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Analysis of profitability of fish farming among women in Osun state Nigeria

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ABSTRACT

The simple random sampling technique was employed in selecting 62 farmers drawn from the sampling frame obtained from the list of Agricultural Development Programme (ADP) contact farmers in the four Local Governments Areas (LGAs) of Egbedore, Olorunda, Ede South and Ife Central, which made up the study area. The main instrument for collecting the primary data was structured questionnaire. It is evident from the result is that an average total cost of N371486.35 was incurred per annum by fish farmers while gross revenue of N791242.52 was realized with a gross margin of N 574314 and a profit of N 419756.17. The rate of return on investment of 0.58 implies that for every one naira invested in Fish production by farmers, a return of N1.5 and a profit of 58k were obtained. The multiple regression result revealed that fish output was significantly determined by pond size, labour used, cost of feeds, cost of lime and cost of fingerlings. The coefficient of determination indicates that 52.2% of the variation in the value of fish output was explained by pond size, quantity of labour used, cost of feed, cost of lime and cost of fingerlings. The study concluded that fish production in the study area is economically rewarding and profitable.

Introduction

The Nigerian fishing industry comprises of three major sub -sectors namely the artisanal, industrial and aquaculture. The awareness on the potential of aquaculture to contribute to domestic fish production has continued to increase in the country. This stems from the need to meet the much needed fish for domestic production and export. Fish species which are commonly cultured include *Tilapia spp, Heterobranchus bodorsalis, Clarias gariepinus, Mugie spp, Chrysichthys nigrodigitatus, Heterotis niloticus, Ophiocephalus obscure, Cyprinus carpio and Megalo spp*. Fish culture is done in enclosures such as tanks. The aquaculture sub sector contributes between 0.5% and 1% to Nigeria's domestic fish production.

The rapid increase in population of the world has resulted in a huge increase in the demand for animal protein (which is essentially higher in quality than plant protein). The average protein intake in Nigeria which is about 19.38/output/ day is low and far below FAO requirement of 65g/ output/day. The nutritional requirement is particularly crucial in a developing country such as Nigeria where malnutrition and starvation are the major problems faced by million of rural dwellers .The low protein intake is an indication of shortage of high quality protein food in the diet of Nigerians. The consumption has been estimated to be 1.56267metric tonnes. Tabor (1990).

Although fishing started over 40 years ago, aquaculture has not significantly contributed to domestic fish production. Equally estimated was the possible creation of 30000 jobs and generation of revenue of US$160 million per annum by the aquaculture industry.

Fish has been recognized to contribute 55% to the protein intake in Nigeria. However, local fish production has been below consumption with imports accounting for aboutUS$48.8m in 2002 (Central Bank of Nigeria 2004).Despite the increase in the major sources of animal protein such as livestock and poultry industries, the problem of protein deficiency still continues unabated. The protein deficiency in diet is equally associated with the inability of fish farming industry to supply the required quantity of fish.

The situation causes poor health, low efficiency, low productivity and poor standard of living and decline in the contribution of fishery industry's contribution to the Gross Domestic Product (GDP).The industry now contributes only2.0% of the GDP and accounts for 0.2% of the total global fish production. Nigeria is one of the largest importers of fish with a per capita consumption of 7.52kg and a total consumption of 1.2million metric tonnes with imports making up about 2/3 of the total consumption. This indicates the large deficit in fish supply in Nigeria Olapade and Oladokun (2005). It is therefore expedient to examine the profitability of fish farming in the study area to identify possible areas that require improvement. The development of the fish industry will increase local production of fish and save much of the foreign exchange being used for fish importation. Specifically, it has a special role of ensuring food security, alleviating poverty and provision of animal protein.

It is generally accepted that women participate actively in the rural economy due to their social and economic roles. According to Ani (2004), women are the backbone of agriculture labour force producing 40% of the gross domestic product (GDP) and over 50% of food in developing nations. The rural economy in Nigeria is dominated by women through their participation in crop and animal production, marketing as well as processing (Adeyokunnu 1981). Women have important roles as producers of food, managers of resources and as income earners (Angers et al 1995). Women are the mainstay of small scale agriculture. They supply the farm labour and are responsible for the family subsistence.

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The participation of women in aquaculture extends to every aspect of fish farming like preparing fish, feeding the feed, cleaning of nets/cages and general maintenance and upkeep of the pond or cages (FAO 1985). Homestead fish farming is the most suitable option for women to be involved in, since it does not require them to be away from their homes for long periods which might force them to neglect their household or domestic responsibilities (FAO 1985). It is particularly suitable for women Nigeria where women seclusion is practiced. The home base fishery establishments are usually operated by the family or household members. They are characterized by small-scale operation, low capital investment, simple labour-intensive technology.

The study will therefore describe the socioeconomic status of female fish farmers, determine the profitability of fish farming and examine the determinants of fish output in the study area.

Research Methodology

This study was conducted in Osun state, Nigeria and made use of primary data. The main instrument for collecting the primary data was structured questionnaire. Information were collected on input and output in fish farming and socio-economic characteristics of fish farmers through personal interview. A total sample of 62 female fish farmers were randomly selected from the list of fish farmers with the assistance of extension agents from Osun State Agricultural Development Programme (OSADEP) for the study. Data analysis was done using the descriptive statistics, budgetary technique and multiple regression technique.

Budgetary Technique

The budgetary technique which involves the cost and return analysis was used to determine the profitability of fish farming in the study area.

Model Specification

$\angle$ = TR- TC………………………..Equation 1

TR= PQ………………………….…. Equation 2

Where

$\angle$ = Total Profit (N)

TR=Total revenue (N)

TC= total Cost (N)

P= Unit price of output (N)

Q= Total quantity of output (N)

The Regression Model

The multiple regression model was employed to determine the influence of socioeconomic factors on the fish output level. The model is specified as follows

$Q=f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, e)$ ....Equation 3

Q is the value of fish output in naira

X_1 represents the pond size measured in square metres

X_2 is the quantity of labour used in fish production in mandays

X_3 is the cost of feeds measured in naira

X_4 represents the cost of fertilizer in naira

X_5 stands for the cost of lime in naira

X_6 represents the cost of fixed inputs in naira

X_7 is the cost of fingerlings measured in naira

e= Error term

Following Olayemi (1998) the relationship between the endogenous variable and each of the exogenous variables were examined using linear, exponential, logarithm and quadratic functional forms. Based on the value of the coefficient of determination (R^2), statistical significance and economic theory that support fish production, the lead was chosen

Results and Discussion

Descriptive Analysis

Evidence from the descriptive analysis of socio economic characteristics of respondents in the study area in table 1 shows that the fish farmers whose ages fall between 31 – 40 years constituted the majority.

On the whole, 80.0% fall into the economically active group of 20 – 50 years. The result of the marital status shows that majority 67.7% of the fish farmers were married. It is also evident that most of the respondents (66.1%) were part time fish farmers. A large proportion (54.8%) of them fish farmer had no formal training. A large proportion (77.5%) finances their fish production through personal savings. The result compares favourably with Aromolaran (2000) .The distribution of the household size indicates that the household size ranged from 2 to 13 while the average fish pond size was found to be 355m^2. The study also revealed poor extension visits to fish farmers who mostly operated on part-time basis. Also 74 (90.3%) of them obtained their fingerlings from farm gate while 84.2% purchased the feeds and 10.5% used household wastes. The descriptive analysis also indicates that most fish farmers (56.5%) feed their fish twice daily to achieve high yield. The most common breeds of fingerlings utilized by fish farmers were Claris, Heteroclarias and Tilapia

Profitability Analysis

The study examines the profitability of fish production in the study area. To determine the profit level, attempts were made to estimate the cost and return from fish farming. The input used, cost, yield or output data generated from the farmers were used to undertake the cost and return analysis for assessing the profitability of fish production in the study area.

The cost and return analysis is presented in the table 2. The result reveals that the cost of feeds accounted for the largest proportion (17.7%) of the total cost of fish production. This is followed by cost of fingerlings (12.4%).The lime cost and labour cost accounted for 3.2% and 3.9% 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 56.5% of total production cost. Consistent with the finding of Ashaolu et al. (2005) from their studies on profitability on fish farming. The rate of return per capital invested (RORCI) is the ratio of profit to total cost of production .It indicates what is earned by the business by capital outlay Awotide and Adejobi (2007). The result revealed that the RORCI of 83% is greater than the prevailing bank lending rate, 17% implying that fish farming in the study area is profitable. If a farmer takes loan from the bank to finance fish farming, he will be 58k better off on every one naira spent after paying back the loan at the prevailing interest rate.

Multiple Regression Result

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 double logarithm was chosen as the lead equation and the results as presented in the table 3. The multiple regression result revealed that fish output is significantly determined by pond size, labour used, cost of feeds, cost of lime and cost of fingerlings. The coefficients are in line with the *a priori* expectation. Hence, the more the amount expended on labour, lime and feeds, the more the amount that will be realized from fish farms in the study area. The result is consistent with the finding of Emokaro and

Ekunwe (2009). The result equally suggests the need for fish farmers to purchase more of these inputs to increase their revenue from fish production. Similarly, policies that will ensure availability of these inputs to fish farmers at affordable price should be put in place. The positive relationship between value of fish and pond size indicates that with increase in the size not surprising because all things being equal the

Equally evident from the result an average total cost of N371486.35 was incurred per annum by the respondents while gross revenue of N 791242.52 was realized thereby returning gross margin of N574, 314 and a profit of N419756.17. The rate of return on investment of 0.58 implies that for every one naira invested in fish production by farmers, a return of N1.58 and a profit of 58k were obtained.

The implication of this is that there is a considerable level of profitability in fish farming in the study findings area. This result is quantity of fish produced is directly proportional to the pond size.

The coefficient of determination, R^2 values of 0.52 indicates that 52% of the variation in the value of fish output is explained by pond size, quantity of labour used, cost of feed, cost of lime and cost of fingerlings. Also, 48% of the variation in the value of fish is determined by other factors not considered. Table 4 shows that the regression coefficient, standard error, F ratio and the level at which the ratio was significant for each of the independent variables. The performance of the analysis of variance in table 4 shows that F ratio of 9.110 was significant at 0.01 alpha level. This provided the evidence that a combination of pond size, cost of labour, cost of feeds, lime, fertilizer, fixed inputs and cost of fingerlings had joint impact on the fish output in the study area. The beta weight ranged from 0.056 to 0.316. The result implies that out of seven independent variables considered, fingerling is the most important input. It has the highest value of 0.316. This is followed by the quantity of lime while fertilizer is the least. This is not surprising because irrespective of the efforts and management practices, the output from a fish farm will be determined by the quantity and quality of fingerlings used.

Elasticity of Production and Return to Scale

The magnitude of elasticity of production is one of the economic concepts of measuring efficiency in resource-use Oladeebo, Ambe-Lamidi (2007). The total sum of elasticity of production of the significant variables, 0.787 as shown in table 5 was less than unity. This suggests that fish production in the study area had a decreasing return. The implication is that each additional unit of the inputs will results in a small increase in the value of fish output than the preceding unit. This shows that production occurred among fish farmers in the study in stage 2, a rational stage of production. In stage 2, the sum of elasticity of production is greater than zero but less than one. The implication is that the more the inputs used, the higher will be the value of fish even though at a decreasing rate. This finding is consistent with that of Olagunju et al. (2007) in their study on economic viability of cat fish production in Oyo state, Nigeria. The degree of responsiveness of the value of fish output to changes in the independent variables shows that a percent increase in the values of pond size, labour, feeds, fertilizer, lime, fixed input and fingerlings will lead to 20.1%, 26.3%, 27.6%, 2.7%, 6% , 14.1% and 0.1% change in the value of fish produced respectively. With the production result, increase in the utilization of labour and feeds is likely to boost the fish output substantially.

Conclusion and Recommendations

It was shown in this study area that fish production among women is economically rewarding and profitable. It is capable of creating employment, augmenting income and improving the standard of living of the women. The result also shows that the positive decreasing return to scale as evidence by the return to scale estimate, indicating that fish production in the study is still in stage 2 of the production process. This suggests the existence of intervention points by relevant stakeholders in the current production technology of fish among women farmers in the study area.

To ensure sustainability in homestead fish production and provide substantial income for women, there may be the need to develop an extension system is gender specific and tailored towards women. This can be achieved if the level of women's involvement in homestead fish production in Nigeria is determined and in addition, if the constraints they face and their training needs are identified. If the identified needs of women involved in homestead fish production are used in the design of the training content, then the training becomes more effective in enhancing the skills and competence of women.

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Table 1: Socio economic characteristics of women fish farmers

	Frequency	*Percentage (%)*
Education		
Primary	2	3.2
Secondary	49	79.1
Tertiary	11	17.7
Total	62	100.0
Age		
10-20	2	3.1
21-30	19	30.0
31-40	31	50.0
41-50	7	12.1
>50	3	4.8
Total	62	100.0
Marital Status		
Married	42	67.7
Widow	11	18.8
Single	09	14.5
Total	62	100.0
Household Size		
1-4person	25	40.3
5-8	21	33.9
>8	3	4.8
No response	13	21.0
Total	62	100.0
Farming Experience (Years)		
<5 yrs	24	38.8
5-10yrs	32	51.6
11-15 yrs	3	4.8
>15yrs	3	4.8
Total	62	100.0
Times of Feeding		
1 time	7	11.3
2 times	35	56.5
3 times	16	25.8
4 times	2	3.2
5 times	2	3.2
Total	62	100.0
Contact with Extension Workers		
0 time	49	79.0
1 time	5	8.1
2 times	5	8.1
3 times	2	3.2
5 times	1	1.6
Total	62	100.0
Training on Fish Farming		
Formal training	28	45.2
No formal training	34	54.8
Total	62	100.0
Mode of Farming		
Par time	41	66.1
Full time	21	33.9
Total	62	100.0
Main Source of Finance		
Personal savings	48	77.5
Friends	1	1.6
Relatives	2	3.2
Cooperatives	9	14.5
Bank loans	2	3.2
Total	62	100.0
Main Source of Feeds		
Purchase	52	83.8
Households waste	5	8.1
Others	5	8.1
Total	62	100.0
Farming Experience (Years)		
<5	40	64.5
5-10	18	29.1
11-15	2	3.2
>15	2	3.2
Total	62	100.0

Source: Field survey data 2009.

Table 2: Average Cost and Return of Fish Production

Item	*(Annual) Amount (₦)*	*% of total cost*
Fertilizer	23560.21	6.34
Feeds	10541.34	17.7
Lime	1374.22	3.2
Fingerlings	53452.03	12.4
Labour	15529.11	3.9
Total variable cost	14742.44	
Fixed inputs	252287	
Total cost	371486.35	
Total returns	791242.52	
Profit	419756.17	
ROI	0.58	
ROIC	0.83	

Source: Computed from Field survey data 2009

Table 3: The Regression Result of the Determinants of Fish Output in the Study Area

Variable	*Coefficient*	*Beta*	*T*	*Significant*
Constant	7.328	-	4.882	.000*
Pond size	0.201	.204	2.234	.029**
Labour	0.263	.174	1.934	0.57
Feed	0.276	.263	2.888	0.005*
Fertilizer	0.027	.056	0.625	0.534
Lime	0.006	0.248	2.780	0.007*
Fixed input	0.141	0.163	1.783	0.79
Fingerling	1.471E-05	0.316	3.33	0.001*

R^2 = 0.52; F stat = 9.110

*variable significant @1% ** Variable significant @5%

Source: Computed from Field survey data 2009.

Table 4: Analysis of Variance

Source of Variation	*sum of square*	*Df*	*Mean square*	*F-ratio*	*Sig.*
Due to regression	40.260	7	5.866	9.110	0.000
Due to Residual	49.637	74	0.646		
Total	89.897	81			

Source: Computed from field survey data 2009.

*Significant 1%

Table 5: Elasticity of production and return to scale of fish farmers

Independent variables	*Elasticities of production*
Pond size*	0.201
Labour*	0.263
Feed*	0.276
Fertilizer	0.027
Lime*	0.060
Fixed input	0.141
Fingerling*	1.471E-05

Source: Computed from field survey data 2009.

*Significant Variable@5%.