking density, cost of fingerlings and transportation cost has a positive influence on profitability of catfish farming. While salaries and wages of farm labourers does not significantly influence output of catfish

enterprise. The major constraint encountered in catfish production was high cost of feeds. Based on these findings the following recommendations were made.

1. Women need to be encouraged to participate in catfish production; this will reduce the high cost incurred for salaries and wages.
2. Cat fish farmers need training on the local production of feed to reduce cost, this could be done by cooperative societies, Non-Governmental Organisations and local governments.

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