

## Fish culture techniques practiced by the farmers and cost-benefit analysis

Aovijite Bosu<sup>1\*</sup>, Monoranjan Das<sup>2</sup>, Sajjad Hossain<sup>2</sup>, Md. Moniruzzaman<sup>1</sup>

<sup>1</sup>Scientific officer, Bangladesh Fisheries Research Institute, Mymensingh-2201, Bangladesh

<sup>2</sup>Department of Aquaculture, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

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#### \*Corresponding Author

Aovijite Bosu  
E-mail: [ovi\\_bosu08@yahoo.com](mailto:ovi_bosu08@yahoo.com)

### ABSTRACT

The present study was conducted to determine fish culture techniques practiced by the farmers and cost-benefit analysis in terms of single and multiple ownership of fish farms in Mankun Union of Muktagacha Upazilla of Mymensingh District. For this study 5 fish farms: Ali Mia Fish Farm, Amin Uddin Fish Farm, Shaiful Fish Farm, Tanzil Fish Farm, and Shapon Fish Farm were selected covering the different areas of the study area. Data were collected for a production cycle starting from April, 2014 to November, 2014. The fish farms in the study area were established during 2000 to 2011. Four fish farms were established before 2010 whereas only one fish farm was established in 2011. The maximum area of fish farm was found in Shapon Fish Farm (780 dec.) and minimum area of fish farm was found in Shaiful Fish Farm (123.5 decimal). The minimum size of the pond was 13 decimal and the maximum size of the pond was 84.5 decimal and average pond size was 47.97 decimal. The maximum net income of was observed in Ali Mia Fish Farm (7836 BDT/decimal), whereas the minimum was observed in Shapon Fish Farm (1631 BDT/decimal). The maximum BCR (1.483) and the minimum BCR (1.096) was found in Ali Mia Fish Farm and Shapon Fish Farm respectively. Average BCR was higher in single ownership fish farms (1.30) than multiple ownership fish farms (1.15). The major problem in the study area was high price of feed and low price of fish.

### Introduction

Fish play a significant role in the economy of Bangladesh in terms of nutrition, income, employment and earning foreign exchange. Bangladesh is a densely populated country. Total population of this country is about 153.6 million (BBS 2013). So the nutritional requirement is very high in our country. Fish is the principle source of animal protein to the people of Bangladesh. About 60% animal protein is met by fish as an available and chief source of protein. There are about 16.5 million peoples directly or indirectly depends on fisheries sector for their livelihood. Fisheries sector contributed about 4.39% to GDP, and 2.46% of the total export earnings, and 22.76% to agricultural sector. Pond fish culture in Bangladesh has been mainly major carp oriented farming practice. Presently commercially important fish species like rui, catla, mrigal, sarpunti, shingh, magur and some exotic fish species such as, silver carp, grass carp, bighead carp, common carp, mirror carp, Thai pangus, Thai sarputi, Thai koi etc. have been introduced to Bangladesh for their aquaculture potentials and are being culturing. This exotic species gain much popularity in Bangladesh for its rapid growth, easy culture system, high disease resistance and tolerance to a wide range of environmental change, high market demand and low price. These species are cultured in monoculture or poly culture system. Polyculture is the system in which fast growing compatible species of different feeding habits are stocked in different proportions in the same pond. The basic principles of poly culture, i.e. culture of species of different feeding habits in the same pond for best utilization of natural food of different strata and

zones without any harm to each other. Different culture system as well as input determined the production of fish. Practice of monoculture or polyculture on scientific basis by the farmers is of great importance which requires specialized types of knowledge, skill and attitude to undertake this practice (DoF, 2013).

Fish farm owner's use both farm made and company produced feed. Farm made feed cost less than the company produced feed. Sometimes farmers use low quality feed of some feed companies or they use their own made feed of unknown quality, result in low growth and production of fishes (FAO, 2014).

There has been a virtual revolution in fish farming in the ponds at Mymensingh District. Mymensingh District has created a stir in fish production not only in Bangladesh but also in the world. Mankun Union of Muktagacha Upazilla of Mymensingh District has been selected as the study area because having some important reasons such as there are lots of fish farms, recently fish culture are being grown more rapidly in this area, fish culture practice is very popular in this area, the different types of culture practice was conducted in this area, different types of feeds were used in culture system, many fish farmer changed their living standard by practicing fish culture. Previously research works were not done appropriately in that area. It has been found that it is the common ego of the farmers to execute their own idea even who received training or collect information from different institutions about modern fish culture technology but they are not interested to practice fish culture on scientific basis rather they are commonly used the technology of their

own, learning from their friends or others living in the surrounding areas. Farmers generally conduct fish culture with the moderation of the available technology of fish culture provided by different fisheries research institute and information about fish culture from another farmer and their friends.

## MATERIALS AND METHODS

### Study area

The study was conducted at Mankun Union of Muktagacha Upazilla situated at 10 miles western side of Mymensingh District headquarters. Many fish farms have been constructed in Mankun Union of Muktagacha Upazilla with in last decade. For this study 5 fish farms- Ali Mia Fish Farm (located in Mankun village), Amin Uddin Fish Farm (located in Nogdharalia village), Shaiful Fish Farm (located in Rudrapur village), Tanzil Fish Farm (located in Adhpakhia village), and Shapon Fish Farm (located in Mujati village) were selected covering the different areas of the study area

### Period of data collection

The present study was undertaken for the period of 8 months. Data were collected for a production cycle starting from April, 2014 to November, 2014. Fish farms were visited at regular time interval, preferably monthly.

### Collection of data

The data were collected directly from farm owners with the direct interview. The essential information's were noted carefully during interview. Farm record book (daily data record) was consulted and direct monitoring was conducted on the visiting day for the accurate information about the fish culture. Data were collected from each pond of different fish farms. Data on initial size of the fish, stocking density and ratio were collected directly from fish farmer's record book as well as by oral interviewing.

### Calculation of benefit cost ratio (BCR)

Cost benefit analysis is an important aspect of any farms. The cost benefit analysis of the studied different fish farms in Muktagacha Upazilla was conducted during the experimental period. Fixed cost, operating cost, total cost, revenue income and net profit were calculated and evaluated.

### Fixed cost and Operating cost

The fixed cost was estimated from the cost involves for land, fry, pond construction etc.

The operating cost was calculated from the costs involved to run the farm e.g. Labor salary, feed, fertilizer, lime and medicine, and miscellaneous.

### Total cost

The total cost was calculated by using the following formula:

$$\text{Total cost} = \text{Operating cost} + \text{Fixed cost}$$

### Revenue income

The revenue income was calculated by using the following formula:

$$\text{Revenue income (BDT)} = \text{Production (kg)} \times \text{Unit price (BDT)}$$

### Benefit cost ratio (BCR)

The cost benefit ratio was calculated by using the following formula:

$$\text{Benefit Cost Ratio (BCR)} = \frac{\text{Total benefits}}{\text{Total costs}}$$

### Net profit

The net profit was calculated using the following formula:

$$\text{Net profit} = \text{Total revenue} - \text{Total cost}$$

## RESULTS

### Establishment of the fish farm

With the contribution of the faculty of fisheries, Bangladesh Agricultural University, BFRI and DoF fish culture in the Mymensingh District has been revolutionized during the last one and half decade. Observing the fast growth, high yield and net profit many local farmers and young people became enthusiastic then motivated and started fish farming. The fish farms in the study area were established during 2000 to 2011. Four fish farms were established before 2010 whereas only one fish farm was established in 2011.

### Area of fish farm

The size of farms plays an important role as it may reflect the availability of capital, farm management ability, operational capability and the resource use efficiency. To achieve maximum production from the investment, suitable farm size was needed to know. The size of fish farm of the study area was ranged from 123.5 decimal to 780 decimal. The maximum area of fish farm was found in Shapon Fish Farm (780 decimal) and minimum area of fish farm was found in Shaiful Fish Farm (123.5 decimal).

### Ownership of the fish farm

Ownership of farm is also an important factor to make smooth decision regarding fish farming. In the study area single and multiple ownership was found. In the study area three fish farms have single ownership (Ali Mia Fish Farm, Tanzil Fish Farm and Shaiful Fish Farm) and two fish farms have multiple ownerships (Amin Uddin Fish Farm and Shapon Fish Farm).

### Price of fish

Price of fish depends on market structure, species and size of fishes. Farmers noted that the price

varied according to the size, freshness, supply and demand of fish. The average prices of different species are given below:

**Table 1:** Average price of different fishes.

Name of fish	Price (Tk/kg)
Pangus	70-80 *
Rui	100
Catla	100
Mrigal	100
Common carp	100
Silver carp	100
Tilapia	90-100 *
Koi	150
Singh	300-400 *
Magur	300

(\*) For calculating the benefit cost ratio (BCR) of different farms the actual sales price that lies in between the range was used.

Economic analysis

Cost required varied for pond preparation and maintenance of fish farm was varied so much for per decimal pond area. The highest pond

preparation and maintenance cost was found in Shapon Fish Farm (1035 BDT/decimal) while the lowest was in Tanzil Fish Farm (419 BDT/decimal). On the other hand feeding cost was varied from 9020 to 15614 BDT/decimal. The highest feeding cost was observed in Amin Uddin Fish Farm (15614 BDT/decimal) and the lowest was observed in Tanzil Fish Farm (9020 BDT/decimal). There was fluctuation of cost among different fish farm in case of fry purchasing and it was ranged between 892 and 3375 BDT/decimal. The highest were observed in Ali Mia Fish Farm and lowest were observed in Shaiful Fish Farm, respectively. The highest gross income earned by Ali Mia Fish Farm (24045 BDT/decimal), while the lowest was earned by Shaiful Fish Farm (13150 BDT/dec). The maximum net income was observed in Ali Mia Fish Farm (7836 BDT/decimal), whereas the minimum was observed in Shapon Fish Farm (1631 BDT/decimal). The BCR of different fish farms ranged from 1.205 to 1.483, the maximum (1.483) and the minimum (1.096) was found in Ali Mia Fish Farm and Shapon Fish Farm, respectively, (Table 2).

**Table 2:** Estimated cost and income of different fish farm.

### 2 (A): Cost per decimal (BDT)

Item of cost/decimal	Ali Mia Fish Farm	Amin Uddin Fish Farm	Shapon Fish Farm	Tanzil Fish Farm	Shaiful Fish Farm
Pond preparation and maintenance (BDT)	1021 (6.29%)*	883 (4.94%)	1035 (5.98%)	419 (3.84%)	611 (5.60%)
Fry (BDT)	3375 (20.82%)	1394 (7.79%)	1303 (7.52%)	1463 (13.42%)	892 (8.17%)
Feed (BDT)	11831 (72.99%)	15614 (87.27%)	14980 (86.50%)	9020 (82.74%)	9411 (86.22%)
Gross cost (BDT)	16209 (100%)	17891 (100%)	17318 (100%)	10902 (100%)	10914 (100%)

### 2 (B): Return per decimal (BDT)

Farm name	Ali Mia Fish Farm	Amin Uddin Fish Farm	Shapon Fish Farm	Tanzil Fish Farm	Shaiful Fish Farm
Gross income from sell (BDT)	24045	21520	18949	13176	13150
Net income from sell (BDT)	7836	3701	1631	2274	2236
Benefit cost ratio (BDT)	1.483	1.202	1.094	1.209	1.205

(\*) The figure in the parenthesis indicate % contribution of cost in fish production

## Discussion

In the study area it was found that the highest dose of lime was applied in Amin Uddin Fish Farm (1.0 kg/dec.) and the lowest dose of lime was applied in Shaiful Fish Farm (0.15 kg/dec.). Parvin (2011) found that 54% and 56% farmers applied lime at the rate of 0.5 kg/dec. and 1 kg/dec., respectively. The dose of lime was within range of the present study. Most of the farmers of the study area following fish culture practice based on culture of Thai pangus fish as major crop together with other bangla fish (carps) at different densities, so that they can get extra production. A few of the farmers also culture other fish like koi, tilapia as major crop together with other fish.

The highest gross income earned by Ali Mia Fish Farm (24,045 BDT/dec.), while the lowest was earned by Shaiful Fish Farm (13,150 BDT/dec). The maximum net income of was observed in Ali Mia Fish Farm (7,836 BDT/dec.), whereas the minimum was observed in Shapon Fish Farm (1,631 BDT/dec.). Akter (2009) found that gross and net return were 31,5361.2 BDT and 13,8601.32 BDT per ha, respectively. Lazu (2011) found that net income was ranges from 490 BDT/dec. to 1221 BDT/dec. All the previous reported result is lower than present study.

In the present study it was found that BCR of different fish farms ranged from 1.205 to 1.483, the maximum (1.483) and the minimum (1.096) was

found in Ali Mia fish farm and Shapon fish farm respectively. Lazu (2011) found that BCR of different fish farms ranged from 1.17 to 1.51 which was more or less similar to the present study.

## Conclusion

From the above point of view it can be concluded that farm owners practice fish culture in their own way learning from their friends, neighbor or from other farm owners. Farm owners did not follow scientific method of fish culture, but they made reasonable profit by practicing fish culture of their own way. The quality of the farm made feed was satisfactory compare to factory made fish feed. This is because farm owners produced feed for their own farm. That's why they maintain the quality (protein quality) of farm made feed effectively. Growth performance was also better in case of farm made fish feed than factory made feed. Feed companies should maintain feed quality as they advertise so that farmers wouldn't be bluffed.

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