

**SOCIO-ECONOMIC CONSTRAINTS TO FISH FARMING INTEGRATION AND IMPEDIMENTS TO THE ACCEPTABILITY OF FISH CULTURED FED WITH MAGGOTS IN ABEOKUTA ZONE OF OGUN STATE, NIGERIA**

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**Abstract:** The study was conducted to evaluate the Socio-economic constraints to integrated fish farming and impediments to the acceptability of fish cultured fed with maggot in Abeokuta zone of Ogun State. Four blocks out of six blocks were studied namely: Ilugun, Olorunda, Wasimi, and Ifo. Primary data were obtained from 120 fish farmers with structured interview schedule which were selected using purposive and convenience sampling techniques and the return rate was 83.3%. The result reveals that majority (73%) of the fish farmers are male, 63% are in the active age distribution of 41 – 50 years, tertiary education (66%) while 95% are in the bracket of 1 – 10 years business experience, married (77%) and 70% are Christians. 83% are not members of co-operatives society and the annual income of many (40%) are above ₦100, 000. The study confirmed that lack of enough capital, access to extension services and unavailability of high quality fingerlings was their major constraints faced by integrated fish farmers. Most of the farmers engaged in integrated fish farming made profit and obtained their information from multimedia approach of communication. Therefore, the public opinions on fish fed with maggot are irritated to consumers (90%), 36% of the fish farmers said that maggot should be used to compliment with other feeds while 13% said that it was cheaper than any other feeds and (85%) of the farmers believed that fish cultured with maggot from pigs manure will not be acceptable to some people based on religion beliefs and fear of disease invasion. There was significant association between the socio-economics characteristics of the fish farmers and the level of constraints faced in integrated fish farming.

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### 1.Introduction

Hunger and malnutrition remain amongst the most devastating problems facing the world poor and needy (FAO, 2002). Nigeria is one of the developing countries affected by hunger, deprivation and abject poverty by its citizenry inspite of its enormous natural and human resources (Alamu *et al.*, 2004).

Nigeria is among the largest fish consumers in the world with over 1.5 million tons of fish consumed annually (Davies *et al.*, 2008). Fish farming in Nigeria has its antecedents in the traditional African reciprocal,

communal, technical, labour support/skills transfer system of about 10,000 years ago. Fish production from aquaculture accounted for about 96,000 metric tons in year 2000, while only 20,000 metric tons in 1994 (Ajana, 2004).

Fishers possibly employed the earliest aquaphore (water-borne), fish enclosures (cages, pencreels, and pots) as fish keeping /storage facilities prior to sales as used in Asia and elsewhere worldwide for generations (Bevendge, 2004).

The coastal and brackish water constitute the major area of production, followed by inland rivers and lakes (Williams, 1996). Integrated fish culture has been considered an ideal method of land use, which has been practiced in Asia for several centuries (Eyo *et al.*, 2006).

Although significant breakthrough has been achieved in these countries with this type of integration, not much has been achieved in Africa with special reference to Nigeria (Eyo *et al.*, 2006). In Nigeria Integrated fish farming has been reported in many states of the federation in which 50% of fish farmers integrate, poultry, piggery or livestock with fish production, while integrated fish cum crop production is on the rise also in several states (AIFP, 2005).

Poultry- fish farming is the integration of poultry animals like chicken, duck and geese with fish farming (Tokrisna, 1995). The most common practice in Nigeria is fish cum chicken, which is widely practiced because of its profitability. Birds raised for egg (layers) or the one that are raised for meat (broilers) can be integrated with fish farming. This will reduce the cost of inputs, such as fertilizer and feed, so as to maximize profits (Asala, 1994).

Pig farming is widely practiced across the southern and middle belt of Nigeria, offers the farmers a husbandry which is easier than chicken farming. It has good returns (AIFP, 2005).

Fish cum crop production is the cultivation of agricultural crops (e.g. vegetables and arable like maize, rice etc) and aquatic plants (like water spinach, water chestnut, aquatic weeds like Pistia, duckweed, water hyacinth, Azolla etc) with fish farming (Nnaji *et al.*, 2003). The common practice in fish cum crop production in the country is in cultivation of fish with rice, and vegetables. This is widely practiced among the farmers in the rural areas, at subsistence level.

With the prevalent economic situation in the country, there is the need for farmers to engage in a result oriented farming system that will guarantee and sustain adequate food security. Integration is suitable for poor farmers with remarkably low expenditure pattern and continuous low spending for food and other dietary requirement (Ayinla, 2003). Integrated fish farming provides the farmers with a steady source of income all year round; this comes from various farm products (Gabriel *et al.*, 2007).

A relatively new approach is the use of insects as a source of animal protein in fish nutrition (Ogunji *et al.*, 2006). Interestingly study of the use of housefly maggot meal (magmeal) as substitute for fish meal in fish diets have increased in recent times (Adesulu and Mustapha, 2000; Fasakin *et al.*, 2003; Ajani *et al.*, 2004).

Maggots are produced from the semi transparent larval stage of the housefly (*Musca domestica*) and are used to process magmeal (Ogunji *et al.*, 2006).

Studies have shown that magmeal is of high biological value. The percentage of crude protein ranges from 39–61.4%, lipid 12.5–21%, and crude fiber 5.8–8.2%. Magmeal is also rich in phosphorus, trace elements and B complex vitamins (Teotia and Miller, 1973). Ajani *et al.* (2004) and Fashina-Bombata and Balogun (1997) reported that magmeal can replace up to 100 percent of fish meal in the diets of Nile tilapia (*O. niloticus*). The authors concluded that the biological value of magmeal was equivalent to that of whole fish meal and that the larvae contained no anti-nutritional or toxic factors sometimes found in alternative protein sources of vegetable origin. According to Ogunji *et al.* (2006) the incorporation of magmeal into tilapia diets seems to have no oxidative stress generating effect on fish metabolism. It contains no compound that stimulates the generation of reactive oxygen species and can effectively be used as an alternative protein source in Nile tilapia fingerling production.

The objectives of the study is to describe the socio-economic constraints to integrated fish farming, determine the acceptability of fish culture fed with maggots and identify the constraints and solution faced by integrated fish farming.

## 2.METHODOLOGY

**Study area:** Ogun State is one of maritime coastal states with 15km seashore located in Ogun water side Local Government Area. Ogun State lies within the longitudes 2°4', and 4°35' and latitudes 6°2' and 7°58' in the tropics. It is bounded in the west by the Benin Republic in the south by Lagos State and the Atlantic Ocean, in the East by Ondo State and in the North by Oyo and Osun States. It has a land area of 1`6, 409.26km<sup>2</sup> and a population of 2,820,298.66. Ogun state is people mainly by the Awori, Egba, Ijebu Ikale, Ilaje, Remo and Yewa. All except the Egun belong to the Yoruba Language sub family (Adekoya 1994).

**Abeokuta Zone:** The study area is the Ogun State Agricultural Development Projects (OGADEP) classified Abeokuta zone. The zone which is one of the four agricultural extension zones in Ogun State covers 6 out of the 20 Local Government areas that presently make up Ogun state of Nigeria. The Local Government areas are: Abeokuta North, Abeokuta South, Odeda, Ifo, Ewekoro and part of Ado-Odo/Ota. The state has a total water surface area of 2,237,000 hectares (Ita *et al.*, 1984) and land area of 16,369,370 square kilometers. As at 2005, there were about 5,530 fish ponds, occupying a total area of 1,518.48 hectares in Ogun State.

The Abeokuta zone of unified extension services was purposively selected due to the fact that fish farming business are majorly embarked upon by the people in the zone. The zone has six extension blocks which are Ilugun, Opeji, Ewekoro, Wasimi, Ifo and Olorunda. Out of these six blocks, four were selected

which are Ilugun, Ifo, Wasimi and Olorunda. The zone has 45 productive fish hatchery and 7 were abandoned making of 15 hatcheries (Olaoye *et al.*, 2007).

**Sampling techniques:** A combination of purposive and convenience sampling procedures were adopted in selecting 25 fish farmers in each blocks. Altogether one hundred respondents were sampled by trained enumerators under the supervision of the researcher. The main instruments for primary data collection were well-structured interview schedules used to obtained information on the socio-economic characteristics, extension and communication services, constraints of integrated fish farming and the public opinions on fish cultured with maggots. The primary data collected were supplemented with secondary data obtained from Ogun State Agricultural Development Programme annual reports, Federal Department of Fisheries reports and relevant journals.

**Data analysis:** The data were analyzed using descriptive statistics (e.g. frequency counts, percentages, etc) and inferential statistics (Chi-square).

### 3.RESULT

#### 3.1 Socio economic characteristics of respondents

The socio-economic characteristics of the fish farmers comprises of age, sex, marital status, household size, level of education, religion, mode of fish farming, other occupation, years of fish farming experience, pond size, land acquired, source of labour and source of finance, derived benefit belong to cooperatives, Name of organization and extension service distance as related to aquaculture in the study areas are presented in Table 1.

Majority (63%) of the respondents were within the age group of 41-50 while very few (3%) within the age of 61-70. Most (93%) of the fish farmers were male while few (70%) were female. Most (92%) of them were married, (77%) single, (1%) widow and none of them are divorced. Several (80%) of the fish farmers household were from 2-6 and 1% were within 12-16. In terms of education, many (66%) of the fish farmers had tertiary education and 2% of no formal education. Majority (70%) of the respondents were Christians while few (30%) were Islam. Among the fish farmers interviewed (83%) were part time in the professions while only (17%) were full-time. Many (59%) of them were civil servant, (14%) were crop farming, (11%) traders, (9%) livestock farming and only (7%) specify others occupation. Most (95%) of the respondents had 1-10 years experienced and 2% had 31-40 years experienced. Pond size of few (36%) farmers was within 1-20m<sup>2</sup> and 2% each within 101-120m<sup>2</sup> and 601-900m<sup>2</sup>. Many (63%) of the respondents acquired their land through purchased and none was leasehold. Source of labour of many (63%) was by hiring labour, (32%) by family labour, (4%) by friends and only (1%) not specified.

Almost half percent (54%) of the respondents' source of finance was by personal savings, most (98%) of the farmers derived benefits while only 2% said No. Most (83%) of them belong to cooperatives and (17%) do not belong to cooperative. Most (90%) of them belongs to Zion Faith Farmers Association while 19% belongs to Imole Ayo CT&CS. The distance of most (85%) farmers' farm to the extension services or agent (km) was between 1km and 10km.

**Table 1: Percentage distribution of fish farmers' socio-economics profiles**

VARIABLES	FREQUENCY	PERCENTAGE
<b>AGE</b>		
28-40	18	18.0
41-50	63	68.0
51-60	16	16.0
61-70	3	3.0
<b>SEX</b>		
Male	93	93.0
Female	7	7.0
<b>MARITAL STATUS</b>		
Single	7	7.0
Married	92	92.0
Widow	1	1.0
Divorced	0	0.0
<b>HOUSEHOD SIZE</b>		
2-6	80	80.0
7-11	17	17.0
12-16	1	1.0
Above 17	2	2.0

<b>LEVEL OF EDUCATION</b>		
No Formal Education	2	2.0
Primary Education	11	11.0
Secondary Education	21	21.0
Tertiary Education	66	66.0
<b>RELIGION</b>		
Islam	30	30.0
Christianity	70	70.0
Traditional	0	0.0
<b>MODE OF FISH FARMING</b>		
Part-time	83	83.0
Full-time	17	14.0
<b>IF PART-TIME WHAT IS YOUR OTHER OCCUPATION</b>		
Civil Servant	59	59.0
Crop Farming	14	14.0
Trading	11	11.0
Livestock Farming	9	9.0
Others	7	7.0
<b>FARMING EXPERIENCE (Yrs)</b>		
1-10	95	95.0
11-20	1	1.0
21-30	1	1.0
31-40	2	2.0
41-50	1	1.0
<b>POND SIZE(m<sup>2</sup>)</b>		
1-20	37	36.0
21-40	15	15.0
41-60	18	18.0
61-80	4	4.0
81-100	13	13.0
101-120	2	2.0
601-900	2	2.0
1-10,000	6	6.0
2-20,000	3	3.0
<b>LAND ACQUIRED</b>		
Purchase	63	63.0
Inheritance	25	25.0
Leasehold	-	0.0
Gift	9	9.0
Others	3	3.0
<b>SOURCE OF LABOUR</b>		
Family labour	32	32.0
Hired labour	63	63.0
Friends	4	4.0
Others	1	1.0
<b>SOURCES OF FINANCE</b>		
Loan	9	9.0
Government	1	1.0
Cooperative	32	32.0
Personal savings	54	54.0
Friends & relatives	4	4.0
Others	-	-
<b>DERIVES BENEFITS</b>		

Yes	98	98.0
No	2	2.0
<b>BELONG TO COOPERATIVE</b>		
Yes	17	17.0
No	83	83.0
<b>NAME OF ORGANISATION</b>		
Zion Faith Farmers Association	90	90.0
Ibogun Farmers Association	2	20.0
Imole ayo CT & CS	1	1.0
Asejere Farmers Association	2	2.0
Ifedola Cooperative	5	5.0
<b>EXTENSION SERVICE DIST</b>		
(Km)	7	
0.10-0.70	85	
1.00-10.00	6	
11.00-20.00	1	
21.00-30.00	1	
31.00-55.00		

Source: Field survey, 2009

Entries in Table 2 show the distribution of fish farmers distance from the farm, culture period. Annual income, spent on labour in a year, amount spent on fish management, what do you realized from other occupation. Among the fish farmers interviewed, (85%) claimed that their distance from farm in a km was between 1 and 20km, many (40%) cultured period for the farmers was 6 months and 2% for 9 and above. Few (40%) of the fish farmer's annual income fell above ₦100,000 and none do not fell between 5,000-10,000. Few (33%) of the farmers spent 20,000-30,000 on labour in a year and 9% spent 40 and above. In term of amount spent on fish production/year (25%) spent above 50,000 and 16% spent ₦ (20-30,000). Many (46%) fish farmers' yield fell within 10-20kg and the amount spent on fish management (37%) spent was ₦ (5-10,000).

**Table 2: Percentage distribution of economic characteristics of fish farmers**

VARIABLES	FREQUENT	PERCENTAGE
<b>FARMERS DISTANCE FROM THE FARM</b>		
0.01-0.20	7	7.0
0.21-0.40	1	1.0
0.41-0.60	5	5.0
0.61-0.80	1	1.0
1 – 20	85	85.0
100	1	1.0
<b>CULTURE PERIOD</b>		
4 months	4	4.0
5 months	20	21.0
6 months	46	46.0
7 months	28	28.0
9 months	2	2.0
<b>ANNUAL INCOME</b>		
₦1,000- ₦ 5,000	1	1.0
₦5 – ₦10,000	-	-
₦10,000- ₦20,000	19	19.0
₦20- ₦50,000	14	14.0
₦50- ₦100,000	26	26.0
Above 100,000	40	40.0
<b>SPENT ON LABOUR IN A YEAR</b>		
₦5- ₦10,000	31	32.0
	27	27.0

₦10- ₦20,000	33	33.0
₦20- ₦30,000	9	9.0
₦40 and above		
<b>AMOUNT SPENT OF FISH PRODUCTION/YEAR</b>		
₦1- ₦10,000	19	19.0
₦10- ₦20,000	23	23.0
₦20- ₦30,000	16	16.0
₦30- ₦50,000	17	17.0
Above ₦50,000	25	25.0
<b>WHAT IS FISH YIELD</b>		
10-20kg	46	46.0
20-30kg	6	6.0
30-40kg	16	16.0
40-50kg	14	14.0
Above 50kg	18	18.0
<b>AMOUNT SPENT ON FISH MANAGEMENT</b>		
₦5- ₦10,000	22	22.0
₦10- ₦20,000	37	37.0
₦20- ₦50,000	16	16.0
₦50 & Above	25	25.0
<b>WHAT DO YOU REALISED FROM OTHER OCCUPATION</b>		
₦5- ₦10,000	7	7.0
₦10- ₦20,000	8	8.0
₦20- ₦30,000	28	28.0
₦30- ₦40,000	57	57.0
₦40- ₦50,000		

### Constraints faced by integrated fish farmers

Table 3 shows the distribution of respondents based on the constraints faced by integrated fish farming and how it can be solved; Majority (76%) of the respondents chosen capital as the major constraints, (20%) chosen unavailability of high quality fingerlings, (14%) chosen suitable land with year round water H<sub>2</sub>O availability, (4%) chosen source of information as the major constraints while only (1%) chosen soil and water but none chosen Government policy, access to extension services and others do not specify. Many (55%) of the fish farmers chosen credit subsidies as the constraints, (20%) chosen input subsidies (9%) chosen cooperative society, (6%) chosen availability of land, (5%) chosen access to information and none do not specify.

**Table 3: Percentage distribution of fish farmers by constraints faced by integrated fish farming**

VARIABLE	FREQUENCY	PERCENT
SUITABLE LAND WITH YEAR ROUND WATER AVAILABILITY		
Capital	14	14.0
Unavailability of high quality fingerlings	76	76.0
Source of information	20	20.0
Government Policy	4	4.0
Access to extension services	0	0.0
Soil and Water	0	0.0
Others (specify)	1	1.0
Availability of land	0	0.0
Cooperative Society	6	6.0
	9	9.0

Credit Subsidies	55	55.0
Input subsidies	20	20.0
Access to information	5	5.0
Others (specify)	0	0.0

### 3.2 Fish farmers' extension and communication services

Table 4 shows the distribution of respondents on extension and communication services. The entries are; majority (87%) of the farmers got their information from the extension agents, (8%) from friends, (5%) from Radio/T.V and none from printed media and nobody specify either. Most (99%) of the farmers had access to extension service and only (1%) do not. (67%) of the farmers says, extension agent visited them every fortnight, (32%) said monthly, only (1%) said occasionally by specification. (63%) of the fish farmers had training programmes or meeting on integrated fish farming attending once in one month, (16%) each for once in 3 month and once in 6 month and (5%) specified that once in a year. Most (95%) of the fish farmers got their source of information from extension agent, (4%) from others farmers, (1%) from contact farmer and none specified. (98%) of the respondents suggested that the system of contact farmer should continued while (2%) said No.

**Table 4: Percentage distribution of fish farmers by extension and communication services**

VARIABLE	FREQUENCY	PERCENTAGE
Extension agents	87	87.0
Radio/T.V	5	5.0
Printed media	0	0.0
Friends	8	8.0
Other	0	0.0
<b>Access to Extension Services</b>		
YES	99	99.0
NO	1	1.0
<b>AGENT/VISIT</b>		
Monthly	32	32.0
Every fortnight	67	67.0
Quarterly	0	0.0
Yearly	0	0.0
Never	0	0.0
Others (occasionally)	1	1.0
<b>ATTENDING PROGRAMME</b>	63	63.0
Once in one month	16	16.0
Once in 3 month	16	16.0
Once in 6 month	5	5.0
Other (Once in year)		
<b>SOURCE OF INFORMATION</b>	4	4.0
Other farmers	95	95.0
Extension agent	1	1.0
Contact farmer	0	0.0
Others		
<b>CONTACT FARMER CONTINUES</b>		
Yes	98	98.0
No	2	2.0

### 3.3 Public opinions on fish cultured with maggots

Table 5 shows the distribution of respondents by public opinions on fish cultured with maggots. Most (98%) of the respondents claimed that people got irritated with fish fed with maggots, fish cultured with maggots from piggery will not acceptable to some, based on religion beliefs (85%), flesh density of fish fed with maggot is different from that of other fish fed with compound diets (90%) and cost effectiveness of maggot use as fish diet is



less compared to that of others (97%). The labour forces involved in maggot collection is laborious from distances compared to farmer(s) having poultry-cum integrated fish in the same location says by most (97%), fouling and contamination of fish pond medium with maggot is possible if items are not thoroughly washed or neutralized (96%), decay on left over of maggots used as diet for fish can affect the fish pond medium if care is not taken (92%), the fear of transferring of communicable (Zoonotic) diseases on consumption of fish fed with maggots to man is possible (78%), the return on investment (ROI) of fish fed with maggots only better than that of maggot with other feeds (44%) and. (60%) of the respondents believe that maggot use as fish diet is more accessible and affordable for the farmers than total compounded feed use.

**Table 5: Percentage distribution of fish farmers by public opinions on fish cultured with maggots**

VARIABLES	FREQUENCY	PERCENTAGE
People get irritated with fish fed with maggots.	98	98.0
People believed that fish fed with maggots from piggery will not be acceptable based on religion beliefs	85	85.0
Flesh density of fish fed with maggots is different from that of other fish fed with compounded diets or other feedstuff	90	90.0
The cost-effectiveness of maggots used as feed diet is less compared to that of others	97	97.0
Labour force involve in maggots collection is labourious from far distances compared to farmer(s) having poultry cum fish integration in the same location	97	97.0
Fouling & contamination of fish pond medium with maggots is possible if not properly washed	96	96.0
Residues on the pond bottom may affect the fish	92	92.0
Fear of transferring of communicable diseases (Zoonotic) on consumption	78	78.0
Contain plenty water	8	8.0
Should be used to complement feed	36	36.0
Save cost	13	13.0
Labour intensive	13	13.0
Differs from other feeds	6	6.0
It can cause disease transfer	5	5.0
Not too good for consumption	3	3.0
Gives low returns	10	10.0
Not recommended	6	6.0

These are the opinions gave by the fish farmers on maggot use as fish diet; 8% suggested that maggot contains plenty water, (36%) said that it should be used to complement other feed, (13%) suggested that it saves cost, another (13%) said that it was labour intensive, (6%) of the respondents suggested that it differs from other feeds. (5%) said it can cause disease transfer, (3%) said not too good for consumption, (10%) of the fish farmers observed that it gives low returns while (6%) of last respondents said that it was not recommended.

#### **Relationship association between socio-economics constraints and integrated fish farming by fish farmers**

**Table 6: Result of chi-square analysis of socio-economic constraints to integrated fish farming**

Entries in Table 6 reveal that Chi-square ( $\chi^2$ ) analysis was used to test the association between socio-economic constraints to integrated fish farming and acceptability of fish cultured fed with maggots. The analysis was tested at 1% and 5% percent significance level. The finding in Table 6 shows that factors under socio-economic constraints are significant at 1% level and thus the Null hypotheses is a rejected except for the amount spent on management operation. Thus, there was a significant association between the production factors under the socio-economics characteristics and the level of constraint faced by fish farmers in integrated fish farming.



**Table 6: Relationship association between socio-economics profiles and the integrated fish farming**

CONSTRAINTS			X <sup>2</sup>	SIGNIFICANCE	DF	DECISION
labour	Source of		100.4	0.00**	3	S
			94.91	0.00**	4	S
finance	Source of		81.18	0.00**	1	S
	Derived benefits from					
	Association Name of		4.67	0.00**	4	S
organization	Access to		70.62	0.00**	19	S
	Extension services					
farm	Distance from		76.50	0.00**	20	S
	Culture		93.80	0.00**	5	S
period			44.52	0.00**	4	S
	Animal		39.80	0.00**	4	S
income			20.72	0.00**	5	S
	Amount spent		46.40	0.00**	4	S
(labour)			7.71	0.00**	3	S
	Amount spent					
(production)			48.01	0.00**	3	S
	Yield					
(fish management)	Amount spent					
	Occupation					
	Suitable Land		10.29	0.01**	1	S
with water			140.24	0.00**	2	S
	Capital		12.8	0.00**	1	S
	Unavailability					
of fingerlings						
	Attending					
training programme			67.11	0.00**	3	S
	Extension		62.71	0.00**		S
Agent visit					2	
			81.18	0.00**		S
	Contact					
farmers as information					1	
source						

#### 4. DISCUSSION

According to the study, it can be shown that the entire fish farmers involved in integrated fish farming are (63%) fell between age distribution of 41-50 years, indicating that the majority of the respondents were within economically active age distribution (FAO, 1997) while minor (3%) proportion of the respondents are above 60 years of age, which means that the capacity or strength for integrated fish farming was insufficient.

The gender distribution of the respondents from the result reveals that (73%) of the respondents

were males while (7%) were females. This indicate that male are involve in integrated fish farming due to the great task and energy required integrated fish farming and also require a great deal of time, which women may not be able to cope. This is country to Worby (2001), report that a female are often motivated than male. This agree with FAO, (1995) which says that most women in fishing communities, have little or no say in making decision in area affecting their lives in the fishing industry and that they are more involve in marketing compared to integrated fish farming. Also supported by Olaoeye, (2002) who reported that

female in this part of country are usually involve as helper or as supplier of labour “light” farm operation such as planting, weeding, harvesting, processing and marketing.

Majority (92%) of the fish farmers were married, this may be due to the labour-intensive nature of integrated fish farming thus family labour play an essential role in feeding, sorting and digging of ponds.

Household size is an important variable of farm enterprise and an indication of degree of rurality. Close examination of variables related to household size level shows that most (80%) of the fish farmers had between 2-6 persons while few (1%) of the respondents have less than 2 person integrated fish farming has been found to be labour intensive and thus the need for family labour to support the integrated farming system and reduce cost of hiring labour may be seen as an advantage for a moderately large family size.

Majority of the respondents had Tertiary education (66%) while (21%) had complete secondary school, (11%) complete primary school and (2%) had no formal education. It shows that integrated fish farming require high technical know-how and skill thus, people who are illiterate cannot cope with integrated fish farming unless they have adequate training programme which can assist them on the field. Also previous studies have shown that education is a key factor in shaping perception of farmers (Adebayo and Adeyemi 2000). Also supported by the study of Maduke, (1995) which stressed that the education level of farmers is one of isolated variable related to their adoption improve farm practices.

From the study, it can be shown that (70%) of the farmers were Christian while (30%) were Muslim. It can be concluded that majority of the fish farmers involved in integrated fish farming are Christians and no traditional religion involves.

Majority (83%) of the respondents were part-time in the profession while (17%) were full-time. It can be shown that the farmers involved in integrated fish farming mostly have other profession apart from integrated fish farming while less people are really full-time and show more concentration or have enough time for the profession.

Since majority are part-time in integrated fish farming then (59%) of the fish farmers were Civil Servant. It can be shown that majority of fish farmers involved themselves in Civil Servant job than and other occupation.

95% of the respondents are in bracket 1-10 years experiences in integrated fish farming, 2% are in bracket 31-40 years and 41-50 years experience. This implies that the fish farmers in the study area have experience in integrated fish farming but there is

indication that the technology is still very new. “Experience plays a prominent role in any farming enterprise”.

The study reveals that majority (37%) of the respondents had pond size within the bracket of 1-20m<sup>2</sup>, (18%) within a bracket of 41-60 m<sup>2</sup> (15%) within a bracket of 21-40m<sup>2</sup>, (13%) within a bracket of 81-100m<sup>2</sup>. This implies that integrated fish farming require high financial capital to established thus money is a major constraint in pond construction.

Most of (63%) of the fish farmers acquired their land through purchase while (25%) through inheritance, (99%) gift. This implies that majority of the fish farmers bought their land through personal savings while some fish farmers inherited their own through parents or other relations.

63% of the respondents hired labour to construct their pond or any other work being carried out for the progress of the business enterprise while (32%) uses their family labour for the work done on the farm, through this, it reduces the cost being spend on the farm and a few member (4%) uses their friends as source of labour.

From the study, it can be reveal that most (54%) fish farmer’s source of finance was through personal savings, (32%) through cooperatives, 9% through loan, 4% through friends and relatives while (1%) was through Government. This implies that micro-credit is not usually accessible.

The main objective behind any fish farming enterprise is either to make profit (benefit) or to supplement income from other sources, most (98%) of the fish farmers practicing integrated fish farmers explained that they derive benefit while (2%) disagree with this facts. From the study, it can be concluded that the integrated fish farming was used mainly for source of income and not for home consumption.

Majority (83%) of the fish farmers are not member of cooperatives society while (17%) were members of cooperative society in order to derive one benefit or the other whether by borrowing money or any other form of achievements.

The study reveals the distribution of fish farmers belonging to one association or the other. It was shown that (90%) of the fish farmers belong to an organization known as Zion Faith Farmers Association, 5% belongs to Ifedola Cooperative, (2%) each belongs to Ibogun farmers association and Asejere Farmers Association while (1%) belong to Imoleayo CT&CS. 85% of the fish farmer’s distance farm to the extension services were within 1-10km, 7% within 0.10 – 0.70km, 6% were within 11-20km and (1%) each were within 21-30km and 31-35km. This implies that for any integrated fish farming to be achieved, the distance from the farmer’s farm to the extension

service must not be too long for the possibility of the work to be carried out. Because through the extension services or agents they can get information on how to manage their farm and help them acquire more knowledge to make the enterprise profitable.

This is the most important aspect in integrated fish farming because once the farmer's location to the farm is far, the operational aspect in the farm will be affected. Because through livestock feeding more manure will be generated out directly to the pond, but if otherwise there will be shortage of nutrients to the fish consumed. From this study, majority (85%) of the farmer's location to the farm are within 1-20km, (7%) were within 0.01-0.20km, (5%) were within 0.41-0.60km and (1%) was within 0.21-0.40km, 0.61-0.80km and 100km respectively. This implies that proximity has effect on the adoption of integrated fish farming.

Attaining faster culture period depends on the feeding habit of the fish. This implies that culture period in any integrated fish farming depends on the feed been given to the fish. That is feeding to satiation will allow the fishes to reach the culture period faster and from the study, it can be revealed that majority (46%) of the farmers cultured their fish within 6 months (28%) culture theirs within 7 months, (20%) within 5 months, (4%) culture within 4 months and 2% cultured above 9 months.

The annual income of most (40%) of the farmers are above ₦100,000 (26%) were within ₦50,000 – ₦100,00, (19%) were within ₦10,000 – ₦20,000 (14%) were within ₦20,000 – ₦50,000 and (1%) within ₦1,000 – ₦5,000. From this, it can be concluded that the rate of feeding the fish will allow the fish to reach a sizeable medium and sell them at a faster rate.

(33%9 of the respondents explained the amount of money spent on labour land in a year are within the range of ₦20,000-~~₦30,000~~, 30% spent between ₦5,000-~~₦10,000~~, (27%) spent between N10,000 , N20,000 and 9% spent above N40,000. This implies that majority of the integrated fish farmers uses hired labour for their farm. 25% of the fish farmers spend above N50,000 on fish production per year, 23% spent between N10,000- N20,000, (19%) spent between N1,000-N10,000, 17% spent between N30,000-N50,000 and 16% spent between N20,000-N30,000. This implies that 25% of the fish farmers spent above N50,000 for fish production per year while others spent less. This implies that pond construction is highly capital intensive. (46%) of the respondents hat fish field between 10 – 20kg, 18% above 50kg, 16% between 30 – 40kg, 14% between 40-50kg and 6% between 20-30kg. From this study, it

can be concluded that the higher the feeding rate, the high the fish yield.

37% of the respondents spent between N10,000- N20,000 fish management, 25% spent between N20,000 – N50,000 on fish management.

Majority (57%) of the fish farmers realized between ₦40,000 – ₦50,000 from other occupation apart from integrated fish farming, 28% realized between ₦20,000 – ₦30,000, 8% realized between ₦10,000 – ₦ 20,000 and 7% realized between ₦5,000 – ₦10,000.

From the study revealed fish farmers complained about the constraints faced by the integrated fish farming. 76% of the fish farmers said that capital was only constraints they are facing as integrated fish farmer, 20% said availability of high quality fingerlings, was their constraints, 14% said suitable land with year round water availability was their own constraints, 4% said source of information was the problem and only 1% said soil and water was his/her constraints and none out of the fish farmers chosen Government Policy, access to extension services to be their constraints faced by integrated fish farming.

Another set of fish farmers stood up and 55% of them said credit subsidies was their own constraints as integrated fish farming, 20% said input subsidies was their own problem, 9% said cooperative society was their constraints, 6% said availability of land and lastly 5% said access to information was the constraints encountered in integrated fish farming.

The results shows that majority (87%) of the respondents receive information on integrated fish farming through-extension agents, this is similar in case of television broadcast or radio, where 8% of the respondents received information on integrated fish farming via friends, this is also consonance with report of FAO (2001) that farmers view their friends, relation and neighbour as insurance against risk.

Access to extension service is one of the most valuable resources on integrated fish farming (Fabuson, 2000). Majority (99%) of the fish farmers have access to extension service while 1% said No.

From the study (67%) of the respondents said that extension agent visited their farm every fortnight, 32% said every month extension agent visited them and only 1% said that extension agent visited occasionally. This implies that most of the fish farmers are just aware of the activities of extension agent to disseminate information on integrated fish farming or fisheries technology, this is because integrated fish farming is very new in Nigeria

compared to ordinary fish farming with integrated. This finding is in agree with Ajetomobi et al., (2001) that weak linkage between research and extension have consistently been the major bottleneck in fish farming in Nigeria, also attribute timing of fishing operation by fishers in early morning or late in the night, this differ from the normal time schedule of extension visit.

The study reveals that majority of the fish farmer had one or the other form of fish farming training and had the technical expertise to manage their fish farm respectively. This implies that integrated fish farming require technical skill in handling integrated fish farming in other to have maximum yield. 63% of the respondents attending programme once in a month, (16%) each attending programme or group meetings on integrated fish farming once in 3 months and once in a 6 months while 5% specify that they attending programme on integrated fish farming once in a year.

The distribution of respondents by source of information on integrated fish farming shows that most (95%) of the farmers received their source of information through extension agent, 4% of the farmers did not make extension agent as their source of information on integrated fish farming but through other farmers while only 1% receives his/her own through contact farmer. This shows that most fish farmer depend on extension agent to received information on integrated fish farming, thus fisheries education and training should be encourage on radio and television and more extension agent should be employed this also argued by Ajetomobi et al (2001) that fisheries subset sector has not been fully developed like the crop sub-sector, this is due to the fact that fisheries extension is relatively new service in Nigeria.

Majority (98%) o the fish farmers advice that they wanted the contact farmer system to continued, that is they employed the extension agents to always contact the farmers in other to increase their knowledge through disseminating of information on integrated fish farming, so that the farmers will require more technical skill in handling fisheries technologies in other to have maximum yield.

This shows the distribution of the public opinions on fish cultured with maggots. 90% of the respondents believe that people got initiated with fish fed with maggots while 10% disagreed with this statement. Actually it is a "TRUE STATEMENT" in the sense that many people have it at the back of their mud that maggot is activity animal which people run away from and at the same time people do not want to associate with, because of its nature. Also, it can be as a result of spoilage. In short, in our society of today, opinions based on maggot can not be overlooked

because the statement is really affecting virtually all Nigerian when interviewed through questionnaire. "Truly people get initiated with fish fed with maggot is a true that".

Majority (85%) of the fish farmers believes that fish cultured with maggots from piggery will not be acceptable to some based on religion beliefs while (15%) said No. This is a true fact because it is mostly applicable to Islam because of the fact that maggots gotten can be from the pig manure or dung which cannot be consumed by the general Muslims.

90% of the fish farmers said that the flesh density of fish fed with maggots is different from that of other fish fed with compounded diets or other feeds stuffs while 10% said No. This statement is true for the fact that fish fed with maggot only is quite different in term of flesh density and also the weight of that fish are quite larger in size because maggot contain 80% of water and this is associated with the fish in question having lot of water its body.

97% of the respondents concluded that the cost-effectiveness of maggot use as fish diet is less compared to that of others while (3%) did not. This statement is true for the fact the maggot are gotten at a cheaper rate compared to others fish fed which are very expensive.

Most (97%) of fish farmers said the labour forces involved in maggot collection is laborious from far distances compared to farmer(s) having poultry-cum fish integration in the same location while (3%) did not. This is a true statement in the sense that maggot collections time consuming and at the same time it is rigorous in labour when the farm is far from the fish pond.

Fouling and contamination of fish pond medium with maggot is possible if items are not thoroughly washed or neutralized was said by most (96%) of fish farmers while (4%) did not agreed with this statement. This implies that direct feeding of maggot inside the fish pond without thoroughly washing or removing the diet or sand can pollute, contaminate and at the same time smelling of the fish pond, it is therefore advisable to wash the maggot including the items used like bowls, plastic spoons, bucket, scoop net e.t.c before using its to feed the fish or even after finish using them.

(92%) of the fish farmers said that decay on left over of maggot used as diet for fish can affect the pond medium if care, is not taken while 8% said NO. This implies that the uneaten maggot remaining inside the pond can affect the fish, if they are not remove on time through draining the water out of the fish pond and pouring another water which can result in any kind of diseases leading to the death of the fish (mortality)

The fear of transferring of communicable (zoonotic) diseases on consumption of fish fed with maggot to man is possible was said by 78% of the respondents while 22% did not agreed with this fact. This statement is true for the fact the unwashed maggot given to the fish and consumed directly by populace can spread diseases and affect the totality of people negatively. With this point most farmers have the fear of feeding maggot to their fish and concentrate more on the artificial feed.

44% of the respondents said that the return on investment (ROI) for fish fed with maggots only better than that of maggot with other feeds while (56%) opposes this statement.

Majority (60%) of the respondents said maggot use as fish diet is more accessible and affordable for the farmer than total compounded feed use while (40%) said No. This implies that maggot use only as fish diet are more cheaper than feeds and less time consuming if the farm is not close to the fish pond. Also it can be more accessible and affordable for the fact that the farm is very close to the fish pond where the farmers can easily have contact of getting the maggot directly from the integrated fish farm.

The last results shows the view of respondents about their opinion or what they can say of maggot use as fish diet (8%) suggested that maggot contains plenty of water, (36%) said that maggot should be used to complement with other feeds (13%) suggested that it saves cost, another (13%) said it was labour intensive (10%) of the respondents said it gives slow returns, (6%) said maggots differ from other feeds, another (6%) said it was not recommendable, (5%) said maggot can cause disease transfer and lastly 3% of the respondent said maggot was not too good for consumption.

There was significant association between the production factors under the socio-economics characteristics of the fish farmers and the level of constraints faced in integrated fish farming.

## 5. CONCLUSION

After careful analysis of the socio-economic constraints to integrated fish farming and impediments to the acceptability of fish fed with maggots, the major conclusion that could be drawn from this study are as follows:

- The result of this study reveals that majority of the fish farmers were male and most of the fish farmers age range was equally within the economic active range which also favour integrated fish farming.
- The study shows that majority of the fish farmers were named, it also revealed that they have experience in integrated fish farming.

- The study revealed the undermining role play by capital which constitutes serious threat to integrated fish farming.

- It is shown in the study that most of fish farmers engage in integrated fish farming to make profit. The result of the study shows that most of the farmers obtained information from extension agents and via friends, though Radio/T.V was not left out.

- Most farmers involve in integrated fish farming had a high level of education.

- Majority of the fish farmer do not belong to co-operative society.

Majority of the respondents are Civil Servant and take integrated fish farming as a subsidiary occupation. There was significant association between the production factors under the socio-economics characteristics of the fish farmers and the level of constraints faced in integrated fish farming.

## 6. RECOMMENDATION

According to Osuji (1983), lack of access to education, failure of extension to visit farmers and lack of financial assistant as institutional factors hindering the progress of integrated fish farming.

1. Capital is a major determinant of integrated fish farming among respondents. It will be of advantage to the farmers of credit scheme could be improved in order to increase the adoption of integrated fish farming among farmers. Nigeria Agricultural Cooperative, Rural Development, and Cooperatives Bank.

2. Bank, Cooperative Societies should reach out to farmers in this area by providing credit facilities to those that really want to go into integrated fish farming and to allow those that are already in it to expand their production level.

3. There is need for more publicity on integrated fish farming and people should be encouraged via input and technical support, woman should also encourage to engage in integrated fish farming.

4. There is also need for the farmers to always complement their live food (maggot) with other artificial feed if at all they want to use maggot, because maggot alone using as fish diet contain 80% of water and the labour involved is not appealing though it saves cost.

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