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Determinants of Small Scale Fish Farming in Owerri Agricultural Zone of Imo State, Nigeria

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Abstract: Socio-economic factors such as age, household size, education etc can influence the level of income from investment to a considerable extent. A fuller explanation of the technical aspect of farmers' behaviour can be obtained through the combination of socio-demographic and economic variables. Consequently socio-economic variables like gender, age, marital status, educational status, major occupation and input variables like expenditure were subjected to regression analysis using the Ordinary Least Squares Method (OLS). The primary objective of this study, was to identity the major constraints to increased returns from fish farming in the study area. The regression parameter estimates showed that, gender, age, marital status, education, primary occupation, feed, labour and size of pond were all important determinants of fish output. Based on the these findings, the study recommended that access to capital and borrowing costs should be improved. Producer organizations that can serve as a lobby and information group should be encouraged. Finally effective producer organization that can market their fish products should be encouraged, these will ensure high quality of products.

Key words: Small scale fish farming, returns to scale, Owerri, agricultural zone, Nigeria

INTRODUCTION

Fish farming is a form of land use whereby land is used for growing or rearing selected fish species under controlled conditions in natural or artificial environment for economic and social benefits (Obasi, 2004). It involves the construction of ponds, cages tanks reservoirs or clams and stocking them with food fish which are grown to table size. Fish farming in Nigeria, especially in the south east zone has not gained proper attention relative to other aspects of farming. This may be attributed to lack of knowledge about the factors that determine production in this important fish business that supplies dietary protein. Anyanwu *et al.* (2005) reported that a good majority of the inhabitants of Owerri metropolis have flair for fish as their primary animal protein source. Among Nigerians there have been a problem of low protein intake. This has necessitated importation of stock fish, frozen fish, meat, etc. to forestall an impending food crisis (Osugiri *et al.*, 2007). Fish importation has cost the nation as much as N27 billion in the year 2000 alone. Despite this, the low protein intake problem is yet to be over. Ajao *et al.* (2005) opined that a wide gap exist between demand and supply of fish in the dietary intake of Nigerians. One viable means of tackling this problem is to establish small scale fish farms. Fish farming could provide a good source of income to fish farmers, reduce pressure on fishing in natural waters and serve as a cheaper and more reliable method of producing fish. The output of fish farming is food and the income from its production can be used for purchasing other types of food, thereby contributing to food security. The focuses on determinants of small scale fish farming in Owerri Agricultural zone of Imo State, Nigeria.

MATERIALS AND METHODS

This study was carried out in Owerri agricultural zone of Imo State, Nigeria. Imo State is divided into three agricultural zones namely, Owerri, Orlu and Okigwe. Owerri agricultural zone was purposively selected for this study due to availability of data and accessibility. The major occupation in the zone is farming. The major agricultural enterprises of the people are arable crop farming, livestock husbandry and fish farming. The mean annual rainfall in the area ranges between 20,000-25,000 mm with mean temperature of about 27°C.

The relative humidity is about 98% during the rainy season and 82% during the dry season. The dry season starts from November to Late March, while rainy season starts from April to October. Random sampling technique was used to select 30 fish farmers from a list of Agricultural Development Project (ADP) fish farmers in the zone. Variables collected included pond size, quality of fingerlings, feed, farming experience, input and output.

The data collected were subjected to regression analysis using the Ordinary Least Squares (OLS) method of regression. Four functional forms were tried. The forms include, Linear, semi-log, double log and the exponential form. The lead equation was chosen on the basin of R^2, F-ratio, t-ratio, number of variables significant and a priori expectations. The parameter estimates were tested at five percent level of significance.
The implicit regression model is presented below.

$$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, U)$$

Where
Y = Value of output (N)
X_1 = Gender (Dummy)
X_2 = Age (Numbers)
X_3 = Marital status (Dummy)
X_4 = Educational y
X_5 = Major occupation (Dummy)
X_6 = Cost of fingerlings (Naira)
X_7 = Cost of feed (Naira)
X_8 = Cost of labour (Naira)
X_9 = Cost of water (Naira)
U = error term

RESULTS AND DISCUSSION

The sum of the production elasticity was used as a measure of the nature of returns to scale. A sum equal to unit shows constant returns to scale. However, a sum greater than one implies increasing returns, while a sum less than unity suggests decreasing returns to scale.

The result of the double-log parameter estimates are presented in Table 1. The double-log regression model was chosen as the lead equation

From Table 1, the R^2 was found to be 0.9376, suggesting that 93% of non zero variations in the observed data are explained by the double log regression model. Gender (X_1) was found to be negatively correlated with fish output and not significant at five prevent level. This may be due to the fact that majority of the fish farmers are males. This may be attributed to the cost intensive nature of fish farming. Women have been described as not having enough farm capital and are most of the times discriminated in procurement of farm credits (Ibekwe, 2001) The parameter age (X_2) was found to be negatively correlated with fish output but significant. Age has a positive relationship with production up to productive middle age of 40-55years but it is also negatively correlated with production during old age. This has implications for productivity. The variables, level of education, major occupation expenditure on fingerlings, expenditure on feed input, expenditure on labour, expenditure on water and size of pond were found to be positively correlated with fish out put in study area and significant at 5% level. The importance of education to adoption of agricultural technologies cannot be overemphasized. Authors have reported that education has significant influence of adoption (Imoh and Essien, 2006). The parameter expenditure on fingerling which is positively correlated with output may be due to the fact that incase in stocking of high quality fingerlings leads to increased production. This is similar to the findings of Obasi (2004) The parameter expenditure on feed which was also significant may be due to the fact that increase in quantity and quality of feed to the fish could lead to quick maturity thereby reducing production time lag. The variable expenditure on labour has a positive correlation and statistically significant at 5% level. This is due to the fact that skilled and efficient labour is more productive when its investment is improved. Expenditure on water which was also significant at 5% and positively correlated may be due to the fact that quality and steady water supply to the fish pond would reduce fish mortality rate and thereby improve the output. This may be related to the assertion by Osugiri *et al.* (2005) that the production and marketing of fish are profitable economic means of earning a livelihood. However, it was noted, the supply has always run short of the demand. Giving credence to this, Okoye and Ladu (2000) stated that the current domestical fish production has been less than 500, 000 tonnes and this is grossly inadequate to cater for the domestic demand.

The size of pond which was found to be positively correlated and significant at 5 may be due to the fact that a large pond size will enjoy economy of scale. Since the sum of production production elasticities in the estimated model (-0.0771 -0.0429 + 0.0582 + 0.0922 + 0.0787 + 0.3091 + 0.0521 + 0.0654 + 0.0899 + 0.4073 = 1.0329 is more than one, then it shows that fish farming enjoys

Table 1: Parameter estimate of double log function

Variables	Estimated value	Std. error	t-ratio	Unit measure
Value of output (Y)				Naira
Constant	17.5913	0.0987		Naira
Gender (X_1)	-0.0771	0.0607	-1.2702	Dummy
Age (X_2)	-0.0429	0.0131	-3.2748*	Number
Marital status (X_3)	0.0582	0.0199	2.9246*	Dummy
Educational level (x_4)	0.0922	0.0317	2.9085*	Number
Major occupation (x_5)	0.0787	0.0209	3.7656*	Dummy
Cost of fingerlings (X_6)	0.3091	0.1606	3.0726*	Naira
Cost of feed (X_7)	0.0654	0.02071	3.1594*	
Cost of labour (X_8)	0.0654	0.0207	3.1594*	Naira
Cost of water (X_9)	0.0899	0.0225	3.9956*	Naira
Size of pond (X_{10})	0.4073	0.1182	3.4459*	Number

Source: Field survey, 2005, * = Significant at 5% level of significance, t-tabulated = 2.750, F-calculated = 28.5487, R^2 = 0-9376, Number of variables = 9, Number of significant variables = 8

an increasing return to scale in the study area. This means more profit could be made by investing more on the production inputs. This holds a good promise for increased fish farming in Owerri agricultural zone of Imo State, Nigeria. This finding, however, contrasts with Obasi (2004) who found that pond size was not statistically significant with revenue from fish.

CONCLUSION

Fish farming is a fast growing source of food in the world and could account for more than half of all food fish by 2010. To encourage its expansion private individuals must be encouraged to invest in fish production. In Nigeria food policies to alleviate poverty should be combined with measures to increase food availability. This is possible when the private sector with its capital for investment is integrated in food production policies. The results of this study showed that: education, farmers primary occupation, expenditure on fingerlings, expenditure on feeds, expenditure on labour, expenditure on water and size of fish pond are important determinant of fish farming enterprise in the study area. There is need to assist farmers in form of production credits with low interest rates. This will encourage private sector participant in ensuring food security and poverty alleviation. The fact that the farmers in the study area experienced increasing returns to scale (1.0329) suggests that there is hope for increased output if the farmers can increase their level of investment in fish farming.

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