SOCIO-ECONOMIC VARIABLES AFFECTING AQUACULTURE PRODUCTION PRACTICES IN BORGU LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA.

FEJIKA, P. I., AYANDA, J.O AND SULE, A.M

ABSTRACT

The study examined the effect of socio-economics variables on aquaculture production practices in Borgu LGA of Niger State. Structured questionnaire was purposively used to obtain data through interview schedule from thirty identified fish farmers, while descriptive tools and chi-square were used for data analysis. Result of the analysis reveals that 72 ponds exist in the area with mean pond size of 438m2. Aquaculture is practice as a secondary occupation by 90% for the purpose of income generation and food security. The popular production practices are earthen pond (87%), semi-intensive system (67%) and poly-culture (90%). Socio-economic variables of age ($p=<0.001$), purpose ($p=<0.002$), education ($p=<0.0392$), and availability of technology ($p=<0.0471$) were found to be significantly associated with production practices. The positive association of variables is linked with high fish yield, profitability, and sustainability of aquaculture practices in the area. This confirms that pro-active information sharing and access to inputs by end users is necessary for growth and development of fish farming in Nigeria.

Keywords: aquaculture; practices

INTODUCTION

Technology, economic benefit and efficient extension delivery are responsible for the rapid growth and development of aquaculture experienced around the world. This is evidence in its high monetary value and increase in quantity supply. According to FAO (2004) report, the total world aquaculture production (excluding aquatic plants) in 2002 and 2003 were 39.8 and 42.3 million tonnes valued at US$ 53.8 billion and US $60.9 billion respectively. Asia dominates aquaculture and has successfully integrated it as livelihood activity in rural development programmes, thus, contributing positively to nutritious food supply, job creation, foreign exchange, poverty reduction, income generation and food security measure.

In 2003, Nigeria was placed in the 40th position with 30,677 (0.1%) tones in the world ranking of top 40 aquaculture producing nations (FAO/IFID, Accessed, 2005). Despite this, Nigeria is still the highest fish importer in Africa. Calculation from Federal Department of Fisheries (FDF) (2002) data reveal that in the last decade (1991-2000), the total aquaculture production was 201,707 tonnes of local total fish supply representing 5.3%, with an average of 20, 171 tonnes per year. The 5.3% contribution of aquaculture sub- sector is poor, which is evidence in the low exploitation of its potentials put at 12,547 million hectares of various inland water bodies in the country. In acknowledgement of this, Ugwumba and Ugwumba (2003); Dada (2004) agreed that aquaculture potentials of the country have not undergone the degree of development it is expected because less than 1% of potential is under going utilization. Presently, aquaculture is characterized by small scale producers at low levels of intensification. In recognition of this fact, the National Institute for Freshwater Fishery Research (NIFFR), New- Bussa, in 1996, recommended various technologies on aquaculture production practices for fish farmers in Nigeria to boast its development.

According to Decline (1992), fish production of a pond is the amount of fish gained at harvest and is dependent on the farmer's management and system of practice. Aquaculture practice is the adoption/use innovations in fish farming in an enclosure. The degree of

aquaculture practices affects productivity, benefit derived and subsequently development. By implication, type of production practice adopted indicates level of technology input to stimulate production growth and sustainability. The sustainability of aquaculture practice depends on the economic disposition and value it adds to the welfare of the farmer. Assessment of socio-economics factors as one of the indicators of aquaculture performance is crucial in a country like Nigeria, where its development is at infancy level. Bolorunduro (2003); Bolorunduro and Falaye (2003) agree that personal characteristics of farmers have a key role to play in adoption decision on improved technologies, and are therefore, important consideration in adoption studies. In the same vein , Oladele (2005), asserted that several parameters have been identified as influencing the adoption behaviour of farmers from qualitative and quantitative models for the exploration of the subject. Considerable evidence shows that demographic variables, technology characteristics, information sources, knowledge, awareness, attitude, and group influence affect adoption behaviour. CIMMYT (1993); Sevilleja (2000) identified some vital socio-economic variables for study to include age, education, sex, experience, membership of association, credit availability, farm tenure, input supply and risk aversion.

In Nigeria, studies in aquaculture farmers' socio-economic variables are scanty compare to other areas in agriculture. Edwards (2000) affirm that major gaps in knowledge exist in the social and environment/resource aspects of aquaculture especially in developing country. Therefore, for this purpose, the study attempts to investigate into the socio-economic characteristics that affect aquaculture production practices among farmers in Niger state with focus in Borgu Local Government Area (LGA). The specific objectives of the study include to determine the socio-economic characteristics of the aquaculture farmers in the area; to ascertain the type of aquaculture production practices adopted by the farmers; and to identify the information sources and constraints experienced in production practices.

METHODOLOGY

In Nigeria, Niger state and indeed Borgu LGA is strategic in fishery development because of the presence of Kainji lake measuring 1,240km^2; NIFFR; Federal College of Freshwater Fisheries Technology (FCFFT) in New-Bussa, the headquarter. Borgu LGA is located between 9°50, -10°55,N and 4°23-45,E (okoye, 1992). The population of Borgu LGA in 1991 census was 110,366 with a projection of over 144,770 in 2005 by Central Bank of Nigeria (2003). They people are known for crop farming, fishery and livestock rearing. According to Okoye (1992); Otubusin (1992); Okomuda *et al.* (1994) active aquaculture practice began in the area in 1980s, while the homestead fish technology was disseminated in 1988. Thirty aquaculture farmers were identified to be actively involved in fish farming practice in New-Bussa and Dogangari communities. Structured questionnaire were used to collect data in 2005 through interview schedule. The data were analysed using descriptive statistics and chi-square as presented below.

RESULTS AND DISCUSSIONS

Data on age shows that 60% is the most active productive workforce are within 41-50 years followed by 51-60 years (20%) and youths (20%). Dey *et al* (2002) reported an average of 43 to 52 years among Asian farmers, which is consistent with Bolorunduro (2003) and Ifejika (2006) findings in Nigeria. The 20% participation of youths is considered to be low, indicating that aquaculture is not attractive to them; hence, the issue of succession will affect future fish food supply because the active workforce is ageing. On sex, majority (80%) are male and 20% as female. The same trend was recorded in China, Philippines, India, Bangladesh and Indonesia except Vietnam where 56% are female according to Dey *et al*

(2002). The low participation of female will be attributed to a number of factors such as religious practice (Islam), oppressive land tenure system against women and lack of interest. This agrees with assertion of Oakley *et al* (1992) and Nigerian Institute of Social and Economic Research (NISER) (2003) on exclusion of women participation in socio-economic activity and agricultural constraints . The table further reveals that 87% of the respondents are married and single (10%). It implies that majority of the fish farmers shoulder a lot of family responsibilities. Frequencies on educational attainment show that secondary/ tertiary account for 94% compared to 6% for primary/ stack illiterate. The high literacy level of 94% of the farmers is enough to support information on technology use. Ridler and Hishamunda (2001) reported that successful cage farmers in Niger Republic were at minimal literate and is collaborated in Fawole and Fashina (2005) on association of education with the use of technology on organic fertilizer. Response on years of experience in aquaculture farming indicate that more than 60% of the respondents have over 10 years of experience and 13% had less than 5 years. Krause (1995) supported that experience reduces management risk, while Sevilleja (2000), Edwards (2000), Dey *et al* agree that experience is crucial and is contributing to the success of Asian aquaculture. Purpose of fish culture reveal that 50% operate fish farm for the dual purpose of income /consumption, 33% for income, and 17% for food. It implies that fish farming as a main source of income (33%) is on the increase, though. at infancy stage as established by Okomuda *et al* (1996) and Ifejika (2006) which is consistent with trend in Orissa and Utta Pradesh states in India according to Dey *et al* (2002). Sevilleja (2000) and FAO (2000) reported higher percentage of 66% and 81% as main source of income for fish farmers in Philippine and Indonesia respectively. Almost the respondents (97%) engage in fish farming as secondary occupation. Civil servants (67%) are majority followed by traders (20%). It establishes that aquaculture is practiced in the area as income generating activity and food security measure. Aquaculture as primary occupation is observed to be lowest in Vietnam (2-4%), Bangladesh (9%), Thailand (20%) and highest in China (100%) according to Dey *et al* (2002).

Table two shows that a total of 72 ponds exit in the area measuring 13,158m^2 and capable of producing 6. 5 tonnes of fish if stocked to capacity under high intensification. Ownership structure of the pond reveals that institutions own 50%, individuals (40.3%) and rented (9.7%). Sevilleja (2000) established that tenancy do not limit output, but rather motives the producer to achieve maximum benefit. Hence, farm renting could be alternative means to promote and attract youths as well as women into fish farming. The mean pond size is 438m^2 and is operated at small-scale level. Majority (73%) has pond size of 101-500m^2, followed by 20% for homestead pond (<100m2). In Indonesia, 78% culture fish in less than 500m^2 pond and high in China, Philippine, Thailand as reported by FAO (2000), Dey *et al* (2002), while Dada (2004), Oresegun and Ayinla (2001) reported the same in Nigeria. The popular pond system practiced by the farmers is earthen pond (87%) and concrete (13%). NIFFR Extension Guide Series (1996) recommended earthen pond system because it ensures maximum utilization of pond resources to supply fish food for increase production. On culture system, semi- intensive accounts for 67%, intensive system (23%) and extensive system (10%). The high percentage (90%) degree of intensification indicates that fish farmers practice high yielding and value added aquaculture to derive economic benefit with investment on conventional feed. The adopted culture system is consistent as experienced in China and Philippines according to Decline (1992), ICLARM (2001), Dey *et al* (2002), and established in Nigeria by NIFFR (1996), Okoye and Opeloye (1996). The dominant culture practice in the area is poly-culture (90%) of catfish and tilapia, followed by monoculture (7%) and integrated (3%). The practice of poly-culture is in line with NIFFR (1996) recommendation because it is cost effective and ensures high fish yield as observed in

Bangladesh according to Dey *et al* (2002). Evidence from the various adopted practices implies that fish farmers use conventional aqua feed to intensify pond productivity for profit.

On table 3, respondents affirm NIFFR (80%) as the main source of information, extension guide (13%) and friends/relatives (7%). It shows that contact and group methods of dissemination are effective compared to mass methods in the promotion of aquaculture activities as established in Sevilleja (2000) and Ifejika (2006). On availability of aquaculture technologies for use, 90% claim always available and 10% rarely available. Sevilleja (2000) and UNDP(2006) reported 50% and 41% increase in pond production in Bangladesh and Philippines respectively due to availability of technology in aquaculture. Majority (90%) source their fingerlings from hatchery and 93% agree that aquaculture is profitable which sales for #350-#450per kilogram depending on fish specie. Madu (1992) asserted that the use of improved and hybrid fish species ensure maximum growth and yield. The identified constraints experienced by the respondents are water supply (54.5%), high cost of feed (27.2%), credit (13%) and cost of fingerling (5.3%). The finding is consistent with Sevilleja (2000), Oresegun and Ayila (2001). To overcome the economic and technical issues of water supply, introduction of cage culture technology will prove useful by utilizing the Kainji lake water body.

The result of Chi-square analysis reveals that age ($p=<0.0001$), purpose ($p=<0.0002$), education ($p=<0.0392$), and availability ($p=<0.0471$) are significantly associated with the adopted aquaculture production practices of earthen pond, semi-intensive and poly-culture. Experience ($p=0.4435$) and gender ($p=0.9081$) were not significantly related with the production practice. Sevilleja (2000), Fawole and Fasina (2005) disagree with the finding. Experience, though important, is more likely to have influence where management and constraints to production constitute high risk.

CONCLUSION AND RECOMMENDATIONS

Aquaculture enterprise is found to be profitable, serving the purpose of income generating activity and food security. High yielding and value added fish farming is practice by farmers in earthen pond under semi-intensive and poly-culture production systems at small-scale level for economic benefit. Availability of technology and pro-active information dissemination were contributing factors to increase productivity and profitability. Water supply and high cost of feed are major constraints experienced. Various socio-economic factors have being established to affect production practices varies depending on environment and institutional factors. The following recommendations are made as matter of policy include; introduction of farm rental, cage culture and promotion of aquaculture in the mass media to increase awareness, attract new entrants and youths. Also, the NIFFR extension linkage with the State ADPs and other extension service providers should be strengthen to reach end users for sustainable increase in fish food supply and economic benefit.

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Table 1. Socio-Economic Characteristics of Aquaculture Farmers

Age	**Frequency**	(%)
21-30	2	7
31-40	4	13
41-50	18	60
51-60	6	20
Sex		
Male	24	80
Female	6	20
Marital Status		
Single	3	10
Married	26	87
Widow	1	3
Education		
No formal education	1	3
Primary	1	3
Secondary	2	7
Tertiary	26	87
Experience		
>5	4	13
6-10	6	20
11-15	8	27
16-20	10	33
>20	2	7
Purpose		
Consumption/Sales	15	50
Sales only	10	33
Consumption only	5	17
Primary Occupation		
Civil Servants	20	67
Traders	6	20
Farming	3	10
Clergy	1	3

Source: Field Survey 2005

Table 2: Response on Aquaculture Production Practices

Pond Ownership (Multiple Response)	**Frequency**	**%**
Individual	29	40.3
Rented	7	9.7
Institutions	36	50
Pond Size (m^2)		
<100	6	20
101-500	22	73
>1000	2	7
Pond System		
Earthen	26	87
Concrete	4	13
Culture System		
Extensive	3	10
Semi Extensive	20	67
Intensive	7	13
Culture Practice		
Monoculture	2	7
Polyculture	27	90
Integrated	1	3

Source: Field Survey 2005

Table 3 Information Sources and Constraints Experience by respondents

Information Channels	**Frequency**	**%**
Friend / Relative	2	7
Extension Guide	4	13
Research Institute (NIFFR)	24	80
Availability of technology		
Always available	27	90
Rarely Available	3	10
Not Available	0	0

Source of Fingerling		
Wild	3	10
NIFFR Hatchery	27	90
Profitability of Fish Culture		
Yes	28	93
No	2	7
Constraint to production (multiple response)		
Water Supply	30	54.5
High cost of feed	15	27.2
Credit	7	13
High Cost of fingerlings	3	5.3

Source: Field Survey 2005

Table 4: Result of Chi-square Analysis of Socio-economic Variables

Variables	**X^2**	**df**	**p-value**
Age	73.568	21	0.0001*
Experience	28.398	28	0.4435
Purpose	41.075	14	0.0002*
Sex	2.738	7	0.9081
Education	33.681	21	0.0392*
Availability	14.239	7	0.0471*

*Significant at 0.05 level