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Full Length Research Paper

Effect of Productive Inputs of Pond Fish Production on the Output of Fish in Owerri Agricultural Zone of Imo State, Nigeria

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The study focused on effect of productive inputs of pond fish production on the output of fish in Owerri Agricultural Zone of Imo State, Nigeria. A total of forty pond fish farmers selected through a random sampling effort were interviewed using questionnaire. Data collected were analysed using descriptive statistics and multiple regression analysis. The average age of the fish farmers was 59.7 years, majority (62.50%) of the fish farmers were males, majority (47.50%) of the fish farmers had tertiary education, average fish farming experience of the farmers was 5.4 years, and majority (85.00%) of the fish farmers were married. From the regression result, four regression coefficients were significantly and positively signed (pond size, feed consumed, start up capital and stock rate) related fish farming output. Majority 60.00%, 52.50%, 50.00% and 45.00% of the pond fish farmers reported that inadequate finance, high cost of feeds, scarcity of good sources of fingerlings and high cost of transportation respectively were their major constraints to increased pond fish production. Hence, for increased production of fish in the study area, these constraints must be reduced to the barest minimum. It is recommended that policies be directed to the establishment of commercial pelleted and floating fish feed mills, modern fish hatcheries, provision of credit facilities, provision of adequate infrastructural facilities and intensification of extension services. Government should provide good feeder roads so that this produce can be transported easily and cheaply into areas where they are not produced.

Keywords: productive inputs, output, pond fish, multiple regression, constraints

INTRODUCTION

Increasing the per caput consumption of fish in any country benefits health. Fish and fish products are known worldwide as a very important diet because of their high nutritive quality and significance in improving human health (Amao *et al.,* 2006). Fish plays a vital role in feeding the world's population and contributing significantly to the dietary protein intake of billions of the populace (Amao *et al.,* 2006). On a global scale, almost 16 percent of total average intake of animal protein was attributable to fish in 1988 (FAO, 1990). The Food and Agriculture Organization (FAO, 1991), recommended that an individual takes 35 grams per caput of animal protein per day for sustainable growth and development. Fish which contributes 36.6 grams per day of net protein utilization in Nigerian homes

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is still below the recommended requirement by the world health organisation (WHO) (Amao *et al.,* 2006). However, the animal protein consumption in Nigeria is less than 8 g per person per day, which is far lower than the FAO minimum recommendation (Niang and Jubrin, 2001). Fish and fish products provide more than 60% of the total protein intakes in adults especially in the rural areas (Adekoya, 2004). Regrettably, the supply of food fish has been on the decline and it is due to consistent declines from the country's major source of food fish (Ugwumba and Chukwuji, 2010). 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 abridged by the importation of 680,000 metric tonnes annually consuming about ₦ 50 billion in foreign exchange (Odukwe, 2007). In a meeting of the African Regional Nutrition Strategy in 1993, Nigeria was included as one of the countries having the lowest daily per capita supplies of between 70-90 percent of nutrition requirements (Amao *et al.,* 2006). 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). Similarly, the Imo State government created a fisheries component in their Agricultural Development Programme with many technologies to support fish farmers in order to compliment the Federal Government effort.

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). Greater improvement in fish production can be achieved with a proper analysis that will lead to knowledge of the effect of productive inputs on output of pond fish farming and constraints to pond fish production which constitute the basis for this study.

METHODOLOGY

The study was conducted in Owerri agricultural zone of Imo State, Nigeria. Owerri agricultural zone shares boundaries with Okigwe agricultural zone on the northeast, Orlu agricultural zone on the north and Rivers State on the south and west. With respect to annual precipitation, there are two major seasons in the area – dry and rainy seasons. The dry season starts by November and lasts to early March, while the rainy seasons starts from April to October with a short dry spell in August called the "August Break". The agricultural zone is demarcated into eleven local government areas, more for administrative and extension services rather than any agro-ecological differences. Agriculture is the predominant occupation of the people. Random sampling technique was adopted in the selection of respondents for this study. Four local government areas were randomly selected from the zone. From each local government area, ten pond fish farmers were randomly selected making the sample size for this study a total of forty pond fish farmers. The main tool for data collection was the questionnaire. The questionnaire designed sought for information on the fish farmers' socio-economic characteristics, pond fish farming inputs and output and constraints to pond fish farming. Data collected were analyzed with descriptive statistics and regression analysis. The implicit model of the regression is stated as follows; $Y = f(X_1, X_2, X_3, X_4, X_5, e)$. Where;

Y = Fish output (Kg)
X_1 = Pond size (cubic metres)
X_2 = Fish feed (Kg)
X_3 = Cost of labour (Naira)
X_4 = Start up capital (Naira)
X_5 = Stock rate (Number of fingerlings)
e = Error term.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Pond Fish Farmers

Table 1 shows that a simple majority (45.00%) of the fish farmers were 60-69 years old. The average age of the fish farmers was 59.7 years. This implies that fish farming in the zone is being manned by relatively elderly people which will affect the productivity and output of fish farming negatively. Majority (62.50%) of the fish farmers were males. This indicates that males dominate the enterprise in the area (Table 1). The table also reveals that 47.50% of the fish farmers had tertiary education while 12.50% and 20.00% stopped their formal education training at the primary and secondary school levels respectively.

Only 20.00% of the fish farmers had no formal education. This implies that most of the fish farmers in the zone were educated and this will facilitate the rate of adoption of fish farming technologies which in turn will increase the output and productivity of the enterprise. This finding is consistent with that of Nwosu *et al*. (2012), Emenyonu *et al*. (2010) and Nwachukwu and Onyenweaku (2009). The level of education of farmers increases their farm production and also enhances the ability to understand and evaluate new

Table 1. Socio-Economic Characteristics of Pond Fish Farmers

Variable	Frequency	Percentage
Age (Years)		
30 -39	1	2.50
40 – 49	4	10.00
50 – 59	13	32.50
60 – 69	18	45.00
70 - 79	4	10.00
Total	**40**	**100.00**
Gender		
Female	15	37.50
Male	25	62.50
Total	**40**	**100.00**
Marital Status		
Married	34	85.00
Single	6	15.00
Total	**40**	**100.00**
Educational Level (Years)		
No Formal Education	8	20.00
Primary Education	5	12.50
Secondary Education	8	20.00
Tertiary Education	19	47.50
Total	**40**	**100.00**
Farming Experience (Years)		
1-3	5	12.50
4-6	26	65.00
7-9	7	17.50
10-12	2	5.00
Total	**40**	**100.00**

Average age of the farmers= 59.7 years; Average farming experience = 5.4 years,

production technologies. This could be a strategy to assist in the family upkeep. Majority (65.00%) of the farmers had fish farming experience of 4-6 years while the average fish farming experience of the farmers was 5.4 years (Table 1). The farmers have had an experience about the fish farming which implies that they have knowledge of managing the enterprise for the purpose of maximizing production. Experience of farmers increases their farm production. Table 1 also indicates that majority (85.00%) of the fish farmers were married. An implication of this result is that there could be more support from the spouses and children of the farmers with a view to improving and increasing fish production. It could mean that, unmarried people rarely engage in farming as they may not have domestic responsibilities to shoulder (Nwosu *et al*., 2012).

Effect of Productive Inputs on the Output of Pond Fish Farming

In order to determine the effect of productive inputs on the output of pond fish farming, a multiple regression analysis was done in four functional forms (linear, semi log, double log, and exponential forms). Based on the statistical significance of the coefficients and the economic theory that support production concept, the linear function was chosen as the lead equation. The linear function was chosen also because it has the highest R^2 value (0.89) and F-ratio (55.636). The result is presented in Table 2.

The coefficient of multiple determination (R^2) was found to be 89% and was statistically significant at 1% level. This implies that the productive inputs had a significant

Table 2. Multiple Regression Estimates of the Effect of Productive Inputs on Output of Pond Fish Farming

Variable	Coefficient	T-ratio
Constant	795.758	1.810
Pond Size (X_1)	4.009	7.302**
Fish feed (X_2)	2.632	5.699**
Cost of Labour (X_3)	-0.004	-.0.137
Start up Capital (X_4)	0.014	2.484*
Stock rate (X_5)	0.009	6.220**
R^2	0.89**	
F-ratio	55.636**	

**Significant at the 1% level, *Significant at the 5% level

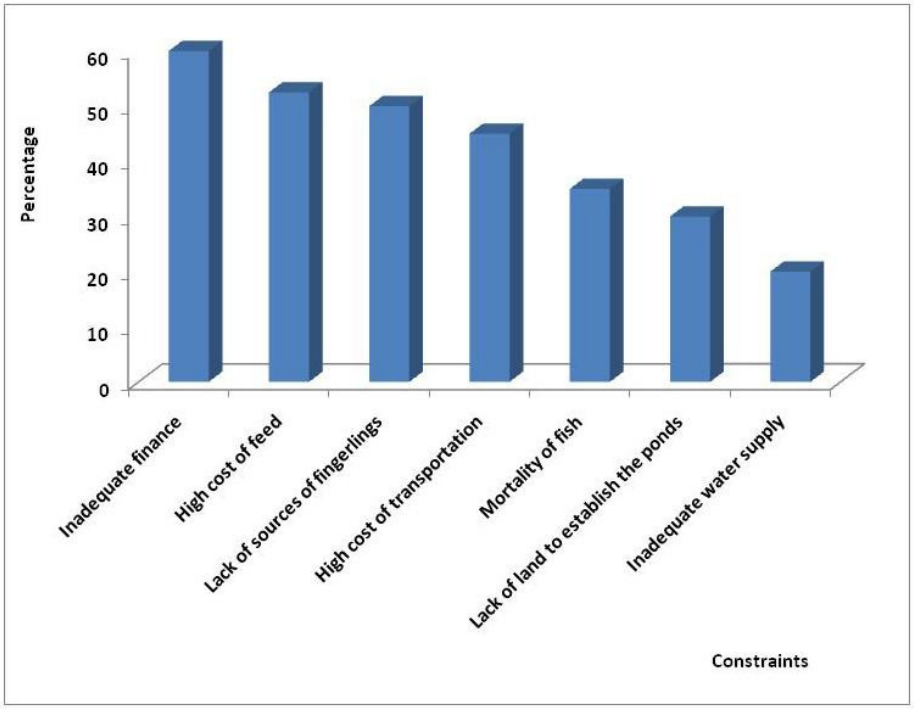

Figure 1. Percentage Distribution of the Constraints to Increased Pond Fish Production

influence on the output of fish farming in the study area and that the regression has a very high explanatory power. This is an indication that 89% percent of the variation in fish farming output is explained by the explanatory variables- pond size, feed consumed, labour, start up capital and stock rate. From the regression result, four regression coefficients were positively signed (pond size, feed consumed, start up capital and stock rate). The coefficient of pond size (X_1) is positive and also significant at 1% level of probability. It has a direct relationship with fish farming output and is an important determinant of pond fish farmers' output. This implies that the more the size of a fish pond, the higher the output; ceteris paribus. Fish feed (X_2) was positively related to the output from pond fish farming business and is significant at 1% level of probability. This shows that the quantity of feed given to the fishes is an important input to fish production and increases the output of the business. The coefficient of start up capital (X_4) is very significant at 5% level of probability and is positively signed. This implies that it has

a direct relationship on the output of farmers. This means that pond fish farmers who started the business with higher capital recorded higher output than pond fish farmers that started with lesser capital. The coefficient of stock rate (X_5) is very significant at 1% level of probability and positively signed. This implies that it has a direct relationship on the output of pond fish farming. Farmers who stocked more fingerlings recorded higher output than their counterparts who stocked less. The F-ratio which determines the overall significance of the regression is highly significant at 1% level of probability implying that the regression has high explanatory power.

Constraints to Pond Fish Farming

The major constraints faced by pond fish farmers in the area include inadequate production capital, high cost of feed, high cost of transportation, lack of good sources of fingerlings, scarcity of land to build the ponds, mortality of fish and inadequate water supply (Figure 1). The figure shows that majority (60.00%) of the pond fish farmers reported inadequate finance as a major problem challenging pond fish farming in the area. Pond fish farming is capital intensive and thus requires big capital investment for reasonable profit to be made. This was indicated by Ugwumba and Chukwuji (2010) as one of the major problems facing catfish farmers in Anambra State, Nigeria. Adeogun *et al.* (2007) also reported lack of capital as one of the problems affecting aquaculture in Lagos State, Nigeria. The second serious problem was the problem of high cost of feed as reported by 52.50% of the farmers. The scarcity of commercial pelleted and floating fish feed mills and problems associated with production and distribution of fish feeds could be the main reasons for the hike in feed prices. Madubuike (2012) reported high cost feed as one of the problems of livestock production in Nigeria. These commercial fish feeds possess floating and high protein qualities and are therefore preferred by fish farmers (Ugwumba and Chukwuji, 2010). Lack of good sources of fingerlings is the third serious problem reported by 50.00% of the pond fish farmers. This could be due to the nearly inexistence of local supplies of pond fish fingerlings in the study area. Farmers relied on the importation of most of their fingerlings from neighbouring States. The fourth serious problem to pond fish production reported by 45.00% of the farmers was high cost of transportation. This is due to the inadequacy of motorable roads in the area.

Conclusion and Recommendations

The major determinants of output of fish farming in the area are pond size, quantity of feed consumed by the fishes, start up capital and stock rate. These productive inputs positively affect output of pond fish farming. Constraints to pond fish production in the study area arranged in descending order of seriousness were, inadequate capital, high cost of feeds, scarcity of fingerlings, high cost of transportation, mortality of fish, lack of land to establish the ponds, and inadequate water supply.

Pond fish farmers should explore every available credit opportunity within their communities, such as commercial banks, credit and thrift societies, and microfinance institutions among others. Government could also place more emphasis on credit facilities toward agricultural production in general and fisheries in particular; such include Agricultural Credit Guaranteed Scheme Fund which enhanced credit availability to the farmers and taking care of tangible proportion of any default so as to encourage the commercial banks to make credit facilities available to farmers. It is recommended that policies be directed to the establishment of commercial pelleted and floating fish feed mills, modern fish hatcheries, provision of credit facilities, provision of adequate infrastructural facilities and intensification of extension services. Government should provide good feeder roads so that this produce can be transported easily and cheaply into areas where they are not produced.

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