Constraints to Adoption of Recommended Fish Technologies among Homstead Catfish Farmers in Ebonyi State, Nigeria

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ABSTRACT

Constraints to *adoption of recommended fish technologies among homestead catfish farmers in Ebonyi State, Nigeria were investigated in this study. Multistage random sampling procedure was used in selecting agricultural blocks, circles and homestead catfish farmers. The sample size was 120 homestead catfish farmers. Data was collected on farmers' socioeconomic characteristics, level of adoption of fisheries technology and constraints to adoption. Data was analyzed using descriptive statistics such as frequency counts, percentages and mean. Results indicate that fertilization of pond/water management and fingerlings production ($\bar{X}$ = 4.1), pond construction ($\bar{X}$ = 3.9), feeding rate ($\bar{X}$ = 3.7), stocking rate ($\bar{X}$ = 3.8) and harvesting and processing ($\bar{X}$ = 3.8) were the catfish technology packages adopted by farmers. Constraints to adoption of catfish technology packages amongst homestead catfish farmers were unavailability of hybrid fingerlings ($\bar{X}$ = 2.6), fish diseases ($\bar{X}$ = 2.3), water pollution (M=2.2), high cost of fish feed ($\bar{X}$ =2.1) and infrequent visit by extension workers ($\bar{X}$ = 2.3). Policies aimed at encouraging farmers' access to extension education, subsidy of farm inputs, availability and effective distribution of improved fish seeds were advocated for increased catfish production.*

Keywords*:* Catfish technologies, Homestead catfish farmers, Fingerlings production

INTRODUCTION

Nigeria has natural endowment for aquaculture production through virtually uninterrupted year round environmental condition. Ebonyi State is surrounded by numerous rivers, swamps, with abundant rainfall, effective harvesting and storage surface water and run off which undoubtedly favour fish farming (Egwu, 2001). Catfish, particularly *Heterobranchus spp* is the specie of choice generally accepted and grown in monoculture by fish farmers in the State (Nwosu *et al*., 2001). Notwithstanding, the natural endowment of the state, low production and productivity have characterized this sub sector, thereby limiting its ability to form the traditional role of economic development. It is assumed that farmers make adoption decision based upon utility consideration and comparing various technologies that are available. Farmers will adopt a technology if its utility exceeds the utility of others (Louis, 1999).

Fish production in Nigeria is either capture fisheries (Artisanal fishing and small-scale fish farming) or by importation. Subsistence fish farming involves dig dung seasonal ponds in the well developed fish water flood plains and enclosure tank, or swamps to retain fish at the recession of the flood water with little or no management, resulting to subsequent low yield. (Sikoki and Otobotekere, 1999).The contributions of fish to the existence of man cannot be over emphasized being a good source of animal protein. It plays a vital role in the nutritional diet of man serving as source of employment and income (FAO, 2001). However, fish consumption is gaining wide prominence particul0arly in developing countries where 40% or more of their protein comes from fish (Amaefula *et al*., 2010). This is because fish is more affordable, palatable and readily available than other sources of animal protein, less tough, more digestible and its acceptability cut across religion, ethnics and cultural boundaries (Ekeocha *et al*., 2010). The FAO (2006) estimated the total demand for fish in Nigeria at 2.1 million tonnes at 11.5kg per capita consumption whereas the domestic production is 452,460 metric tonnes. Fish contain high level of essential sulphur containing amino acids with low; cholesterol and fat content, thus often recommended in the diets of high blood pressure, diabetic and obesity patients, (Nwosu, *et al*., 2001). Apart from nutrition, fish contribute to Millennium Development Goal (MDG) through providing employment opportunities and generation of revenue for local and national government from licences and taxation. More so, fish is a source of livestock feeds and fish oil is

used in pharmaceutics/ companies (Isiebor *et al*., 2006).

Fish farming as a branch of aquaculture is defined as the raising of fish for immediate family consumption or as commercial ventures (FAO 2006). Voluntary service overseas (2002) described fishing as the rearing of fish in a controlled volume of water, but when it is raised in an enclosure, it is known as a pond. There are about 7,823 fish ponds and 8 lakes, covering about 2089.01 million cubic meters of water within the middle belt and coastal fishing zones having the highest number. This indicates that Nigeria has a high potential for fish production (Adikwu, 1999). Fish farming is relatively a new study in Agriculture. It is about 50 years old in Nigeria (Olukunle 2004; Olagunju *et al.,* 2007). Halfrick (2003) opined that fish can be grown in tanks of nearly every shape and size. Fish tanks typically are rectangular, circular or oval in shape, and in earthen and concrete ponds. The size of the tank or pond depends on a variety of factors including: stocking rate, species selected, water supply, water quality and economic considerations.

However, it's obvious that fish supply from marine and freshwater capture fisheries cannot meet the growing global demand for aquatic production. The quantity supplied is consistently lower than the increasing demand, thus an importation of about 800,000 tons (valued at $900 million) in 2009,that later increased to about one million tons before early 2011 was made to augment the shortage (Marcela and Uche, 2010). Ogundale (2007) in a study on backyard fish farming found that fish farmers need training on management practices in order to adopt recommended fish technologies. Adoption is an evidence of technology acceptability and use achievement of Millennium Development Goals (MDG's) of eradicating extreme hunger and poverty by 2015 as well as achieving food security by 2020. This depends to a large extent on the innovation adopted by farmers, factors that influence adoption of technologies by farmers which ranges from level of education, farm level constraints to technologies, gender and social barriers to inappropriate technology in an environment (Chambers 1993, Ezebuiro 2009). Innovation worth of adoption by farmers must be compatible with existing farming systems, norms, values and belief of farmers. The information on improved technology or change programme through agencies has in recent time's generated conflictions in rural and traditional societies. These usually move dramatic when the idea for scale is at variance with the prevailing norms, belief systems are values of the rural communities. Adequate market inventories would encourage farmers to be market oriented and adopt more improved technologies than at present (Kughur, 2011). For fish farming to excel technologically there is need for the adoption on recommended technologies of fish farming using homestead which is convenient to use low level of adoption of improved technologies. Improper packaging of research results thus leading to misinterpretations, release of vague technologically not feasible, economically unviable and culturally incompatible technologies, lack of adequate manpower in the extension delivery outfits, inadequate logistic support and extension massages skewed in favour of crops (Ugboh 1999, Nwachukwu 2003).

Many improved fish technology packages has been developed and disseminated to farmers in the study area without considering the constraints to their adoption. There is a dearth of information hence; the broad objective of this study is to assess the adoption of fish production technologies by homestead catfish farmers in Ebonyi State, Nigeria. Specifically the study, estimated average socio-economic statistics of homestead catfish farmers in the study area, ascertained the levels of adoption of fish technology packages by homestead catfish farmers in the study area and identified constraints to catfish production in the study area

METHODOLOGY

The study was conducted in Ebonyi State, Nigeria. Ebonyi is primarily an agricultural producing region. The three agricultural zones in Ebonyi State namely; Ebonyi North, Ebonyi central and Ebonyi south were used for this study. A multistage random sampling procedure was adopted in the selection of blocks, circles and catfish farmers. First two blocks were randomly selected from each of the three zones namely Abakiliki and Ebonyi from Ebonyi North Agricultural zone; Ezza South and Ikwo from Ebonyi Central Agricultural zone and Afikpo South and Afikpo North from Ebonyi South Agricultural zone. This gave a total of six (6) blocks. From the selected blocks, two (2) circles each were randomly selected to give a total of twelve (12) circles. Finally five (5) contact catfish farmers were randomly selected from the selected circles and this gave a total of sixty (60) catfish farmers. A structured questionnaire was used in soliciting information on farmers' socioeconomic characteristics, level of adoption of fish technologies and constraints to adoption of the technologies. Data were analyzed with descriptive statistics such as frequency counts, percentages and mean scores. Problems associated with adopting fish technology packages among catfish farmers was measured using a 7–item rated on a 3-point likert type scale of very serious, moderately serious and less serious and scored as 3, 2 and 1 respectively. A midpoint was obtained and based on the mid score decision rule, any mean score greater than or equal to

2.00 implied a serious problem and mean score less than 2.00 denotes no serious problem.

Model specifications

The adoption of recommend fish technology packages by catfish farmers were determined using adoption score analysis. This is in accordance with Okoye *et al*., (2009). It will be achieved using 7 point likert Scale

1	Unaware	O
2	Aware	1
3	Interest	2
4	Evaluation	3
5	Trial	4
6	Accept	5
7	Reject	6

Farmers with adoption score of 3.0 and above were regarded as having reached average score of technology, that is, they are at evaluation stage, while farmers with adoption score of less than 3.0 where either at unaware, aware and interest stages.

The mean adoption score is determined thus

$$Xs = \frac{\Sigma X}{n}$$

Xs of each was computed by multiplying the frequency of each response pattern with its appropriate nominal value and dividing the sum with the number of respondents to the items.

This can be summarized with the equation below

$$Xs = \frac{\Sigma fn}{nr}$$

Where Xs = mean score

Σ = Summation

f = Frequency

n = Likert nominal value

nr = Number of respondents

$$Xs = \frac{0+1+2+3+4+5+6}{7} = \frac{21}{7} = 3$$

RESULT AND DISCUSSIONS

Socioeconomic characteristics of homestead catfish farmers in Ebonyi state Nigeria

The data on Table 1 shows the average statistics of catfish farmers in Ebonyi State, Nigeria. On the average, a typical homestead catfish farmer was 45.12 years. This shows that the framers were in the age range of making decision on adopting catfish production recommended strategies. This will help in risk aversion and efficient use of available resources disposed to the farmer. The catfish farmers had 9.22 years of education and 14.2 years of farming experience. The mean value for education among farmers reveal that the they did not complete secondary education, hence education is thought to enhance adoption of technologies Unamma, (2004).The average pond size of the farmers was 7m^2 with an average extension contact of 4.5 times in a month. The mean size of the ponds is encouraging since fish farming is practiced on homestead. The size of pond is dependent on the stocking rate which in turn translates to profit. The result of extension contact is not surprising because most ADP's in the country are faced with the challenges of funding and inadequate extension staff Naswem, (2007)

Table 1
Average statistics of homestead catfish farmer in Ebonyi state, Nigeria

Variables	Mean	Standard deviation	Minimum	Maximum
Age of the farmer (years)	45.12	12.01	22	31
Educational level (years)	9.22	4.07	4	14
Farming experience (years)	14.2	14.10	6	12
Pond size (m^2)	7	2.10	4	32
Extension visits (number of times)	4.5	0.34	0	6

Levels of adoption of fish technology packages among homestead catfish farmers in ebonyi state, Nigeria

Results in Table 2 shows that a fairly good proportion of catfish farmers (41.7%) with a mean adoption score of 3.3 and 36.7% with mean adoption score of 3.8 indicated that pond construction and stocking rate were accepted and adopted respectively. Also 56.7 percent and 35 percent of the farmers adopted fertilization of pond/water management ($\overline{X}$= 4.1) and feeding/feeding rate ($\overline{X}$= 3.7) respectively. Furthermore, 25 percent and 48.3 percent of the respondents adopted test cropping and fingerlings production with means of 3.3 and 4.1 respectively. Finally, a fairly good proportion of the farmers (45%) with a mean of 3.8 adopted harvesting and processing technology packages. Since the mean adoption scores of these packages were above 3.0, it shows that the technologies were fully adopted by the homestead catfish farmers.

Table 2
Levels of Adoption of Fisheries Technology Packages among Catfish Farmers inEbonyi State, Nigeria.

TEP	Unaware	Aware	Interest	Evaluation	Trial	Accept	Reject	Total	Mean adoption
Pond Construction	5 (8.33)	2 (3.3)	4 (35)	57 (28.3)	20 (8.3)	125 (41.7)	24 (6.7)	237	**3.91**
Stocking Rate	4 (6.7)	3 (5)	6 (5)	21 (11,7)	70 (23.3)	88 (36.7)	42 (11.7)	230	**3.8**
Fertilization of pond/Water Mgt	2 (3.3)	4 (6.7)	8 (6.7)	15 (3.3)	32 (13.3)	170 (56.7)	18 (10)	247	**4.1**
Feeding/Feeding Rate	2 (3.3)	10 (16.7)	4 (6.7)	21 (.11.7)	52 (21.7)	105 (35)	30 (8.3)	222	**3.7**
Test Cropping	4 (6.7)	3 (5)	20 (16.7)	42 (23.3)	48 (20)	75 (25)	12 (3.3)	200	**3.3**
Fingerlings Production	3 (5)	5 (8.3)	2 (1.7)	9 (5)	64 (26.7)	145 (48.3)	18 (5)	243	**4.1**
Harvesting and Processing	3 (5)	6 (10)	10 (8.3)	9 (5)	56 (23.3)	135 (45)	12 (3.3)	228	**3.8**
Total Mean Adoption Score									**261**
Mean ($\overline{X}$)									**3.7**

Decision Rule = 3.0 and Above = Adoption
Values in Parentheses are Percentages
Where, TEP = Technology Packages

Farmers' constraints to catfish adoption in Ebonyi state, Nigeria

The constraints encountered by homestead catfish farmers in adopting fish technology packages in the study area are presented in Table 3. The result indicates that unavailability of hybrid fingerlings ($\overline{X}$= 2.58), Fish diseases ($\overline{X}$= 2.37) and water pollution ($\overline{X}$= 2.27) were problems encountered by homestead catfish farmers in the study area. Improved fingerlings have proved to produce early maturing and healthy table fishes, thus attracting higher price. One of the most important problems that have limited fish production and led to folding of some fish farms in Ebonyi State is diseases which consume a lot of capital (Danveura and Fuller, 1999). High cost of fish feed ($\overline{X}$= 2.10) and infrequent visits by extension workers ($\overline{X}$= 2.03) were also ascribed problems of the catfish farmers. High cost of feed as a problem has an implication on the total cost of production of catfish, thereby affecting farm gate price of the commodity. Extension contacts have shown to enhance the adoption of farming technologies there by giving confidence to the agent on the innovation he/she is disseminating (Imoh and Essien, 2006).

Table 3
Constraints associated with catfish adoption in ebonyi state, Nigeria

Constraints	Very Serious	Moderately Serious	Less Serious	Total	Mean
Unavailability of Hybrid Fingerlings	40(120)	15(30)	5(5)	155	**2.58***
High Cost of Fish Feed	33(99)	18(36)	9(9)	126	**2.10***
Fish Diseases	28(84)	20(40)	12(12)	138	**2.37***
Water Pollution	132(73.33)	20(16.67)	6(10)	158	**2.27***
Lack of Storage FacilitiesMarketability	23(66)	10(20)	27(27)	113	**1.88**
Infrequent Visits By Extension Agents	23(66) 24(72)	9(18) 14(28)	28(28) 22(22)	112 122	**1.86** **2.03***

Decision Rule 2.0 and above is Serious
Less than 2.0 is Less Serious, Very Serious 3, Moderately Serious 2, Less Serious 1
Values in parentheses are nominal Likert values multiplied by frequencies

CONCLUSION AND RECOMMENDATIONS

The study has revealed that homestead catfish farmers adopted all the technology packages (pond construction, adequate stocking rate, fertilization of pond/water management, feeding rate, test cropping, fingerlings production and harvesting and processing) disseminated by extension to their contact farmers in the study area. Unavailability of hybrid fingerlings, fish diseases, water pollution, high cost of fish feed and infrequent visit by extension workers were the major adoption problems encountered by homestead catfish farmers in the study area, it is recommended that;

1. Farmers access to information about fish farming technologies packages need to be sustained. This underscores the importance of disseminating information to the potential farmers about the technology, considering the fact that there are barriers hindering such.
2. Access to education for the catfish farmers is advocated to enhance the acceptance of any technology package transferred.
3. Formation of cooperative societies is advocated. This will encourage access to credit and farm inputs such as fingerlings and fish feed at reduced costs.
4. Stakeholders in the fishery sector and research institutes are encouraged to develop hybrid fingerlings that will give higher returns to the farmers. This will encourage the unemployed youths to engage in catfish production as a poverty alleviation strategy.

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