



ECONOMICS OF FISH PRODUCTION IN KADUNA STATE NIGERIA

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ABSTRACT

This paper examines the resources, costs and returns and other factors affecting fish production. A sample of 44 fish farmers was randomly selected from two local government areas of Kaduna State (Chikun and Kaduna South). Data was collected in 2006 production season through administration of a questionnaire to the fish farmers. Analysis of the data was done using descriptive statistics and budgeting technique. The analysis revealed that land, water, labour and capital were the main resources employed in fish production. The costs and returns analysis indicated that, variable cost constituted 97.63% of the total cost of fish production in the study area, while the fixed cost constituted 2.37%. Amongst the variable inputs, fingerlings/juveniles (42.82%) and feed (34.70%) constituted the highest (77.52%) to cost of production, while hired labour constitutes 16.91%. The cost of production was ₦571, 231.79, the total revenue of ₦5, 853, 625.64 and the net income was ₦5, 282, 393.85 indicating that fish production was highly profitable. Despite the high profitability in fish production, fish farmers identified lack of finance (97.7%), lack of good market (81.8%), pests and diseases (56.8%), and water supply (21%) as their most important problems in fish production. With this high level of profitability in fish farming, it is recommended that this information should be disseminated to all the farmers in these and other surrounding communities.

Keywords: fish, production, economics, analysis.

INTRODUCTION

Fisheries occupy a unique position in the agricultural sector of the Nigerian economy. In terms of Gross Domestic Product (GDP), the fishery sub-sector has recorded the fastest growth rate in agriculture to the GDP. The contribution of the fishery sub-sector to GDP at 2001 current factor cost rose from ₦ 76.76 billion to ₦ 162.61 billion in 2005 (CBN Report, 2005).

Fish is an important source of protein to large teaming population of Nigeria. Fish provides 40% of the dietary intake of animal protein of the average Nigerian (FDF, 1997). According to Adekoya (2004), fish and fish products constitute more than 60% of the total protein intake in adults especially in rural areas. Amienheme (2005) enumerated the importance of fish in Human Nutrition as follows:

- Food fish has a nutrient profile superior to all terrestrial meats (beef, pork and chicken, etc) being an excellent source of high quality animal protein and highly digestible energy;
- Fish is a good source of sulphur and essential amino acids such as lysine, leucine, valine and arginine. It is therefore suitable for supplementing diets of high carbohydrates contents;
- Fish is also a good source of thiamine as well as an extremely rich source of Omega-3 polysaturated fatty acids, fat soluble vitamins (A, D and E) and water soluble vitamins (B complex) and minerals (Calcium, Phosphorus, Iron, Iodine and Selenium);
- It has a high content of Polyunsaturated (Omega III) fatty acids, which are important in lowering blood cholesterol level and high blood pressure. It is able to mitigate to alleviate platelet of (cholesterol) aggregation and various arteriosclerosis conditions in adult populations;

- It reduces the risk of sudden death form heart attacks and reduces rheumatoid arthritis;
- Omega-3 fatty acids also lower the risk of age related muscular degeneration and vision impairment; and
- It decreases the risk of bowel cancer; and reduces insulin resistance in skeletal muscles.

Nigerians are large consumers of fish with demand estimate at 1.4 million metric tones. However, a demand supply gap of at least 0.7 million metric tones exists nationally with import making up the short fall at a cost of almost 0.5 billion US dollars per year. Domestic fish production of about 500,000 metric tones is supplied by artisan fisher – folk (85%), despite over fishing in many water bodies across the country (Adekoya, 2004). Nigeria has a land area of 923,768Km² with a continental shelf area of 47,934Km² and a length of coast line of 853Km. It also has a vast network of inland waters like rivers, flood plains, natural and man made lakes and reservoirs (Shimang, 2005). The inland water mass was estimated to be about 12.5 million hectares of inland waters capable of producing 512,000 metric tons of fish annually (Ita, 1984; and Shimang, 2005). Kaduna State has a fair share of the vast fishery resources. These include rivers, dams, and ponds where many fishing activities take place.

Despite these considerably high potentials, local fish production has failed to meet the country's domestic demand (FAO, 1995). The fish industry remains the most virgin investment in Nigeria compared with the importation of frozen fish in the domestic market (Ndu, 2006).

A sure means of substantially solving the demand -supply gap is by embarking on widespread homestead/small scale fish production. However, the sources of this effort must be anchored on analysis of fish



production. Therefore, this study was designed to determine the resources, costs and returns, and other factors affecting fish production in Kaduna State.

MATERIALS AND METHODS

The study was conducted in Kaduna State which occupies part of the central portion of Northern Nigeria. The State is situated between latitude $8^{\circ}45'$ and $11^{\circ}30'N$ and longitude $6^{\circ}10'$ and $9^{\circ}E$ (Nwanta, *et al.*, 2006). The State occupies a land area of approximately 48,473.2 square kilometers and has a population of 6,066,652 (NPC, 2006), about 80% of this population engages in peasant farming. Primary data were collected in 2006 production season through administration of a questionnaire instrument to fish farmers from two Local Government Areas (LGAs), namely, Chikun and Kaduna South. The two LGAs were purposively selected on the basis of their high involvement in fish farming. Out of a total of 450 fish farmers from the two LGAs, 22 were randomly selected from each LGA giving a sample size of 44 or 10% of the total fish producers. The data were collected on production variables such as; type of fish culture, size and capacity of fish pond, species and number of fish cultured, stocking, feeding, medication, harvesting and marketing taking into consideration the cost involved in carrying out each operation. Data on production and marketing constraints such as availability of fingerlings/juveniles, feeds, water and capital, climate, pest and diseases, market, transport, storage and prices were also collected. Analysis of the data was done using descriptive statistics and budgeting technique. Simple descriptive statistics such as the mean and percentages were used. The budgeting technique employed was the net farm income. The difference between the gross revenue (GR) and total cost (TC) gives the net revenue (NR), Net farm income (NFI) is expressed as:

$$NFI = GR - TC$$

where

NFI = Net Farm Income

TC = (TVC + TFC) = $P_x \cdot X$

GR = $P_y \cdot Y$

GR = Gross Return / Pond

P_y = Unit Price of Output

Y = Quantity of Output

P_x = Unit Price of Input

X = Quality of Input

TC = Total Cost (₦)

TFC = Total Fixed Cost (₦)

TVC = Total Variable Cost (₦)

RESULTS AND DISCUSSIONS

RESOURCES USED IN FISH PRODUCTION

Many resources in fish production were identified in the study area. But the ones identified by the fish farmers as the most critical were in order of their importance, land (95%), water (93%), labour (87%), and capital (79%).

Land

Land is one of the most important resources readily available for production in developing countries. The mode of acquisition of land in the study area is mostly through outright purchase from individual owners or from government by issuance of a certificate of occupancy. However, there are still other areas where land acquisition is by traditional inheritance. The location of land determines how land is used and the type of fish culture adopted by fish farmers. Farmers, whose lands are located in swampy areas with plenty of water, simply excavate such lands into earthen ponds. On the other hand, farmers utilize any available empty space in their homes and build them into ponds. The study reveals that 75% of the farmers used concrete ponds, while 25% used earthen ponds because their lands were located in swampy areas. The average pond size in the study area was found to be $174m^2$.

Water

This is one of the most important resources used in fish farming. Without assured, adequate and good quality water supply, fish production would be made impossible. The major source of water for fish farmers in the area was tap water from domestic water supply. The results in Table-1 shows that 70.45% of fish farmers used tap water while 20.45, 6.82 and 2.27% used water from streams/ rivers, well and boreholes, respectively.

Table-1. Distribution of respondents according to source of water.

Source of water	Number of respondents	Percentage
Tap water	31	70.45
Stream/River	9	20.45
Well	3	6.82
Borehole	1	2.27
Total	44	100

Labour

Labour is a very important factor in traditional agriculture (Norman, 1972). Two kinds of labour were identified in the study area that is, family labour and hired labour. Family labour is very important in fish production in the area because majority of the fish farms are homestead type located in the farmers homes. The size of the household helps in making this kind of labour available. The results in Table-2 shows that majority (27%) of fish farmers had household size of 5 persons, while 9.1, 11.4, 18.1 and 20.5% had household sizes of 10, 5, 8, and 7, respectively. The average household size in the study was 6. The analysis shows that family labour is a major component of the resources used in carrying out various operations in fish production in the study area.

**Table-2.** Distribution of respondents according to household size.

Household size	Number of respondents	Percentage
3	2	4.5
4	8	18.1
5	10	22.7
6	5	11.4
7	9	20.5
8	2	4.5
9	4	9.1
10	4	9.1
Total	44	100

Capital

The study considered both durable and non-durable capital items used in fish production. The durable capital items used by the fish producers in the area are the fish ponds, while the non durable capital items were the feeds and fingerlings/juveniles that farmers purchase from the open market. The study revealed that, there are two kinds of feed available to farmers; foreign or imported feeds and the local feeds made by local feed mills within the country. The study shows that majority (86%) of the fish farmers used foreign feeds, while 14% used local feeds. The results in Table-3 revealed that majority (43.2%) of the farmers preferred culturing Juveniles, while 18.2% preferred culturing fingerlings and 38.6% used both. Capital in the form of money needed to finance all production activities is also another important resource. The results in Table-4 shows that 93.2% of the fish farmers depended on personal savings to finance their production activities, while 4.5% of the farmers used group funds and 2.3% used other sources to finance their fish production.

Table-3. Distribution of respondents according to use of Fingerlings/Juveniles.

Type of fishes cultured	Number of respondents	Percentage
Fingerlings	8	18.2
Juveniles	19	43.2
Both	17	38.6
Total	44	100

Table-4. Distribution of respondents according to source of credit.

Source of credit	Number of respondents	Percentage
Cooperative and group funds	2	4.5
Personal	41	93.2
Others	1	2.3
Total	44	100

COSTS AND RETURNS ANALYSIS OF FISH PRODUCTION

The costs and returns analysis as shown in Table-5 revealed that variable cost constitutes 97.63% of the total cost of production while the fixed cost constitutes 2.37%. The results indicate that the cost of fingerlings/juveniles (42.82%) feed (34.70%) and hired labour (16.91%) were the major variable costs incurred in fish production. The average table size of fish was 1.12kg and price per table size fish was ₦624.92. The quantity of fish actually sold was 9367. The analysis as shown in Table-5 indicated that the cost of production was ₦571, 231.79 and the total revenue of ₦5, 853, 625.64 was realized, making a net income of ₦5, 282, 393.85. The analysis indicated that fish production was highly profitable.

**Table-5.** Estimated costs and returns of fish production in Naira.

Item of cost	Quantity	Unit cost (₦)	Cost/Month (₦)	Total cost for 8 months	%
A. Variable cost					
Juveniles/fingerlings stock per pond	9781	25.00		244,525.00	42.82
Feeds			24,771.70	198,173.60	34.70
Family labour	896 man-hours for 8 months		1,040.91	8,327.28	1.46
Hired labour	1344 man-hours for 8 months		12,068.18	96,545.44	16.91
Medication			-	2,586.36	0.41
Maintenance			-	7,459.09	1.31
Transportation			-	56.82	0.01
Storage			-	22.73	0.004
Total				565,187.70	
B. Fixed cost					
Water rate			936.30	7490.88	1.31
Depreciation (ponds/equipments)			720.45	5763.64	1.01
Insurance, tax, levy and commission				280.45	0.05
Total				6,044.09	
Total cost (A+B)				571,231.79	
C. Revenue					
Quantity of fish sold (table size)	9367	624.92		5853625.64	95.77
Total revenue (C)				5853625.64	
Net farm income C - (A+B)				5282393.85	

\$1 = ₦127.00**Note:** Depreciation on ponds/equipment was calculated using the straight line depreciation method.The average pond size in the study area was 174m².**FACTORS AFFECTING FISH PRODUCTION**

The factors affecting fish production are shown in Table-6, indicating that, the most important problems encountered in fish production were capital, marketing and diseases and pests as indicated by as many as 98%, 82% and 57% of the respondents, respectively. Also, 21% faced water supply problem, which, however was not severe. It is quite understandable that fish farmers, majority whom are peasant and small scale farmers, would be hard put to

raise about ₦ 0.6million which was found to be the estimated required total cost for a period of 8 months fish farming (Table-5). With respect to marketing, the farmers indicated that, they faced the problem of lack of organized fish marketing system which resulted in all the farmers selling their live fishes at the farmers' farms.

Fish production was affected positively through effective delivery of fingerlings/juveniles and feeds to the fish farmers. Furthermore, fish was sold live and therefore storage/preservation did not constitute any problem.

**Table-6.** Problems encountered in fish production (N = 44).

Problems	Number of respondents with problems	Percent of respondents
Supply of fingerlings/ juveniles	2	4.6
Availability of feeds	2	4.6
Water supply	9	20.5
Capital/finance	43	97.7
Disease and pest	25	56.8
Lack of organized market	36	81.8
Transportation	2	4.6
Storage	2	4.6

CONCLUSIONS AND RECOMMENDATIONS

Land, water, labour and capital were found to be the main resources employed in fish farming. The total revenue realized from total cost of production of ₦571, 231.79, was ₦5, 853, 625.64, making a net income of ₦5, 282, 393.85. Therefore, fish production in the area was highly profitable. Nonetheless, a vast majority of the fish farmers indicated that, they were faced with problems of finance, market, pests and diseases and water supply. With this high level of profitability in fish farming, it is recommended that this information should be disseminated to all the farmers in these and other surrounding communities.

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