Journal of Agricultural Technology 2011 Vol. 7(6): 1539-1548
Available online http://www.ijat-aatsea.com
ISSN 1686-9141

Adoption of new technologies by fish farmers in Akure, Ondo state, Nigeria

Okunlola, J.O.*, Oludare, A.O. and Akinwalere, B.O.

Department of Agricultural Economics and Extension, The Federal University Of Technology Akure, Nigeria

Okunlola, J.O., Oludare, A.O. and Akinwalere, B.O. (2011) Adoption of new technologies by fish farmers in Akure, Ondo state, Nigeria. Journal of Agricultural Technology 7(6): 1539-1548.

Fish has been used a major source of protein for Nigerians. Of all the resources protein, fish is the easiest to digest with low level of calories than other protein foods and thus have overall superiority over. Others in weight control diets. Despite its importance, the level of production is low in Nigeria. There is therefore, the need by the fish farmers to adopt improved technologies for fish production. The adoption of new technologies by fish farmers in Ondo State was clearly investigated. The identification of various technologies being introduced to the farmers, determine the sources of information to the fish farmers, examine the effect of extension visitation on farmers adoption of new technologies and compare farmers production level before and after adoption of new technologies were preformed. Purposive sampling technique was used to select five communities and 50 fish farmers by observation technique to obtain information on farmers' production and confirmed some of the facts earlier stated by the respondents. Results showed significantly associated between age, level of education and adoption of new technologies while sex, religion and marital status were no significantly associated with adoption of new technologies. The average output of fish farmers before adoption was 2653.57 and after adoption was 3,465.63. The cost of input before adoption was $ 3718.62 and after adoption was $11861.11, while the quality of stock before adoption of innovation was 5,950.0 and after adoption of innovation was 25,360.

Key words: Fish, Adoption, Technology, Farmer

Introduction

The search for adequate food supply in view of the soaring population in most part of Nigeria has been a serious concern for International agencies, government and many agricultural food Scientists. Apart from the above, the issue of malnutrition and inadequate food supply is a critical problem. The energy intake by Nigerians averaged 225 kilocalories a day against internationally estimated minimum of 2500 and 2800 kilocalories daily. About 13-18 million people (mostly children) also die yearly from hunger,

* Corresponding author: Okunlola, J.O; e-mail: niyiyela@yahoo.com

malnutrition and poverty-related causes. Over 70% of Nigerians lived within the ambit of poverty (Okumadewa, 2006) and they are poor to obtain food required for healthy growth of children and minimal activities of adults. It is important to note that the global food equation recognizes two major protein components namely, food crop components and animal protein component. Animal protein sources include meal from cattle, sheep and goat, poultry, eggs, milk and milk products, wild life and fish. As a result of the bottlenecks in the production of animal, there has been the problem of meeting the percent animal protein consumption required by the average Nigerian (Tewe, 1997). The per capital protein intake as recommended by FAO is 55gm out of which 10.6 gm should be from animal origin FAO, 2004. The Nigerian food balance sheet showed that only 4.82 of animal protein in consumed which is only about 10% of the recommended total protein intake (Ajayi, 1985).

In view of the situation above, there is the need to identify animal protein source whose quality and biological value has been ascertained and has been tested for nutritional programmes to reverse its symptom of protein malnutrition-Fish protein is an essential major source that could be used to address the above. Fish offers high quality protein, provides 19% of the protein source in developing countries and offers up to 180 calories per capita per day (FAO, 1992). The overall demand for dietary protein is also asserted to be on the increase with population growth and rising standard of living in rural and non rural areas. Apart from fish been a major protein source, it is also recommended for those whose lives are threatened by Cardio-Vascular Diseases, bearing the fact that lipids in fish unlike animals are formed from a relatively high proportion of unsaturated (Omega-3) fatty acids, the lipids are polyunsaturated fatty acids (Balogun, 1998). People who suffer from atherosclerosis are also encouraged to choose meat from lean fish as it contains low cholesterol content. Clinical trials have also shown that fish oil supplementation is effective in the treatment of many disorder including rheumatoid, arthritis, diabetes, ulcerative collites and raynands diseases (Toft, 1987). Fish contains vitamin A and D which helps to maintain healthy eyes and strong bones respectively. It also contains Vitamin B which helps to reduce stress, anxiety and depression; furthermore, it helps to prevent skin disorder such as psoriasis (www.fishthought.co.uk).

In Nigeria, most fish production comes from artisanal fisheries until recently when there is growing awareness of the potentials of aquaculture (fish farming). It is unfortunate that despite the growing awareness of fish farming most practicing farmers operate extensive fish culture in the ponds leaving fish to forage on their own food, space, without appropriate attention to fish health, water quality, and nutrition. In recognition of the above, concerted efforts are

being made by government at various levels in the country to introduce improved technologies to fish farmers to enhance their level of production. With the efforts of both government and non governmental organizations in recent time towards improved fish production; it is therefore pertinent to ask the following questions: Which new technologies are being introduced to the farmers? Do the farmers adopt the new improved technologies? What are the factors affecting adoption of these technologies by the farmers?

The main objective was to examine adoption of new technologies by fish farmers in Ondo State. The specific objectives were to examine the socio-economic characteristics of respondents, identify the various technologies being introduced to the farmers, determine the sources of information to the fish farmers, examine the effect of extension visitation on farmers adoption of new technologies and compare farmer production level before and after adoption of new technologies.

Methodology

The study was carried out in selected communities of Akure North and South Local Government Areas (LGAs) of Ondo State, Nigeria. The state is agrarian in nature as it locates in the tropical rainforest with over 70 percent of the indigenes being farmers.

Sampling and sample size

Purposive sampling technique was used to select five communities from the LGAs namely Oba-Ile, Iju, Akure, Ogbese and Ijare where aquaculture is prominent. The list of fish farmers in these communities were collected from the state ministry of Agriculture. From the list, systematic sampling was used to select 50 fish farmers. A pre-tested and validated structured questionnaire was administered on the respondents to obtain the primary data for the study. Observation technique was also used to obtain information on farmers' production techniques and confirmed some of the facts earlier stated by the respondents.

Method of data analysis

Descriptive and inferential statistics were used to analysis the primary data. This included the use of frequency and percentage distribution and Chi Squares. Cost analysis (π=ATR-ATC) method was also used

Results and discussion

Socio-Economic Characteristics of respondents

Most of the farmers are middle aged (mean age of 40.5 years). This implied that the respondents are agile and active to withstand the rigors of fish farming. Eighty two percent are male and 98% of Christians and 2% of Muslims. Majority of the respondents were married (86%) while 12% were single and 2 percent divorced. Result indicated that 70% of the respondents studied in tertiary education, 12% with Diploma certificate while 16% studied in secondary school and 2% primary school (Table 1). Educational level of the respondent is a strong factor to be considered in adoption of innovation. Okunlola (2009) and Agbamu (2006) stated that educational level is one of the factors that influences adoption of new technology by farmers.

Seventy six percent of the respondents were worked in livestock production, while 24% were involved in both livestock and food crop production. The study also showed that 58% of the respondents worked in between 1–10 fish ponds, 16% of 11–30 fish ponds and 4% above 30 fish ponds. The most of farmers were small scale fish farmers. With the type of farm sizes, 34% a stock of 10,000 fishes, 8% of 11,000–50,000 fish stock and 10% above 50,000 fish stock.

Table 1. Socio-Economic characteristics of the respondent

Variables	Frequency	Percentage
Age	5	10
26–35	10	20
36–45	18	36
46–55	14	28
56–65	3	6.0
Male	41	82
Female	9	18
Religion		
Christianity	49	98
Islam	1	2
Marital Status		
Single	6	12
Married	43	86
Divorced	1	2
Level of Education		
Primary	1	2
Secondary	8	16
OND/NCE	6	12
Tertiary Level	35	70
Type of Farming		
Livestock	38	96
Crop and Fish Farming	12	24
Years of Farming Experience		
≥ 5Years	20	40
6–10	19	38
11–15	4	8
16–20	4	8
≥ 20 years	1	2
Mode of Farming		
Full time	36	72
Part time	14	28
No of Ponds		
1–10	32	64
11–20	8	16
21–30	6	12
30 and above	4	8

Respondents fish farming characteristic

Seventy percent of the farmers produced only cat fish, while 30% produced both cat fish and Tilapia. The reason for the above, could be attributed to the fact that cat fish adapts more to the fishing environment and could withstand stress more that Tilapia. The study revealed that 20% of the respondents use the conventional method of farming, 68% use the modern method while 12% of the respondents combined both methods. The most respondent have started fish farming less than 10 years and are educated. It could give to various sources of information on modern method of farming. Fifty percent utilize hired labour, 42% used farm labour and 8% contract labour for their farm work. Sixty six percent of the respondents got their fingerlings from government sources while 40% got their stock from local friends and co-farmers.

Table2. Respondents farming characteristics

Type of fish	**Frequency**	**Percentage**
Catfish only	35	70
Tilapia and cat fish	15	30
Production method		
Traditional	10	20
Modern Method	34	68
Conventional & Modern Method	6	12
Modern Methods of Production		
Re-circulatory System	28	56
Flow–through System	2	4
Stagnant Pool System	5	10
Combine Methods	10	20
Sources of labour		
Hired labour	25	50
Farmily labour	21	42
Contractual	4	8
Sources of fingerlings		
Local hatchers	33	66
Friends	6	12
Government sources	11	22
Stock Capacity		
$10/m^2$	3	6
$20/m^2$	16	32
$30/m^2$	9	18
$50/m^2$	4	8
No response	18	36

Respondents sources of information on new technology.

The study revealed that 42% of the respondents got their information from fellow farmers, 32% from published materials such as practice booklets and bulletins, 22% through television programme, 20% from radio and model farmer respectively while 22% through extension visitation. The result implied that majority of the farmers did not have access to extension activities which is supposed to be a major source for disseminating information to respondents on new technologies. This could be attributed to the most Agricultural Extension Programme in Nigeria are tilted towards food crop and livestock production. The results confirmed by Fasakin, (2008) who stated that poor agricultural extension services are a serious constraint to fish production in Nigeria.

Sources o f Information	Frequency	Percentage
Radio	10	20
Television	11	22
Extension Visitation	9	18
Published materials	12	24
Fellow Farmers	21	42
Model Farmer	10	20

*Mutiple response

The various technologies in fish farming and farmers' level of awareness of the technologies was shown in Table 3. Eighty four percent of the farmers was very high aware of the use of flow through techniques in fish production. Fifty six percent was also very high aware of the use of floating feeds (Pellets) while 44 percent claimed that they were not aware of the use of sex reversal (hormone) method for production. About 58 percent was also high aware of the use of homestead fish tanks for production. The level of awareness of these technologies gave a lot of influence on adoption of technology and fish production.

Table 3. Respondents level of awareness of fish production technologies

Technologies	Level of Awareness							
	Very Much		Just Aware		Not Aware		No Response	
	F	%	F	%	F	%	F	%
Flow through	42	84.0	5	10.0	1	2.0	2	4.0
Re-circulatory	28	56.0	12	24.0	7	14.0	3	6.0
Induced breeding	18	36.0	16	32.0	13	26.0	3	6.0
Floating feeds (Pellets)	28	56.0	16	32.0	4	8.0	2	4.0
Sex reversal methods (hormones)	12	24.0	14	28.0	22	44.0	2	4.0
Use of homestead fish tanks	29	58.0	12	24.0	6	12.0	3	6.0

Perception of respondents on adoption of new technology

From the result, 33% of the respondents agreed that the technologies that were introduced to them that more complex to comprehend and utilize, 26% disagreed with the assertion and 38% were undecided. Majority of the respondents (28%) could not decide whether the technologies were costly or not. Similarly, 40% was undecided whether the inputs to back up the technologies were available. However, 30% showing the inputs were accessible to acquire. Forty four percent of the respondents also were no adequate sources of information on the new technologies. The consequence is that most of the farmers could not adopt the technologies, since they were not aware of the innovation. Okunlola, (2009) stated that awareness is the first stage of adoption before the respondents develop interest in the technology and later decided on adoption.

Table 4. Perception of respondents on adoption of new technology

Variables	SA		A		U		SD		D	
	F	%	F	%	F	%	F	%	F	%
It is complex to utilize	7	14	22	19	38	5	10	8	16	
It is too costly	12	24	18	36	14	28	4	8	2	4
It is culturally incompatible	3	6	3	6	2	46	7	14	14	28
There are no inputs to back up the technologies	4	8	11	22	20	40	2	4	13	26
The timing was not appropriate	3	6	8	16	25	50	5	10	5	10
Farm Size	4	8	8	16	20	40	6	12	12	24
Inadequate source of information	2	44	9	18	17	34	11	22	10	20

Socio-economic characteristics of respondents and adoption of new technologies

Results showed that there is a significant association between age, level of education and adoption of new technologies while sex, religious, marital status has no significant association with adoption of new technologies. The implication is that age and educational level influence adoption of technologies by the respondents. The study confirmed by Adebiyi *et al.* (2010) Agbamu, (2006) studied that education and age influence adoption of new technology.

Table 5. Association between Socio-economic characteristics of respondents and adoption of new technologies

Socio-Economic Characteristic	Cal X2	Tab X2	Level of Significance	Degree of Freedom	Decision
Age	13.17	7.815	0.05	3	S
Sex	0.03	3.84	.005	1	NS
Religion	0.25	3.84	0.05	1	NS
Marital Status	0.33	5.9	0.05	2	NS
Educational Level	24.22	9.4	0.05	4	S

The average output of fish farmers before adoption was 2653.57 and mean average output after adoption was 3,465.63 as shown in Table 6. The cost of input before adoption was $ 3718.62 and cost of input after adoption was $11861.11 while the mean quality of stock before adoption of innovation was 5,950.0 and mean quality after adoption of innovation was 25,360. This indicates that the new technologies are more expensive and could serve as a constraint to adoption of new technologies by the farmers. However, the profit level (**$**55034.56) was higher that before adoption of new technologies.

Table 6. Mean average output of fish farmers before and after adoption

Variable	Mean Value before	Mean Value after
Average output	2,653.57	3,456.63
Cost of input**($)**	3718.62	11861.11
Quantity of Stock	5,950.00	25,360.00
Cost of Output**($)**/ Kg	2.33	2.63
Profit (ATR-ATC)	**Before Adoption($)**	**After Adoption($)**
	10164.7	55034.56

Conclusion

From the study, socio-economic characteristic of respondents play a significant role in adoption of new technology among the farmers. Despite these factors, the low level of extension visitation affects adoption of new technology. In order to increase the level of fish production effective visitation to the farmers must be carried out.

References

Adebiyi, S and Okunlola J.O. (2010). Factors affecting Adoption of Cocoa Rehabilitation Techniques in Oyo State of Nigeria. Proceedings The 18TH Annual Congress of the Nigerian Rural Sociological Association of Nigeria. FUTA. Akure, Nigeria.

Agbamu, J.U. (2006). Essentials of Agricultural Communication in Nigeria. Malthouse Ltd. pp. 65-73.

Ajayi, S.S. (1985). Wild life in Crisis: Conservation the antidote: Inaugural Lecture University of Ibadan. Ibadan Nigeria.

Balogun, A.M. (1998). The Sanctity of Fish As Food. Inaugural Lecture Series 14;The Federal University of Technology Akure.

Food and Agricultural Organisation of the United Nations (FAO), 2004: FAO Year Book Vol. 92 /1,2 (1992). FAO Year Book Published by FAO, Rome, Italy. p 62.

Fasakin, E.A. (2008). Fish as Food:Yesterday, Today and Forever. Inaugural Lecture Series 48;The Federal University of Technology, Akure. pp 6-7.

Okunlola, J.O. (2009). Factors influencing Adoption of Rubber Based Technologies among Small Holder Farmers in Delta state Nigeria International Journal of Food Agriculture and Environment Helsinki, Finland 7:2.

Okunmadewa, F. (2006). Poverty Reduction and The Nigerian Agricultural Sector. El Shaddai Press. pp 1-7.

Tewe, O.O. (1996). Sustainability and Development Paradigms from Nigerias Livestock Industry; Inaugural Lecture, University Of Ibadan. pp 6-10.

Toft, I. (1987). Effect of n-3 poly unsaturated fatty acids supplementation in active rhumated Arthritis. A double controlled consumer study. Annal of integrated Medicine 106: 497-503.

(Received 3 May 2011; accepted 1 October 2011)