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Assessment of Awareness and Adoption of Fish Farming Technologies in Obio-Akpor Local Government Area of Rivers State, Nigeria

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ABSTRACT

Fish farming has great potentials for ameliorating the problems of youths unemployed, poverty and nutritional deficiencies because it has been found to be economically rewarding and capable of providing vast employment, augmenting farmers' income and improving standards of living of the citizenry. The study assessed farmers' awareness and adoption of fish farming technologies in Obi-Akpor Local Government Area of Rivers State. A sample of 87 fish farmers was selected from the population of about 570 through multistage random sampling technique. Structured interview schedule was used to collect relevant research data. Data were analyzed with descriptive statistics (percentage and ranking). It was found that cat fish was cultured by more than 81% of the respondents. More than 72% of the farmers were aware of the eight fish farming technologies under study. More than 71% adopted aerator, flow through system, float fish feed and ova-prim but adoption of pituitary gland and re-circulatory system were at very low ebbs. High cost of feed, erratic power supply, inadequate capital and untimely or unavailability of production information were the major constraints to adoption of fish farming technologies. It was recommended that farmers continue to culture catfish which is hardy, easier to rear and tolerant to stressful conditions. Intervention programmes should be implemented to ensure that farmers adopt technologies whose adoptions were at low ebbs. The Government should subsidize the prices of fish feeds and other inputs while improving the perennial poor power supply.

Keywords: *awareness, adoption, fish farming, Nigeria*

INTRODUCTION

Prior to the advent of oil, the Nigerian economy was predicated largely on agriculture. According to Badru (2002) and Alademerin (2009), the consequences of Nigeria's neglect of the agricultural sector and sole dependence on oil included aggravated decline in agricultural productivity, significant increase in rural poverty, rising food import bills leading to the persistent huge deficit balance of payment over the years. There has been increasing awareness of the need for adequate protein in human diet to reduce infant morbidity and mortality which Igbedioh (1990) found were on the increase in the Nation. The Food and Agriculture Organization (FAO) (1995) also posits that protein intake in developing countries (such as Nigeria) was below the required 75g per person per day. According to Ajayi (2001), fish has been widely acknowledged as a rich source of dietary protein. However, fish farming is predominantly at small-scale subsistent level. Large scale commercial farming is yet to be popularized in spite of the fact that FAO (2005) has identified Nigeria as one of the countries in the Sub-Saharan Africa with great potentials to attain sustainable fish production considering her extensive mangrove ecosystem.

Fish farming is capable of generating employment for the teeming youths, increasing the socio-economic status of farmers,

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contributing largely to Nigerians GDP and providing direct and indirect employment for over six million people, according to Adeola (2007). The huge drain on Nigeria scarce foreign exchange through fish importation can be reversed through increased fish production in the country. Increased fish production is also essential to increase farm families' protein intake, reduce protein-deficiency diseases, morbidity and mortality (Igbedioh 1990). Fish have a nutrient profile that is superior to beef, pork, and chicken. It is an excellent source of high quality animal protein and digestible energy.

There has been an increased efforts at development of technologies for increased production. Agricultural Extension Agents are constantly engaged in the transfer of developed farming technologies to farmers for adoption. Ekong (2010) explained that adoption is a decision making process which involves a number of stages. Although adoption as the integration of an innovation into farmers' normal farming activities, adoption is not a permanent behaviour According to Olatunji (2005) the steps involved in the traditional adoption process model are, Evaluation, Trial and Adoption (AIETA). Farmers may not adopt innovation because of lack of awareness, ignorance about the benefits of recommended innovation, lack of required resources or negative attitude to extension recommendations. Jibowo (1992) also noted the characteristics of the innovation and those of the farmers are important in innovation decision process of farmers and their overall adoption behaviour.

A number of fish farming technologies that have been developed and disseminated to farmers in Nigeria include, the Water Re-circulatory System (WRS), fish vats, fish culture in earthen ponds, in concrete tanks and in plastic tanks. Others include floating fish feed, ova prim, aerator, pituitary gland, flow through system, siphoning, and farm record keeping (Nwokoye *et al.,* 2007). Effective dissemination of these technologies to farmers, their adoption and diffusion are expected to bring about increases in fish production in Nigeria. The roles of new fish technology are to simplify and make fish production more effective and efficient. It is therefore pertinent to investigate the extent to which fish farming technologies have been transferred to farmers and the extent to which the technology end-users have taken advantage of these technologies. It is also important to assess the constraints being faced by farmers in adopting fish farming technologies. For example, the re-circulatory system requires high initial investment, involves high risks and requires high technical skills. Kudi, *et al.,* (2008) has also noted that water supply contributes 21 percent of most important problem in fish production. Daily monitoring of the condition of the ponds and behaviour of the fishes are paramount. Taking of accurate records would allow the farmer to readily recognize and prevent deleterious environmental conditions that are capable of causing fish mortality. The question is, "how many of the fish farmers in the study area are educated and are keeping accurate records which are useful in optimizing resources invested in fish farming"? The question of farmers' receiving timely production information, adequate funds, timely supply of inputs (such as feed and fingerlings), proximity of farm to market and variables related to processing, storage and marketing of fish and fish products are important factors that may underlie fish farming productivity.

It is in view of the foregoing that it is pertinent to assess farmer's awareness and adoption of fish farming technologies in the area of study. Specifically the objectives of the study are:

1. to identify the types of fish mostly cultured by farmers in the study area.
2. to ascertain improved fish farming technologies that farmers are aware of
3. to assess adoption of improved fish farming technologies among fish farmers in the study area.

4. to identify constraints to fish farming among fish farmers in the area of study.

METHODOLOGY

The population of study comprised all fish farmers in Obio-Akpor Local Government Area of Rivers State, Nigeria. There are 32 communities in the area of study with an estimated population of about 570 fish farmers. Multistage sampling procedure was employed to select the sample. First, 6 communities were selected through simple random sampling technique. This was followed by purposive sampling of between 15 and 20 fish farmers from each of the 6 communities selected for the study. In the end, only 87 fish farmers who were available at the time of data collection and who responded to all the items in the interview schedule correctly and completely comprised the sample for the study. Frequency counts were made of the types of fish cultured by farmers, fish technologies that farmers were aware of and the number of farmers who have moved from one level to another in the process of adoption of various fish farming technologies. Constraints to adoption of fish farming technologies were measured with a 3-point Likert-type scale of "serious constraint" (3), "mild constraint"(2) and "not a constraint" (rated 1), respectively. Data were analyzed with the aid of descriptive statistics (mean, percentage and ranking).

RESULTS AND DISCUSSION

The results of data analyses were presented in tables and discussed in the paragraphs that follow.

Types of fish mostly reared in the area of study

As shown in Table 01, only 11.5% of the respondents were culturing Tilapia while 81.6% cultured Catfish. The findings show that Catfish is the predominant fish being cultured in the area of study. Some of the reasons farmers offered for mainly keeping catfish were that catfish are hardy and tolerant to most strenuous conditions to which other fishes are very sensitive. Indeed, Sehgal (2002) also affirmed that catfish is hardly, easier to farm and very tolerant to strenuous conditions. Kudi, *et al.,* (2008) on the other hand, attested to higher profitability of Catfish production over other types of fish. Only 6.9% of the respondents kept both Tilapia and Catfish together. Studies are needed to ascertain if there are comparative advantages of culturing both Tilapia and Catfish over either of Tilapia or Catfish alone.

Awareness of fish farming technologies by fish farmers in the study area

The results of data analysis shown in Table 02 indicates that more than 72% of farmers were aware of the eight fish farming technologies under study. The percentage awareness ranged from the lowest 72.4% (for re-circulatory system) to 97.7% (for float fish feed). This implies that majority of farmers were aware of fish farming technologies in the study area. This is very commendable, since farmers will only adopt technology they are aware of. Awareness is the first stage in the process of adoption of any innovation. Literature have shown that awareness of innovation usually precede its adoption and diffusion. It has also been found that lack of awareness, lack of knowledge of the effects of recommended technology or negative attitude to the innovation may be responsible for non-adoption among farmers. Others have also noted that farmers sometimes do not adopt agricultural innovations because of the characteristics of the innovation (Jibowo, 1992 and Olatunji and Juwe, 2013). The high percentage of awareness recorded in this study may be an indication of a functional and effective agricultural extension system. However, efforts are needed to bring fish farming technologies to the knowledge of between 5% and 28% of farmers who are still ignorant of these fish farming technologies.

Table 01: Types of fish mostly reared by farmers in the area of study

S/N	Fish culture	Frequency	Percentage (%)
1	Tilapia	10	11.5
2	Catfish	71	81.6
3	Both Tilapia and Cat Fish	6	6.9
	Total	87	100

Table 02: Percentage distribution of farmers who are aware of fish farming technologies

S/N	Fish farming Technologies	Frequency of farmers who are aware of	Percentage (%)	Ranks
1	Aerator	83	95.4	2
2	Float Fish Feed	85	97.7	1
3	Ova-prim	81	93.1	3
4	Pituitary gland	78	89.6	5
5	Flow through system	80	91.9	4
6	Re-circulatory	63	72.4	8
7	Siphoning	66	75.8	7
8	Farm record keeping	76	87.3	6

Adoption of Fish Farming Technologies by Fish Farmers

As indicated in Table 03, about 88.5%, 85.1%, 80.5% and 71.2% of farmers move through all the stages of awareness, interest, evaluation, trial and eventually adopted aerator, flow-through system, float fish feed and ova-prim respectively. The adoption percentages were quite high, and commendable. Efforts should be made to sustain and improve on these levels. In a study of satisfaction of farmers with aquaculture communication channels in Ondo State, Nigeria, Ogunremi *et al.,* (2013) found that, although about 83.7% of farmers agree that the innovation and communication channels used were relevant to their needs, the information did not get to them on time.

Adoption of siphoning and farm record keeping were in the ranges of 60.0% to 66.7%. It should be emphasized that record keeping is central to fish-farming enterprise. Daily monitoring of the conditions of the ponds and fish behavior a long with accurate record keeping would allow farmers recognize and prevent deleterious environmental condition in the pond and thereby prevent mortality while increasing profit. It should be noted that pituitary gland and re-circulatory system were at 33.3% and 27.6% level of adoption respectively. Adoption of these two technologies where at low ebbs. The fact that the re-circulatory system recorded the least percentage adoption may be for the reason that the technology is particularly useful in areas where land and water are not readily available or are expensive. The technology is really suitable in climate conditions which prevent year-round production (For example, winter or desert conditions). On the whole, a more vigorous activity of technology transfer should be embarked upon in the study area, even as Ruttam (1997) had asserted that adoption of technologies and their sustained use would depend on efficiency of technology development, dissemination and follow-up procedures.

Table 03: Percentage distribution of fish farmers on the basis of levels of adoption of fish farming technologies

S/N	Fish farming technologies adopted by farmers	Percentage distribution of farmers at the various levels of adoption					Adoption Ranks
		Awareness	Interest	Evaluation	Trial	Adoption	
1	Aerator	95.4	94.2	94.2	90.8	88.5	1
2	Float Fish Feed	97.7	96.5	93.1	87.4	80.5	3
3	Ova-prim	93.1	89.6	88.5	81.6	71.2	4
4	Pituitary gland	89.6	64.3	58.6	36.7	33.3	7
5	Flow- through system	91.9	90.8	78.1	80.4	85.1	2
6	Re-circulatory	72.4	68.9	58.6	32.1	27.6	8
7	Siphoning	75.8	73.5	70.5	66.6	60.9	6
8	Farm record keeping	87.3	80.4	73.5	71.2	66.7	5

Constraints to adoption of fish farming technologies by fish farmers

The results of data analyses (Table 04) revealed that only 4 out of 15 itemized constraints were significantly affecting farmers' adoption of fish farming technologies in the area of study. These are: high cost of feed (mean 2.45), erratic power supply (mean 2.41), inadequate capital (mean, 2.32), and untimely or unavailability of production information (mean 2.30). Other studies have also identified these as major constraints to adoption of fish farming technologies. For example, Kudi, *et al.,* (2008) and Ugwunba and Chukwuji (2010) have shown that inadequate finance, high cost of feeds and other inputs contributed up to 97% of the production problems faced by fish farmers. Late arrival of and use of inappropriate communication channels of information has also been identified as constraints to adoption of fish farming technologies among farm families in Nigeria (Ogunremi, *et al.*, 2013).

Efforts are needed to ameliorate these challenges so as to fast-track Nigeria's race to self-sufficiency in fish production.

Conclusion and Recommendations

The study assessed awareness and adoption of fish farming technologies in Obia-Akpor Local Government Area of River State, Nigeria. Analyses of research data revealed that more than 51.6% for fish farmers were culturing catfish, and more than 72.4% of respondents were aware of the 8 fish farming technologies under study. Adoption of aerator, flow though system, float fish feed and ova prim were about 71.2% while 66.7% and 60.9% adopted farm record keeping and siphoning respectively. Adoption of pituitary gland and re-circulatory system were at very low ebbs.

Based on these findings, it was recommended:

1. That while farmers continue to culture catfish because of its advantages of being hardy, easier to farm and tolerant to hash environmental conditions. Research efforts are also needed to ascertain comparative economic advantage of keeping both Catfish and Tilapia. Culturing many types of fish would help farmers to satisfy their customers' varying tastes and increase their own sources of income.

Table 04: Constraints to adoption of fish farming technologies by fish farmers

S/N	Constraints	Mean	Ranks
1	High cost of feed	2.45*	1
2	Inadequate capital	2.32*	3
3	Scarcity of fingerlings	1.46	14
4	Lack of modern technologies	1.87	7
5	High cost of transportation	1.68	11
6	High cost of labour	1.74	10
7	High cost of fingerlings	1.52	13
8	Inadequate water supply	1.36	15
9	High mortality rate	1.89	6
10	Inadequate land space for fish culture	1.93	5
11	Inadequate technical manpower	1.79	8
12	Unstable pattern of demand for fish and fish products	1.77	9
13	Erratic power supply	2.41*	2
14	Inadequate storage and preservative techniques	1.59	12
15	Untimely or non receipt of production information	2.30*	4

*Mean ≥2.0 denote serious constraints. (Constraint was measured on a 3-point Likert type of rating scale of "Serious constraint"(3), "Little constraint" (2) and "No constraint" (1) respectively).

2. That efforts be intensified to transfer fish farming technologies to between 5% and 28% of farmers who were not aware of some fish farming technologies.

3. that, in the meantime, efforts at sustaining the level of adoption recorded in this study should be put in place while intervention programmes should be implemented to increase farmers' acceptance of pituitary gland and re-circulatory system whose adoption were at low ebbs. Studies are needed to ascertain reasons for farmers' rejection of pituitary gland re-circulatory system technologies.

4. That the Federal Government should not only subsidize the price of fish feeds to encourage local production and conserve Nigeria's foreign exchange earnings but also tackle the perennial poor power supply.

5. That Fish farmers should be educated on the need for adequate record-keeping. The process of proper farm record keeping should be demystified and farmers trained on how to keep simple but useful farm records.

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