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**Keywords :** pond fish, production, income, umuahia south local government, abia state.

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EVALUATION OF POND FISH PRODUCTION IN UMUAHIA SOUTH LOCAL GOVERNMENT AREA OF ABIA STATE, NIGERIA

*Strictly as per the compliance and regulations of:*



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## 1. INTRODUCTION

### a) Background Information

Fish production as a major sub-sector of agriculture occupies a unique position in Nigeria's economy where the population density is increasing rapidly. In terms of Gross Domestic Product (GDP), it has recorded the fastest growth rate in agriculture to the GDP (CBN Report, 2005). In terms of nutrition, increase in the per capital consumption of fish has benefits to the health of her citizenry. 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). Fish and its products

have been proven to provide more than 60% of the total protein intakes in adults especially in rural areas (Adekoye, 2004).

On a global scale, almost 16 percent of total average intake of animal protein was attributable to fish (FAO, 1990). FAO had recommended that an individual takes at least 27g of animal protein per day for sustainable growth and development. In Nigerian homes today regrettably, fish utilization is still below the recommended requirement. The animal protein consumption in Nigeria is less than 8g/head/day, which is far lower than the FAO minimum recommendation (Niang and Jubrin, 2001).

To compound the problem, the supply of fish food has been on the decline, traced to consistent decreases from the country's major source of fish food (Ugwumba and Chukwuji, 2010). Domestic fish production is put at 551,700 metric tonnes as against the national demand of about 1.5 million metric tonnes estimated as at 2007 (Osawe, 2007). The shortfall is said to be abridged by the importation of 680,000 metric tonnes, annually accounting for about 50 billion naira in foreign exchange (Odukwe, 2007).

Nevertheless, in a meeting of the African Regional Nutrition Strategy years back, Nigeria was included as one of the countries having the lowest daily per capita supplies of nutrition requirements (Amao et al., 2006). This prompted the Federal Government of Nigeria as at 2003, to package the Presidential initiative on fisheries and aquaculture development to provide financial and technical assistance to government programmes and projects, encouraging fish production (Ugwumba and Chukwuji, 2010). In spite of these efforts of Government, fish production has remained low in Nigeria (Ugwumba and Chukwuji, 2010). Inadequate supplies from the local fish farmers due to the use of poor quality fish seeds, inadequate information, high cost of feeds, small size of holdings, inefficient resource use, poor infrastructural facilities, lack of credits, lack of extension agents, lack of veterinary doctors and lack of fish production equipments and low capital investment were posited by literature for the consistent decline (Inoni, 2007).

However, a sure means of substantially solving the demand-supply gap and achieving greater

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improvement in fish production is by embarking on widespread homestead/ pond fish production.

#### b) *Problem Statement*

Over the years, there has been a clarion call to improve the nutritional status of developing countries in the intake of animal protein. Out of the 35grams of animal protein per day per person recommended by F.A.O., less than 7grams is consumed on the average (FAO, 2000). As a result of this, many Nigerians suffer from protein deficiency due to low protein intake. Today, Nigeria is faced with the task of providing enough protein enriched food for its population due to the vital role it plays in health and general well being of the economy.

Ugwumba et al., (2010) reported that one of the major source of animal protein in Nigeria is fish and its products, therefore the problem of inadequate protein intake needs to be addressed through increasing production and consumption of fish. The demand for fish is increasing and would continue to increase. As population grows; and with rising standard of living in urban areas, the expectation for diets richer in animal protein becomes obvious. This has led to a rising interest in fish farming in recent times particularly in Ohafia agricultural zone (Igwe et al., 2011). A similar observation in Umuahia Metropolis has led to the attempt to measure the technical efficiency of fish farming in Umuahia Metropolis specifically and in Abia State in general (Igwe et al., 2011, Igwe et al., 2012). Little wonder Umuahia South Local Government has continued to experience increasing growth in the subsector.

In spite of the emerging fishery production sub-sector, in Umuahia South Local Government Area and Abia State in general, the availability of fish is still declining, with absence of alternative and affordable animal protein source. With large population and less rivers, the demand is bound to run short of supply. Fish production is faced with the pressure of finance and poor management. This management problem for maintaining sustainable production in Umuahia South Local Government Area and Abia State in general therefore requires analysis of production cost and revenue derivable from fish production as this will help in developing the subsector in order to eliminate the problem of protein deficiency gap.

## II. OBJECTIVES OF THE STUDY

The broad objective of the study was to evaluate pond fish production in Umuahia South Local Government Area of Abia State.

Specifically, the study was designed to:

- i. determine the socio-economic characteristics of respondents in the study area;

- ii. identify the various species of fish produced in the study area;
- iii. determine the management options adopted by the respondents in the study area;
- iv. determine the cost, returns and hence profitability of fish production in the study area;
- v. determine the factors affecting pond fish production in the study area;
- vi. identify the constraints militating against fish production in the study area

#### a) *Hypothesis*

It was hypothesized that pond fish production is profitable in the study.

#### b) *Justification for the Study*

Fish farming plays a very important role in making a country self reliant and self sufficient in animal protein production. In some areas within Abia State, where the population density is high with less surface waters, demand supply gap for fish can best be filled through pond fish production. Pond fish production affords best utilization of land and provides income to investors, while helping the nation to conserve foreign exchange. Thus, it is necessary to analyze the present production level of fish, the cost and returns to scale involvement from their operations, with a view to expanding the operation and increasing fish production in the country.

It is hoped that the result of this study will provide valuable information for both prospective and existing pond fish farmers and the government on the need for intensified fish production. The study will also inter alai provide information to the pond fish farmers on the opportunities that abound in fish production, increase output of fish in the study area as well as improve the income of pond fish farmers, enable the financial institutions assess the credibility of any proposal for financial investment in pond fish production as a business, contribute to the reduction of unemployment in the study area and in the country at large, stimulate further research on pond fish production, help government to develop appropriate statewide policy and regulations and plans that ensure an enabling environment for the operation of the industry.

## III. METHODOLOGY

#### a) *Study Area*

The research was conducted in Umuahia South Local Government Area of Abia State. Umuahia South Local Government Area has a total land area of 172,913 square kilometers (Ministry of Lands and Survey, Umuahia).

The Local Government Area is situated on a relief of between 200 and 600 above sea level in capital part of Abia State. It has six notable clans which are

sub-divided into autonomous communities. The clans are Olokoro, Omaegwu, Umuopara, Old umuahia and Nwoachara. It consist of thirty-six (36) villages and twenty-three (23) autonomous communities namely; Umuajameze, Ekenobizi, Amachara, Nsirimo, Amankwo, Ehume, Ugbodiukwu, Umuihie, Ogbodi n'ihie, Ohiya, Eziam, Amuzu, Nsukwe, Umuogo, Amaibo, Umuajata, Amizi, Itaja, Itu, Okwu, Avonkwo, Agbama, and Umuoperaezora.

The total population of the Local Government Area is estimated at about 203,669 (Land survey, Umuahia). Majority of the people are agriculturists and farmers, cultivating various products like yam, cassava, maize, oil palm, rubber, cocoa. They also engage in livestock production and trading. Some are civil servants and business men.

#### b) Sampling Procedure

The sampling frame for this study comprised of pond fish farmers in Umuahia South L.G.A of Abia State. Ten (10) autonomous communities were purposively selected from the (23) autonomous communities in Umuahia South L.G.A. based on the availability of fish farmers in these communities. The selection of pond fish farmers was done by simple random sampling technique in which forty (40) fish pond farmers were selected and data collected from them.

#### c) Data Collection

Data for the study was obtained from primary source. The primary data were collected using a well structured questionnaire.

#### d) Data Analysis

Objectives (i), (ii), (iii) and (vi) was analyzed with the aid of descriptive statistical tools such as; tables, frequencies, percentages.

Objective (iv) was analyzed by cost and return analysis. Here, the total cost which includes the total fixed cost and the total variable cost was estimated. This was compared with the total revenue, to determine the profitability.

$$TC = TFC + TVC$$

$$\Pi = TR - TC$$

Where;

$$TC = \text{Total Cost}$$

$$TFC = \text{Total Fixed Cost}$$

$$TVC = \text{Total Variable Cost}$$

$$\Pi = \text{Profit}$$

$$TR = \text{Total Revenue}$$

Objective (v) was analyzed using multiple regression analysis in which four functional forms were tried. The model is specified thus:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6)$  where;  $Y$  = Total Revenue from fish and fish products (N),  $X_1$  = Farm size (Kg),  $X_2$  = Feed cost (N),  $X_3$  = Labour cost (N),  $X_4$  = Cost of Fingerlings (N),  $X_5$  = Depreciated charges (N) and  $X_6$  = Cost of Drugs (N)

## IV. RESULTS AND DISCUSSION

#### a) Socio-economic Characteristics of the Respondents

The socioeconomic characteristics of pond fish producers examined were basically those of age, gender and marital status. These variables are presented in Tables 1, 2 and 3.

**Table 1 :** Distribution of Respondents According to Age

Age range (years)	Frequency	Percentage
20-29	1	2.5
30-39	7	17.5
40-49	16	40.0
50-59	11	27.5
60-69	5	12.5
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

From the result in Table 1, the study showed that about 60 percent of the pond fish farmers were at most 49 years old. This gives insight into the prospects there are in pond fish farming since it is predominantly in the hands of farmers in their productive age and no doubt of youthful vigour. It goes to emphasize that fish farming is not done by the aged in the study area. Thus, it has prospects of being an enterprise that if well developed could become a tool in dealing with youth unemployment in the study area. Age is an important factor in determining the productivity and adoption of an

innovation by farmers (Kebede, 2001). At the youthful age, decision making for improved production and ability to take risks for expansion of production frontier by the farmers would not be too difficult for these farmers to adjust. This agrees with the findings of Eze (2002) which reported that active age of farmers is a positive factor for decision making. Nwaru (2004) also had opined that the ability of the farmer to bear risk, do manual work and be innovative decreases with increase in age.

*Table 2 : Distribution of Respondents by Gender*

Sex	Frequency	Percentage
Male	15	37.5
Female	25	62.5
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

There were about 37.5 percent of the respondents who were male and 62.5 percent of the respondents that were female. Although farmlands are controlled by men being household heads and by customs in the study area, pond fish production is becoming a sub-sector that is gender friendly in favour of the female folk. This suggests the views of Moehi (2003) and Werby (2001) that women are key players in Africa's agricultural sector and their participation critical to achieving food security and economic well being of households. In the study area and for fish production, this finding is critical. With women dominating this sub-sector, expanding the value chain for pond fish production would receive better attention. Marketing

activities that ensure that the pond fish produced get to their final consumers should be majorly female gender driven activities.

For the economic growth of the sampled households, the activities of women in maximizing land use for the selected livestock production cannot be overemphasized. Women as home makers would feel the nutritional impulse of members of their households and of the society more than any other group. Little wonder they seem to dominate in the fishery sub-sector in the area and would play the most significant roles in the development of its value chain.

The distribution of respondents according to marital status is presented in Table 3.

*Table 3 : Distribution of Respondents According to Marital status*

Marital Status	Frequency	Percentage
Single	2	5.0
Married	33	82.5
Divorced	3	7.5
Widowed	2	5.0
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

It showed that 5 percent of the respondents were single, 82.5 percent of the respondents were married, 7.5 percent of the respondents were divorced and 5 percent of the respondents were widow. This indicates that most pond fish farmers in the study area were married. This would imply the expected support from the spouse(s) and children of these farmers with a view to improving and increasing fish production and improved management of the pond fish farm. Family members would most likely see the farm business as one that directly or indirectly contributes to the economy of the home and so, would not work against the enterprise. The farmers being married are themselves

assumed to be responsible. It could mean that unmarried people rarely engage in farming as they may not have domestic responsibilities to shoulder (Nwosu et al., 2012).

#### *b) Pond Type and Number*

Pond fish production in the area was done using two basic types, namely concrete type and the earthen type. The earthen type seems to be giving way for the concrete type. Table 4 shows the distribution of the types while Table 5 shows the number of ponds owned and managed by the pond fish farmers in the study area.

*Table 4 : Distribution of Respondents According to Pond type*

Pond type	Frequency	Percentage
Concrete	36	90
Earthen	4	10
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

The majority of pond fish farmers in the study area make use of concrete tank (90%) as indicated in Table 4. This might be due to its convenience, ease in cleaning and management of the pond and in particular

ease of harvesting and draining. It is commonly believed by the farmers to be advantageous in the area of high profitability, absence of weed growth or bank erosion, good control of diseases and predators inter alia. It is



considered to be last longer than the earthen pond when properly built and maintained. Simplicity and inexpensiveness in its construction were the basic

reasons for preference of earthen pond to the concrete by the few users (10%) who have continued to use the pond.

*Table 5 : Distribution of Respondents According to Number of Ponds*

Number of ponds	Frequency	Percentages
1-3	5	12.5
4-6	28	70
7-9	5	12.5
10-12	2	5
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

The majority of the pond fish farmers had about 4 – 6 ponds, and very few had less or more of theses. To attain the full potential of pond fish production the operators should have more than 3 ponds that are being managed.

c) *Farm Management Options adopted by the Respondents*

The production system for producing pond fish in the study area is presented in Table 6.

*Table 6 : Distribution of Respondents According to Production system adopted*

Production system	Frequency	Percentages
Extensive	3	7.5
Intensive	37	92.5
Semi intensive	-	-
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

It indicates that about 7.5 percent of the respondents adopt extensive system of production, 92.5 percent adopt intensive system of production while none of the respondents adopt semi intensive system of production. Thus, it could be said that pond fish farmers

in the study area adopt mainly intensive system which is a more productive culture system.

Table 8 shows the feed types given to the fish reared in the ponds by the farmers.

*Table 8 : Distribution of Respondents According to Feed type*

Feed type	Frequency	Percentages
Imported feed	22	55
Local feed	12	30
Both	6	15
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

It shows that 55 percent of the respondents use imported feed, 30 percent use local feed and 15 percent use both imported and local feed. This suggests that

majority of the respondents use imported feed which can be attributed to the common belief, "if it is imported, it has to be better than locally made products".

*Table 9 : Distribution of Respondents According to Water source*

Water source	Frequency	Percentage
Streams/ rivers	2	5
Borehole	34	85
Rainfall	4	10
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

In Table 9, it is shown that 85 and 10 percent of the respondents sourced water from borehole and rainfall respectively. Only 5 percent of the respondents in the study area sourced water from the streams/ rivers. This may be due to poor quality of the streams/ rivers water caused by pollution.

*Table 10 : Distribution of Respondents According to Source of Fingerlings*

Fingerlings source	Frequency	Percentage
Fish farms	18	45
Research centres	12	30
Self breeding	10	25
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

From Table 10, it is shown that pond fish farmers get their fingerlings from different sources. 45 percent obtain their fingerlings from fish farms, 25 percent do self breeding and 30 percent obtain fingerlings from research centres. Larger percentage of those that obtain their fingerlings from fish farms may be due to the fact that fingerlings sourced from fish farms are more likely to be healthier and well bred.

*Table 11 : Response of the Respondents According to Veterinary services*

Response	Frequency	Percentages
Yes	9	22.5
No	31	77.5
<b>Total</b>	<b>40</b>	<b>100</b>

Source: field survey, 2013

In Table 11, only 22.5 percent of the respondents received veterinary services while 77.5 percent of the respondents received no veterinary services. This could be due to the ability of the cultured fish species to resist diseases.

#### d) Various Fish Species Produced

Determining the various fish species produced by the respondents was done by listing out the species of fish and then using percentages and frequencies as shown below.

*Table 12 : Distribution of Respondents According to fish species produced*

Fish species	Frequency	Percentages
Clarias gariepinus	30	75
Tilapia spp	4	10
Heterobranchus spp	4	10
Tilapia and Heterobranchus spp	2	5
<b>Total</b>	<b>40</b>	<b>100</b>

Source : Field survey, 2013

The fish species cultured in the study area are Clarias gariepinus, Tilapia spp and Heterobranchus spp. The result in table 4.17 showed that 75 percent of the respondents produces Clarias gariepinus, 10 percent of the respondents produces Tilapia spp, 10 percent of the respondents produces Heterobranchus spp and 5 percent produces both Tilapia & Heterobranchus spp's. This implies that Clarias gariepinus (catfish) is largely cultured because of its high preference, good marketability, fast growth rate, good feed conversion rate, high resistance to diseases, low mortality rate and can survive in both running and stagnant water (Aromolaran, 2000; Kareen et al., 2008).

#### e) Cost and Returns Analysis

Usually, the cost components considered were the fixed cost and the variable cost involved in fish production. Depreciated value of the pond was the only significant fixed cost used for the analysis. The returns were the income from sales of fish per production cycle. Since there are two circles within the year, the depreciated value was divided by two in accounting for the actual cost within the production circle.

Table 13 therefore shows the cost, returns and profit for an average pond fish producer in the study area.

Table 13 : Cost, Returns and Profit of Pond Fish Production

Cost Item	Value
<i>A) Variable Cost</i>	
Labour	30,498.75
Fingerlings	2,915.00
Transportation	936.13
Feed	26,235.00
Medication	313.70
Water	1,800.00
<b>Total Variable Cost (TVC)</b>	<b>62,698.58</b>
<i>B) Fixed Cost</i>	
Land	-
Depreciation (Pond/Equipment)	78,762.50
<b>Total Fixed Cost (TFC)</b>	<b>78,762.50</b>
<b>Total Cost (TVC + TFC)</b>	<b>141,461.08</b>
<i>C) Revenue</i>	
Sales of fish	321,400.00
<b>Total Revenue</b>	<b>321,400.00</b>
<b>Profit = TR-TC</b>	<b>179,938.92</b>

Source: Field survey, 2013

Note: Depreciation on ponds/equipments was calculated using declining balance method.

From Table 13, the cost items are labour, fingerlings, transportation, feed, drugs and depreciation. The table showed that pond fish production gives returns of about N321,400.00 for 401.9kg of fishes annually. Variable and fixed costs of production were N62,698.58 and N 78,762.50 respectively. Total cost of pond fish production was N141,461.08. This implies that pond fish production in the study area is highly profitable with a profit margin of N179,938.92 per production cycle.

#### f) Factors Affecting Pond Fish Production in the Study Area

The factors that affected pond fish production were examined and results of the regression analysis done on that is presented in Table 14.

The Cob Douglas form was chosen as the lead equation because of relatively more number of significant variables. The result showed that four variables were statistically significant, indicating the basic factors that affect pond fish production in the study area

Table 14 : Summary of Regression Result

Variables	Cobb-Douglas	Semi-log	Exponential	Linear
Constant	-8.603 (-0.338)	-7.160E7 (-1.835)*	13.957 (10.946)***	-3.099E6 (-1.735)*
Farm size (X <sub>1</sub> )	1.197 (1.523)*	-0.454 (-0.853)	0.681 (1.116)	0.056 (0.147)
Feed cost(X <sub>2</sub> )	0.226 (2.584)**	0.028 (0.465)	0.173 (1.856)*	0.075 (1.295)
Labour Cost(X <sub>3</sub> )	0.743 (1.904)**	0.470 (1.782)*	0.399 (1.631)*	0.718 (4.753)***
Fingerlings(X <sub>4</sub> )	-1.202 (-1.727)*	0.452 (0.960)	-1.140 (-2.195)**	-0.082 (-0.256)
Depreciation(X <sub>5</sub> )	0.004 (0.031)	-0.107 (-1.302)	0.006 (0.056)	-0.016 (-0.253)
Cost of Drugs(X <sub>6</sub> )	0.116 (0.583)	0.539 (4.014)***	0.032 (0.271)	0.297 (4.035)***
R <sup>2</sup>	75.9	89.0	88.0	51.05
Adjusted R <sup>2</sup>	71.6	87.0	86.0	88.5
F-Ratio	17.363	44.491	16.10	90.3

Source : Field Survey, 2013

Note: \*\*\* - Significant at 1 percent, \*\* - Significant at 5 percent, and \* - Significant at 10 percent

Farm size was significant at 10% level and was directly related to income. This implies that, the higher the farm size, the higher the income from pond fish production. Pond owners with more number of ponds

had more fish stocked in their farm than those with smaller number of ponds. They consequently would make more income from their fish production business.



The estimated coefficient of feed variable was significant at 5% and has a positive relationship with income. This implies that, the more the expenditure on feed as long as the saturation stage is not exceeded, the more the weight gain and the consequent higher income to be derived from sale of the fish. Feed constitute the highest cost in fish farming. It is therefore advised that cheap sources of feed be harnessed in order to enjoy the full benefits that feeds will have on the growth of fish and consequent income of the farmer when sold to the consumers or end users. It appears that the pond fish farmers have inculcated the management practice of not feeding the fish beyond their saturation stage as that will mean more cost and decreases income for the pond fish farmers.

Labour cost was also statistically significant at 5% level and had a positive relationship with income. This indicates that as pond fish farmers engage more labourers or employ more labour in their farm operations, their income increases. This finding agrees

with that of Yisehak (2008) that increase in labour enhances farm productivity. Again labour usage for fish production does not require laborious tasks as in certain crop production. This makes it possible to harness labour with little technical knowhow and without any gender bias.

Cost of fingerlings was significant at 10% and negative in its sign indicating that the higher the cost of fingerlings, the lower the income derived from fish production and vice versa. This is because sometimes if there is a case of high mortality at this stage, resulting to restocking, it would naturally have effect on the income. This makes it necessary that fingerlings be sourced from certified dealers in order to minimize risks and uncertainties related to loss of fingerlings.

#### g) Constraints to Production

There were seven factors identified by the fish pond producers as constraints to their fish business. These are presented in Table 15.

*Table 15 : Distribution of Respondents According to Production Constraint*

Production Constraint	Frequency	Percentage
High feed cost	20	50
Transportation cost	15	37.5
Inadequate capital/finance	30	75
Disease and pest	7	17.5
Lack of good source of fingerlings	16	40
Inadequate water supply	2	5
Lack of organized market	2	5

*Source : Field survey, 2013 Multiple responses were received*

The constraints faced by pond fish farmers in the study area include inadequate capital/finance, high cost of feed, lack of good source of fingerlings, high transportation cost, pest and disease incidence, inadequate water supply, and lack of organized market. Table 15 shows that majority (75%) of the pond fish farmers reported lack of capital/finance as a major problem challenging pond fish farming in the study area. Pond fish production is capital intensive and thus requires a relative big capital investment for reasonable profit to be made. This was indicated by Ugwumba & 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 which was accounted for by 50 percent of the pond fish 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 that high feed cost is one of the problems of livestock production in Nigeria. Lack of good source of fingerlings is the third serious problem reported by 40 percent 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 37.5 percent of the pond fish farmers was high cost of transportation. This is due to the inadequacy of motorable roads in the study area. It is therefore expected that improvement of infrastructures in the State would favour pond fish production in the area.

## V. CONCLUSION AND RECOMMENDATION

Pond fish production could be a major strategy of government to reduce poverty, generate employment for the teeming unemployed and meet the nutritional needs of the Nigerian people. Its capacity to accomplish these hinges on the enormous potentials available in the country and the benefits that the subsector could generate for both the farming household and the economy in general. This study showed that pond fish farming is a recent phenomenon attracting younger and well educated farmers.

In spite of the constraints faced by pond fish farmers in Umuahia South Local Government Area of Abia State, the prospects of fish production is bright as it is permitted by both religious and cultural practices in the study area. Pond fish production should be accorded the needed recognition. Since most of the

pond fish farmers in Umuahia South are constrained by finance, the need for financing pond fish production is imminent.

Considering the importance of protein in building and replacement of lost tissue in both children and adults, the place of pond fish production as a possible solution to the continuous low protein intake in the developing economies cannot be over emphasized.

The following recommendations were deemed appropriate based on findings:

- i. Lack of capital/finance was a major problem. Farmers should form co-operatives and should be encouraged by the government as this will enable resource poor farmers not only get loans but also to pool their resources together and overcome the inadequacy of capital.
- ii. The problem of inadequate transport facilities should be given priority attention by both local and state governments. There is need to provide accessible roads in the communities of Umuahia South Local Government Area. This will help in reducing marketing challenges and reduce financial cost of transportation.
- iii. Extension agents should embark on intensive educational programmes on the principles, practices and prospects of pond fish production. They should encourage and teach farmers on improved techniques in fish production.
- iv. Significant variables influencing output should be taken into cognizant in formulation of policies relating to fishery sub-sector.

## REFERENCES RÉFÉRENCES REFERENCIAS

1. Adekoya, B.B and Miller, J.W. 2004. Fish cage culture potential in Nigeria-An overview. *National Cultures. Agriculture Focus.* 1(5): 10
2. Adeogun O.A., Ogunbadejo, H.K., Ayinla, O.A., Oresgun, A., Oguntade, O.R., Tanko, A., Williams S.B. (2007). Urban Aquaculture: Producer Perceptions and Practices in Lagos State, Nigeria. *Middle-East J. Sci.Res.* 2 (1): 21-27
3. Akegbejo, Y. and Adeoye, D. (2012). Measuring Profitability in Small Scale Aquaculture Enterprises in South West Nigeria. *IIFET 2012 Tanzania Proceedings*
4. Amao, J. O., Oluwatayo, I.B., and Osuntope, F.K. (2006) "Economics of Fish Demands in Lagos State, Nigeria. *J.Human Ecol.* 19(1):25-30
5. Amos, T.T. (2000). Sustainable Fish Culture Practice in Kano State Nigeria: An Economic Analysis. Unpublished Ph.D thesis. Dept. of Agric. Econs. ABU., Zaria. 120p
6. Amos T.T. and Bolorunduro P.I. (2000). Economics of Aquaculture Production. *NAERLS Extension Bulletin NO 107. Fisheries Series NO 5.* and *Hunger by Improving Fisheries and Aquaculture.* 99 p
7. Aromolaran, A.B. (2000). Analysis of resource use efficiency in fish farms: A case study of Abeokuta zone of Ogun State. *Aquafield*, 1(1): 12-21
8. Arthur, J.R., Bondad-Reantaso, M., Baldock, F.C., Rodgers C.J. and Edgerton B.F. (2004). Manual on Risk Analysis for the Safe Movement of Aquatic Animals (FWG/01/2002). APEC/DoF/ NACA/FAO, APEC Publ. No. APEC #203-FS- 03.1, pp: 59.
9. Buras, N., 1993. Microbial safety
10. Ayinla, O. (2001). Economics of Fish Farming. Preceeding of the Fish Seed Propagation Course. pp 25
11. Boyd, C.E. (1998). Water Quality for Pond Aquaculture. International Center for Aquaculture and Aquatic Environment. Research and Development Pub. No. 43. Auburn University, Alabama, USA
12. CBN (2009) Statistical Bulletin Central Bank, Lagos
13. CBN Report (2005) Annual Report and Statement of Accounts, Central Bank of Nigeria Publication, Abuja
14. Emenyonu, C.A., Odii, M.A., Ohajianya, D.O., Henri-Ukoha, A., Onyemauwa S.C., Ben-Chendo G.N. & Munonye O.U. (2010). Effects of Waste Water Use on Vegetable Crop Production in Imo State, Nigeria. *Res.* 2(10): 47-56
15. Eze, S.O. (2002) Post Harvest Plantain Technology dissemination and Agricultural Extension Implications for poverty eradication among rural women in Amacha LGA Anambra state. In: iloje G.E. Osuji, U. Herbert and G.N Asumugha (eds) *Agriculture. A basis for poverty eradication and couter resolution proceeding of 26th annual ASR FUTO Owerri Nig.* pp201-204
16. FAO, (1990) Commodity Review and Outlook (1990-1991). FAO, Rome, Italy.
17. FAO; Food and Agriculture Organization(2000). The State of World: Fishery and Agriculture, Fisheries Department, Rome
18. FDF. 2009. Nigeria National Aquaculture Strategy. Assisted by FAO. Formally approved by Government. 18 p
19. FISH. (2006). Brochure with Cost Benefit on Cage Fish Farming in Uganda. USAID-assisted "Fisheries Investment for Sustainable Harvest" (FISH) project. Cooperative Agreement: 617-A-00-05-00003-00. Dept. of Fisheries and Allied Aquacultures: Auburn University, Alabama, USA. 2 p
20. Ibenne, E. (2010). A Handbook on Effective Catfish Farming, 24p
21. Igwe, K. C., Onyenweaku, C. E. and Nwaru, J. C. (2011) Application of Linear Programming to Semi-Commercial Arable and Fishery Enterprises in Abia State, Nigeria, *International Journal of Economics and Management Sciences* Vol. 1 (1): 75-81
22. Igwe, K. C., Echebiri, R. N., Nlewadim, A. A. and Anorue, P. C. (2011) Application of the Stochastic

- Production Frontier to the Measurement of Technical Efficiency of Fish Farming in Umuahia Metropolis, Abia State, Nigeria, *Journal of Agriculture and Food Sciences* Vol. 9(1): 1-8
22. Inoni, O.E. (2007). Allocative Efficiency in Pond Fish Production in Delta State, Nigeria: A Production Function Approach. *Agric. Tropica et Subtropica* 40 (4): 127-134
  23. Jauncey, K., Sorensen, P.L. and Areola, F. (2008). A short Handbook- Catfish Feed for Nigeria. Materials, Storage, Handling, Stock, Quality control, Ingredients, Feed Formulation, Feed use and Technical Aspects of Feed Manufacture. Sponsored by CDE, Brussels. 25p
  24. Kebede, T. A. (2001) Farm Household Technical Efficiency: A Stochastic Frontier, A Study of Rice Producers in Mardi-Watershed in the Western Development Region of Nepal, An MSc. Thesis Submitted to the Department of and Social Sciences, Agricultural University of Norway, 56p
  25. Kareem R.O., Dipeolu AO., Aromolaran A.B. , Williams S.B.(2008) Economic efficiency in fish farming: Hope for agro-allied industries in Nigeria. *Chinese Journal of Oceanology and Limnology*, 26(1): 104-115
  26. Madubuike F.N. (2012). Bridging the Animal Protein Supply and Demand Gap in Nigeria. Imo State University, Owerri, Nigeria Inaugural Lecture Series No. 7. Imo State University Owerri
  27. Moehi, J. (2003): Gender and Aquaculture Development in the African Region, *FAO Aquaculture Newsletter*. No, 29 pgs 35- 36
  28. Moehl, J., Brummett, R.E., Kalende, B.M. & Coche, A. (2006). Guiding principles for promoting aquaculture in Africa : benchmarks for sustainable development. CIFA Occasional Paper 28, Food & Agriculture Organization of the United Nations, Accra, Ghana
  29. Niang, T. and Jubrin, S. (2001). Quaterly Newsletter of the Nigeria Agriculture Question and Answer Service, Vol. 1: 1-7
  30. Nwachukwu I.N., and Onyenweaku, C.E. (2009). Allocative Efficiency among Fadama Telfaria Production in Imo State Nigeria. Online at <http://mpr.ub.uni-muenchen.de/27249/> MPRA Paper No. 27249, Posted 07 December 2010 / 11:46
  31. Nwaru, J.C. (2004) "Rural credit markets and resource use in Arable crop production in Imo State Nigeria" PhD Thesis, Michael Okpara University of Agriculture, Umudike
  32. Nwosu, C.S. and Onyeneke, R.U. (2013). Effect of Productive Inputs of Pond Fish Production on the Output of Fish in Owerri Agricultural Zone of Imo State, Nigeria. *Global Advanced Research Journal of Agricultural Science*. Vol. 2(1): 023-028
  33. Nwosu, C.S., Onyeneke, R.U., Okoli, VBN (2012). Socioeconomic Determinants of Fluted Pumpkin Leaf (*Telferia occidentalis*) Production in Ezinihitte Mbaise Local Government Area of Imo state, Nigeria. *Agric. Sci. Res. J.* 2(6): 355 – 361
  34. Odukwe, A.(2007) Fish Farming in the Tropics: A Functional Approach. Maxiprints, Awka, Nigeria. Book Review
  35. Ogamba, E.N. and Abowei, J.F. (2012). Some issues in Culture Fisheries Management and Practices. *British Journal of Pharmacology and Toxicology* 3(5): 205-217, 2012
  36. Okoye, B.C., Okorji, E.C. and Asumugha, G.N. (2004) Outlook on production Economics of paddy Rice under resource constraints in Ebonyi state. proceeding of the 38th annual conference of the Agricultural society of Nig. (ASN), 17-21 Oct 2004, Lafia Nassarawa State. pp 337-342
  37. Osawe, M. (2007). Technical know-how of Catfish Grow-out for Table Size in 4-6 Months. Proceedings of a Seminar on Modern Fish Farming by Dynamo Catfish Production, pp: 1–14. Lagos, Nigeria
  38. Ugwumba, C.O. and Chukwuji, C.O.(2010) The Economics of Catfish Production in Anambra state, Nigeria; A Profit Function Approach. *J. Agric and Soc. Sci.* 6(4):105-109
  39. Werby, E. (2001) Socio-cultural Considerations when introducing a new integrated Agriculture Aquaculture Technology. In *FAO Fisheries Technical* 468. FAO, Rome. pp 3-8
  40. Williams, S.B., Kareem, R.O., Adiegu, C.P. and Dipeolu, A.O. (2012). Resource-use Efficiency among selected Fish Farms in Lagos state, Nigeria. *J. Agric. Sci.*, 3(2):85-94
  41. World Fish Center. 2009. World Fish Medium-Term Plan. 2010-2012. Reducing Poverty
  42. Yisehak, K. (2008) Gender Responsibility in small holder mixed crop livestock production system of Jimma zone, South West Ethiopia