



Production of Clariid Brood stock in Makurdi: Status, Constraints and Implications on Aquaculture in Nigeria

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ABSTRACT:

The availability of quality brood stock is a prerequisite to high quality fish seeds production. Several studies reported that there is shortage of quality Clariid brood stock in Nigeria. But there is no study which quantified the brood stock production status in Nigeria. This study was conducted in Makurdi, the capital of Benue state. The state is ranked among top to ten aquaculture producing states in Nigeria. A well structure questionnaire was designed and used for the study, as the instrument for data collection. This instrument was subjected to content validity. A total of 46 fish farms were purposively sampled. Data was analyzed using descriptive statistics. The study found that only 11 % fish farms in Makurdi Nigeria produce Clariid brood fish with an estimated production of 945 stocks per annum, while 89 % of farms do not produce fish brood stock. Gross shortage of brood fish was reported by 88.64 % of fish farmers. Although 59.09 % of the studied population source fingerlings from hatcheries, 40.91 % still relies on wild stock, particular from River Benue. Revealed constraints to brood stock production were: Poor knowledge and techniques for rearing brood stock, the long period of keeping fish to attain sexual maturity, which discourage most farmers, and lack of suitable culture facilities for brood fish. The most cultured species were *Clarias* sp., (50.00%), and *Heterobranchus* sp., (22.75%). *Heteroclaris* hybrid and *Oreochromis niloticus* had 13.64 % and 11.36 % culture respectively. The categories of fish farms observed in the study area from: Large scale, Medium scale, Small scale and Subsistence level had 13.64%, 40.91%, 29.55% and 15.91 % respectively. The study also found that 45.45% of the respondents had 4-6 years fish farming experience, 18.18 % had 1-3 years' experience, 13.64 % had 7-9 years' experience, while 11.36 % had 10 years and above experience, same with few new entrants. This paper call on the Nigerian government at the Federal and State levels to produce and equip Aquaculture Extension Officers (AEO) with the necessary tools to train fish farmers across the country in brood fish management, manipulations, and techniques to avoid inbreeding. This will not only increase brood stock production, there will be a positive multiplier effect on fingerlings production and table fish supply. The wide gap between fish demand and fish supply will be narrowed, and income will be augmented.

Keyword: Brood stock, fish production, fish seeds, fingerlings, Clariid fishes, Nigeria

INTRODUCTION

Brood stock or brood fish is a sexually matured individual used in aquaculture for breeding purpose [1]. Brood stock production is the most important aspect of aquaculture. There is a direct, positive correlation between quality brood stock, and fish seeds (fry, fingerlings and juvenile), fish yield or profit. The availability of high quality fish seeds is a prerequisite for a successful aquacultural enterprise [2]. The availability of quality brood fish on the other hand is a prerequisite for high quality fish seeds production. Adedeji and Okocha [3], also observed that the availability of fish seeds of the candidate species in adequate quantity is one of the most important factors for sustainable and profitable fish farming, which involves a number of management practices in the maintenance of quality brood fish in adequate number.

The production and management of brood stock provides a room for selective breeding and manipulation. According to Bromage *et al.* [4], managers can select for reproductive characteristic which influence the egg producing capabilities of individuals, and increase fecundity by providing them with optimal environmental diet. Management of brood stock may also involve the optimization of environmental factors such as pH, photoperiods, temperature etc [5]. Brood stock production and management promotes aquaculture growth since breeding season and spawning times can be shifted, thus expanding the seasonal range of production [5]. It also offers the opportunity of producing high

quality breeds with desirable characteristics such as high fecundity, fast growth rate and stress resistance abilities.

In Nigeria, more than 80 % of cultured fish is the catfish, mainly *Claris* sp., *Heterobranchus* sp., and their hybrids [6], members of the family Clariidae [7]. There is shortage of Clariid brood stock across Nigeria. This negatively affects fingerling production in the country. According to Atanda [6], a minimum of 500 million fingerlings per annum, is required to meet the immediate needs of the market in Nigeria. But only about 55 million fingerlings, from all sources is available. Chukwuji [8], also reported that scarcity of quality seeds is one of the major problems encountered by fish farmers in Nigeria. AIFP [10], observed that lack of fingerlings has been one of the major constraints to aquaculture development in Nigeria for the past 40 years. To achieve sufficient fingerlings production in Nigeria, there must be significant increase in brood stock production. The shortage of Clariid brood stock is one of the old problems of aquaculture in Nigeria. However, there is no data that describes or quantify this shortage. This is no study which has provided information on the total brood stock production status of Nigerian and her brood stock requirements. This study thus attempts to determine the brood stock production status of Nigeria, using Makurdi as a case study.

MATERIAL AND METHODS

This study was carried out in Makurdi Local Government Area. Makurdi is the capital of Benue state. Benue state is ranked among the top ten aquaculture states in Nigeria. Makurdi is located in

Central Nigeria along the Benue River. Its coordinate lies between longitude 7° 43' 50" N and 8° 32' 10" E and latitude 7.70 56' N and 8.5 11' E. Makurdi has an estimated population of 500, 797 [9]. The study period was from 18th July 2016 to 22nd August, 2016.

Method and Instrument for data collection

The instrument used for data collection was the questionnaire. A well structure questionnaire was designed. The questionnaire consisted of four sections. Section A was concerned with the Social-economic characteristic of fish farmers in Makurdi. Section B asessed the availability of brood stock across fish farms studied, Section C identified constraints to brood fish production, while Section D requested to know the number of brood stock in every fish farm studied. This instrument was subjected to content validity analysis. A total of 46 questionnaires were distributed to fish farmers with functional fish farms across Makurdi. 44 questionnaires were retrieved and subjected to data analysis.

Technique for Data Analysis

Data collected was grouped, and analyze using descriptive statistics. This was done by dividing the total number of questionnaire returned by the number of respondents agreeing or disagreeing with a question, multiplied by one hundred, divided by one. This was expressed mathematically as $x/y \times 100/1$. The numbers of respondents were represented by x for each questionnaire and the total number of questionnaire returned was represented with y. The results were presented in tables. The interpretation of the data was based on the percentages (%) of the analyzed data, under which inferences were drawn.

RESULTS

The social- economic characteristics of the fish farmers as presented in table 1 revealed that 36.36 % of fish farmers within the age group of 41-50 % were the most dominant age. Most of the farmers, accounting for 31.82 % of the studied population had Nigerian Certificate in Education (NCE), or Ordinary National Diploma (OND). The study found that 13.64 % of fish farmers in Makurdi did not have formal education. During the study, 11.36 % of the respondents were new entrants, while another 11.36 % constituted fish farmers with over ten years of fish farming experience. Most of the fish farmers representing 45.45 % had 4-6 years of experience in fish farming.

Table 1: Social-economic Characteristics of fish farmers

Age interval (years)	Frequency	Percentage (%)
Below 20	0	0.0
21-30	8	18.18
31-40	13	29.55
41-50	16	36.36
51-60	5	11.36
Above 60	2	4.55

Educational Qualification

Non-literate	6	13.64
Primary education	10	22.73
Secondary education	7	15.91
NCE/OND	14	31.82
B.Sc/ HND	7	15.91

Fish farming experience (Years)

New entrants	5	11.36
1-3	8	18.18
4-6	20	45.45
7-9	6	13.64
Above 10	5	11.36

A survey of the characteristics profile of fish farms in Makurdi presented in table 2 shows that 40.91 % of fish farms in the study area practice Medium scale farming, 29.55% were Small scale, 15.91 % Subsistence, while Large scale farming was only 13.64 %. The most cultured fish was *Clarias* sp., which accounted for 50 % of all the cultured in Makurdi. Next was 27.73 % for *Heterobranchus* sp., 13.64 % for heteroclarias hybrid, while tilapia and others accounted for 11.36% and 2.77 % respectively. It was also found that 59.09 % of the fish farmers source their fingerlings from hatcheries. However 40.91% obtain fingerlings from the wild. In all the fish farms studied, it was found that only 11.36 % had brood fish, 88.64 % do not. The study revealed that there is scarcity of fingerlings in Makurdi.

Table2. Characteristics profile of fish farms

Category of fish farm	Frequency	Percentage %
Large scale	6	13.64
Medium scale	18	40.91
Small scale	13	29.55
Homestead fish farm	7	15.91

Cultured species

<i>Heterobranchus</i> sp.	10	22.73
<i>Clarias</i> sp.	22	50.00
Heteroclarias (Hybrid)	6	13.64
<i>Oreochromis niloticus</i>	5	11.36
Others	1	2.27

Sources of fingerlings

Wild	18	40.91
Hatcheries	26	59.09

Brood stock availability

Yes	5	11.36
No	39	88.64

Data on constraints to brood stock production and management in Makurdi, Nigeria is presented in figure 1. The challenges identified against brood stock production, from the major to the least were: Lack of knowledge and technique for brood stock management, Long period of keeping fish to attain sexual maturity, Lack of capital, Lack of brood stock holding facilities, and Lack of interest.

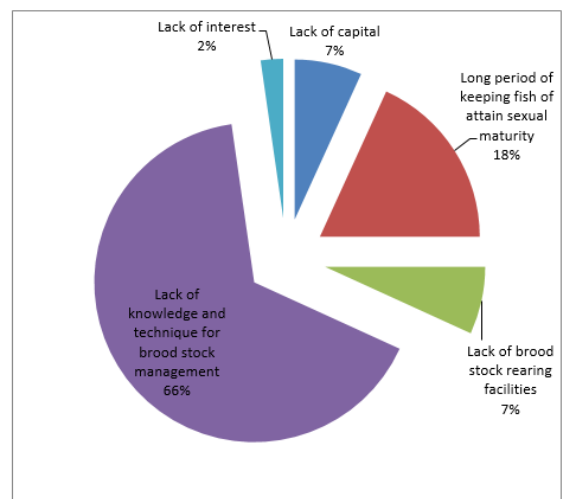


Figure1. Constraints to brood stock production in Makurdi, Nigeria

Only 11% of fish farms in Makurdi Nigeria produce brood stock as shown in figure 2. Estimated annual production was put at 945 Clariid brood fish, while 89 % of the farmers do not produce brood fish.

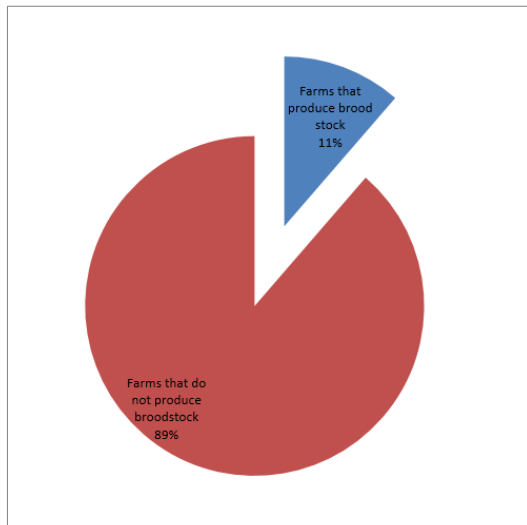


Figure2. Brood stock production in Makurdi, Nigeria

DISCUSSION

The current brood stock production status in Makurdi Nigeria is very insufficient and insignificant. This explains why fish hatcheries in the study area often resort to wild parent brood stock fish seeds production. This also account, why 40.91% of fish farmers in the area riles on fingerlings from the wild. Brood fish sourced from the wild are characterized with often questionable health status, and may likely transmit pathogens to their seeds. Infectious out breaks in fish hatcheries or seeds production failures can be linked to the parent stocks utilized. Also fingerlings sourced from the wild are not better candidates for commercial aquaculture than fingerlings produced from standard hatcheries.

The finding from this study concurs with several reports on scarcity of quality brood stock and fingerlings. George *et al.* [2], observed that the challenge to fish production in Ogun state Nigeria, was lack of good quality brood stock. Obviously, the major problem faced by hatchery owners in Nigeria, is that inadequate quality brood fish. The observed lack of fingerlings in Nigeria has been well documented [6, 10 and 8]. Lack of quality brood stock is a precursor to the gross shortage of quality fingerlings in Nigeria. Despite efforts to increase aquaculture production, annual domestic fish supplies in Nigeria cannot meet local demand. Improving the brood stock production capacity of Nigeria will boost her aquaculture status in all its ramifications.

CONCLUSION

Brood stock production is grossly inadequate in the Makurdi, Nigeria. There is urgent need to encourage the rearing of brood stock among fish farmers in Nigeria. Although the Nigerian

aquaculture industry is characterized with different problems, requiring different solutions, addressing the problem of lack of brood stock will promote the industry greatly. There is need, to equip fish farms in Makurdi Nigeria with the basic knowledge and techniques for management of brood stock. The study encourages government to provide Aquaculture extension workers to train fish farmers on best and improved brood fish management techniques. This will increase fish seeds production, fish production, income and close up to wide fish demand and supply gap in Nigeria.

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