AN ECONOMIC ANALYSIS OF PRODUCTION OF MAGUR HATCHERIES IN BANKURA DISTRICT OF WEST BENGAL

Abstract

The study was conducted in Bankura district of West Bengal which has the highest production of Magur seed in the Hatchery. Ramsagar or 7 more villages were selected on the basis of highest no. of magur hatcheries availability. A sample of 100 farmers was surveyed for this magur seed production in the hatcheries. The sample included 12 marginal, 22 small, 30 semi-medium, 29 medium and 7 large magur seed producer in the hatchery. The analysis of data revealed that the growth rates of area and productivity were significant. On an overall basis, average cost of production of magur seed in the hatchery was Rs. 23627.27. On an average, the gross income was Rs. 60000, net income was Rs. 36372.71, the family labour income was Rs. 38812.65, the farm business income was Rs. 42613.8,the farm investment income was Rs. 38646, with cost benefit ratio 1:2.536.

Keywords – Magur seed, Hatchery, Bankura, cost, production, profitability

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1. Introduction

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Magur hatcheries are present throughout India and play a crucial role in artificial breeding and rearing of Magur fish. They meet the high demand for Magur fish, contribute to species conservation, and promote sustainable aquaculture practices. Using controlled breeding techniques, these hatcheries produce healthy fingerlings that are distributed to fish farmers or stocked in ponds and reservoirs nationwide. Magur fish are popular for their taste, nutritional value, and medicinal properties, and hatcheries help ensure their availability while reducing pressure on wild populations. Production figures vary across regions, with hatcheries established in states like West Bengal, Uttar Pradesh, Bihar, and others known for aquaculture.

Magur hatcheries in Bankura district, West Bengal, India, are essential for the artificial breeding and rearing of Magur fish. These hatcheries cater to the local demand for Magur fish, contribute to the region's fish production and economy, and follow similar processes as other Magur hatcheries. They employ controlled breeding techniques and optimal rearing conditions to produce healthy fingerlings that are supplied to local fish farmers. Additionally, Magur hatcheries in Bankura district provide valuable technical support, training programs, and expertise in hatchery management, water quality maintenance, disease control, and feeding practices, enhancing the productivity of fish farming operations and supporting the local aquaculture sector's growth.

Objective –

- To study the socio-economic status of the farmers in study area.
- To estimate the cost and return / qt fish seed in different size farm groups in a study area.

2. Research Methodology

Comment [DI3]: This section needs several adjustments. In a research methodology, the authors are told to mention how this research was conducted. Besides, it implies to mention what type of research this is framed, the instruments used to collect data and how those were applied and the procedure used to report finding emerged from the study. It is important to mention the ethical considerations as well.

The authors need to add the previous issues in this section since those provide the reader with a logical cohesiveness to understand how the finding emerged from. In that way, this study is reliable.

Bankura district in West Bengal was selected for the study due to its leading position in fish farming production and marketing, with a focus on increasing fish production and developing fisheries infrastructure. The study was conducted in the Onda block of Bankura, known for its numerous fish hatcheries and high demand for pisciculture. The selected villages, including Ramsagar, Barpetia, Radhanagar, Panchmura, Dwarika, Chhinpur, Dhyulapur, and Mouchura, had the highest number of fish hatcheries. A village-wise list of farmers with hatcheries was prepared, and a total of 100 fish farmers, including 12 marginal, 22 small, 30 semi-medium, 29 medium, and 7 large farmers, were randomly selected from different size groups in the sample villages for the study.

Analytical Tools and Technique –

2.1 The different costs items are that are included under each cost concept are detailed below with their procedures.

- **Cost A1=** it includes the value of: -

Cost of hatchery preparation, Cost of hired labor, Cost of all hatchery equipment, Cost of feed , Cost of medicines, Cost of manure, Cost of fertilizer, Cost of water supply charges, Upkeep charges of owned machines, Electric Charges, Cost of Hatchery Management, Miscellaneous charges, Interest on working capital, Depreciation on fixed resources, Land revenue paid to government

The total of all these cost items makeup **cost A1**

- **Cost A2=** Cost A1+ Rent paid for leased-in land, if any.
- **Cost B1=** it includes Cost A1 + Rental value of owned capital assets (excluding land)
- **Cost B2=** Cost B1 + Rental value of owned land (net of land revenue) and rent paid for leased in land.
- **Cost C1=** Cost B1 + Imputed value of family labour.
- **Cost C2=** Cost B2 + Imputed value of family labour.
- **Cost C3=** Cost C2 + 10 % of C2 (value of managerial cost).

2.2 **Total cost of marketing**:

The total cost incurred on marketing by various intermediaries involved in the sale and purchase of the commodity till it reaches the ultimate consumer will be computed as follows:

C = cf + cm1 +cm2+cm3+…….. +cmn

Where:**C** = total cost of marketing

Cf= cost paid by the producer from the time the produce leaves till he sells it

Cmn = cost incurred by middlemen in the process of buying and selling.

2.3 Income Measures -

Gross income = Gross return – Total cost

Net income = Gross income – Cost C

Family labour income = Gross income – Cost B

Farm business income = Gross income –Cost A2

Farm investment income = Net income + rental value of owned land + interest on fixed capital

2.4 Benefit-Cost Ratio –

Benefit-Cost Ratio = ∑ Present Value of Future Benefits / ∑ Present Value of Future Costs

2.5 Arithmetic Mean ($\bar{x}$) –

Arithmetic mean is the quotient that results when sum of all items in the series is divided by the number of items (N).

$$\bar{x} = \frac{\sum x}{N}$$

Where, $\bar{x}$ = mean

$\sum x$ = Sum of each individual score

N = Total number of items

2.6 Standard deviation

Standard deviation is the positive square root of the arithmetic mean of the square of all the deviation from arithmetic mean. It is represented by the symbol (σ).

$$SD = \sqrt{\frac{\sum(x - \bar{x})^2}{n}}$$

Where, X = Each value in the data set

$\bar{}$ = Mean of all value in the data setN = Total number of respondents

3. Results and Discussions –

3.1Socio-economic and demographic characteristics of fish producers

Table – 1 :Age structure of Fish farmers

Sl. No	Age Group (in years)	Categories of fish farmers					Total no of respondents
		Marginal	Small	Semi-Medium	Medium	Large	
1	Young (upto 40)	4	6	2	-	-	12
2	Adult (41 – 60)	6	12	21	25	5	69
3	Old (Above 60)	2	4	7	4	2	19
Total		12	22	30	29	7	100

The study analyzed the socio-economic and demographic characteristics of fish producers based on their age groups and categories. The age structure was divided into Young (up to 40 years), Adult (41-60 years), and Old (above 60 years). The data showed that the majority of fish farmers fell under the Adult age group, with 69 respondents, followed by the Young and Old age groups with 12 and 19 respondents, respectively. The respondents were further categorized into Marginal, Small, Semi-Medium, Medium, and Large fish farmers. The study included a total of 100 respondents, with varying distributions across the different age groups and categories.

Table – 2 :Educational Status of Fish farmers

Sl. No.	Educational Status	Categories of fish farmers					Total no. of respondents
		Marginal	Small	Semi Medium	Medium	Large	
1	Illiterate	2	6	3	-	-	11
2	Primary	4	3	13	7	-	27
3	Secondary	6	12	7	17	2	44
4	Intermediate	-	1	5	2	3	11
5	Graduation	-	-	2	3	2	7
Total		12	22	30	29	7	100

The study examined the educational status of fish farmers and categorized them into different levels: Illiterate, Primary, Secondary, Intermediate, and Graduation. The data showed that among the respondents, the majority were in the Secondary education category, with 44 respondents, followed by the Primary category with 27 respondents. There were also significant numbers of respondents in the Illiterate and Intermediate categories. The study included a total of 100 respondents, with varying distributions across the educational categories.

Table – 3 :Family Structure of Fish farmers

Sl. No.	Family Member	Categories of Fish farmers					Total
		Marginal	Small	Semi Medium	Medium	Large	
1	Small (upto 4)	3	10	9	-	-	22
2	Medium (5 – 6)	9	12	20	28	5	74
3	Large (above 6)	-	-	1	1	2	4
Total		12	22	30	29	7	100

The study examined the family structure of fish farmers and categorized them into three groups:Small (up to 4

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members), Medium (5-6 members), and Large (above 6 members). The data revealed that among the respondents, the majority belonged to the Medium family structure category, with 74 respondents. This was followed by the Small category with 22 respondents. There were also a few respondents in the Large family structure category. In total, the study included 100 respondents, distributed across the different family structure categories.

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Table – 4 :Occupation of Fish farmers

Sl. No.	Occupation	Categories of Fish Farmers					Total
		Marginal	Small	Semi Medium	Medium	Large	
1	Fish Farming	2	2	6	-	-	10
2	Fish Farming + Services	3	8	3	8	-	22
3	Fish Farming + Business	5	9	13	17	4	48
4	Fish Farming + other works	2	3	8	4	3	20
Total		12	22	30	29	7	100

The study examined the occupation of fish farmers and categorized them into four groups: Fish Farming, Fish Farming + Services, Fish Farming + Business, and Fish Farming + other works. The data showed that among the respondents, the majority were engaged in Fish Farming + Business, with 48 respondents. This was followed by Fish Farming + Services with 22 respondents. There were also respondents in the Fish Farming and Fish Farming + other works categories. In total, the study included 100 respondents, distributed across the different occupation categories.

Table – 5 :No. of Trays in the Hatcheries

Sl. No.	Categories of Farmers	No. of Trays	Total no. of Respondents
1	Marginal	<10	12
2	Small	11 – 20	22
3	Semi Medium	21 – 30	30
4	Medium	31 – 40	29
5	Large	>40	7

The study analyzed the number of trays in the hatcheries and categorized them based on the size of the farmers. The results showed that among the respondents, the majority of marginal farmers had less than 10 trays in their hatcheries, with a total of 12 respondents. Small farmers had 11-20 trays, with 22 respondents. Semi-medium farmers had 21-30 trays, with 30 respondents. Medium farmers had 31-40 trays, with 29 respondents. Lastly, large farmers had more than 40 trays, with 7 respondents.

Table – 6 :Distribution of Fish Farmers based on their Annual Income

Sl. No.	Categories of Fish Farmers	Income Range	Total no. of Respondents
1	Marginal	< 90000	12
2	Small	90001 – 180000	22
3	Semi – Medium	180001 – 270000	30
4	Medium	270001 – 360000	29

5	Large	>360000	7

The distribution of fish farmers based on their annual income was analyzed, and they were categorized into different income ranges. The findings revealed that among the respondents, the majority of marginal farmers had an annual income below 90,000, with a total of 12 respondents. Small farmers had an income range between 90,001 and 180,000, with 22 respondents. Semi-medium farmers had an income range between 180,001 and 270,000, with 30 respondents. Medium farmers had an income range between 270,001 and 360,000, with 29 respondents. Lastly, large farmers had an annual income above 360,000, with 7 respondents.

3.2 To estimate the cost of production and farm business income in different magur seed producer

Table – 7 :Cost of Production of different groups of fish seed producer in the Hatcheries

Sl No.	Particulars	Categories of Fish Farmers					Sample Average
		Marginal	Small	Semi Medium	Medium	Large	
1	Lime application	60	60	58	55	52	57
2	Manure	40	40	38	35	32	37
3	Organic fertilizer	70	70	70	70	70	70
4	Supplementary feed and feeding equipment	90	90	90	85	80	87
5	Watching and feeding charges	200	200	190	180	175	189
6	Electricity Charges	700	700	700	700	700	700
7	Fishing charges	45	45	44	43	42	43.8
8	Miscellaneous Charges	16200	16120	15963	15591	15155	15880.2
9	Interest on Working Capital @ 10%	1620	1612	1596	1559	1515	1580.4
Cost A (Variable cost)		17820	17732	17559	17150	16670	17386.2
10	Interest on F.C. @7%	800	800	800	800	800	800
11	Rental value of own land	1875	1828.12	1771.87	1743.75	1725	1788.74
12	Depreciation	1240	1237	1228	1197	1160	1212.4
Cost B (Variable Cost + Overhead Cost)		21735	21597.12	21358.87	20890.75	20355	21187.34
13	Family labour charges	300	300	290	290	280	292
Cost C (Cost B + charges)		22035	21897.12	21648.87	21180.75	20635	21479.34

14	Managerial cost @ 10% of cost C	2203.5	2189.71	2164.9	2118.07	2063.5	2147.93
Total Cost of Production		24238.5	24086.83	23813.77	23298.82	22698.5	23627.27

The cost analysis of fish seed production in Indian hatcheries provides valuable insights into the financial aspects of fish farming for different categories of fish farmers, including marginal, small, semi-medium, medium, and large-scale farmers. The cost components considered in the analysis include lime application, manure, organic fertilizer, supplementary feed and feeding equipment, watching and feeding charges, electricity charges, fishing charges, miscellaneous charges, interest on working capital, interest on fixed capital, rental value of own land, depreciation, family labor charges, and managerial cost.

For marginal farmers, the total cost of production is Rs. 24,238.5. This includes expenses such as Rs. 60 for lime application, Rs. 40 for manure, Rs. 70 for organic fertilizer, Rs. 90 for supplementary feed and feeding equipment, Rs. 200 for watching and feeding charges, Rs. 700 for electricity charges, Rs. 45 for fishing charges, Rs. 16,200 for miscellaneous charges, and Rs. 1,620 for interest on working capital.

Small-scale farmers incur a total cost of production of Rs. 24,086.83. The cost components for this category are similar to marginal farmers, with slight variations in certain expenses such as miscellaneous charges, which amount to Rs. 16,120.

Semi-medium farmers have a total cost of production of Rs. 23,813.77. The costs for lime application, manure, organic fertilizer, supplementary feed and feeding equipment, watching and feeding charges, electricity charges, fishing charges, miscellaneous charges, and interest on working capital are similar to the previous categories, but with slight variations in amounts.

Medium-scale farmers have a total cost of production of Rs. 23,298.82. The cost components for this category are similar to the previous categories, with variations in amounts for certain expenses such as lime application, manure, supplementary feed and feeding equipment, watching and feeding charges, and miscellaneous charges.

Large-scale farmers have the lowest total cost of production among the categories, amounting to Rs. 22,698.50. The cost components are similar to the previous categories, with variations in amounts for certain expenses.

The cost analysis provides fish farmers with valuable information on the financial implications of fish seed production in hatcheries. It allows them to understand the breakdown of costs and make informed decisions regarding their hatchery operations. By analyzing the costs, farmers can identify areas where expenses can be optimized and explore opportunities to improve profitability. Additionally, the analysis serves as a benchmark for comparing the cost efficiency of different categories of fish farmers and aids in formulating strategies for sustainable and profitable fish seed production in hatcheries.

Table – 8 :Farm Business income of different size groups of fish seed producers in Hatcheries

Sl. No.	Particulars	Categories of Fish farmers					Sample Average
		Marginal	Small	Semi Medium	Medium	Large	
1	Gross Income	60000	60000	60000	60000	60000	60000
2	Total cost of production	24238.5	24086.83	23813.77	23298.82	22698.5	23627.27
3	Net income (in Rs)	35761.5	35913.17	36186.23	36701.18	37301.5	36372.71
4	Family labour income (in Rs.)	38265	38402.88	38641.13	39109.25	39645	

							38812.65
5	Farm business income (in Rs.)	42180	42268	42441	42850	43330	42613.8
6	Farm investment income (in Rs.)	38098.34	38236.22	38474.47	38942.59	39478.34	38646
7	Benefit Cost ratio	1:2.47	1:2.49	1:2.51	1:2.57	1:2.64	1:2.536

The farm business income of different size groups of fish seed producers in hatcheries was analyzed. The sample average gross income for all categories, including marginal, small, semi-medium, medium, and large, was 60,000 Rs. The total cost of production varied across the categories, with marginal producers having the highest cost at 24,238.5 Rs and large producers having the lowest at 22,698.5 Rs. The net income, which is the difference between gross income and total cost of production, ranged from 35,761.5 Rs for marginal producers to 37,301.5 Rs for large producers, with an average of 36,372.71 Rs. Family labor income, separate from net income, varied from 38,265 Rs for marginal producers to 39,645 Rs for large producers, with an average of 38,812.65 Rs. The farm business income, calculated by adding net income and family labor income, ranged from 42,180 Rs for marginal producers to 43,330 Rs for large producers, with an average of 42,613.8 Rs. The benefit-cost ratio across all categories ranged from 1:2.47 to 1:2.64, with an average ratio of 1:2.536. These results highlight the variation in farm business income and profitability among different size groups of fish seed producers in hatcheries.

4. Summary &Conclusion

The study reveals the production of Magur seed production in the hatcheries in Bankura District of West Bengal. The main objective of the study was to analyze socio economic characteristic of sample respondents, cost of production and farm business income of magur seed producer in the different categories of fish farmers. From the study, it can be concluded that the majority of the farmers were middle aged, had high school level of education, small size of family with fish farming alone as their occupation. Most of them had small size of area covered under fish farming, and earnshigh level of annual income with medium and high level of fish farming experience respectively. Highest percentage of the fish farmers had low level of scientific orientation with partial training exposure and medium level of market orientation respectively. The average total cost involved in maintenance was Rs.23627.27 with a benefit-cost ratio of 1:2.536. The average farmer's gross income was found to Rs.60000; Average net income was Rs.36372.71; Average family labour income was Rs.38812.65; Average farm business income was Rs.42613.8 and the average farm investment income was Rs.38646 respectively.

5. References –

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Comment [DI6]: It is needed to mention why the insights of this study is relevant for the economy filed in the place where this study took place.

You also need to share the importance of this study and how the insights contribute to the research field.

Comment [DI7]: Look at the objectives that you stated at the beginning
And see if those fit with these lines properly.

- To study the socio-economic status of the farmers in study area.
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Comment [DI8]: Check the rule. If the journal uses APA or other way of writing style.

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