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Economics of Fish Production in Bharatpur District, Rajasthan, India

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Abstract

Fish culture in Rajasthan is a promising sector and the potential for growth in the state is still far from exhaustion. Among the 32 districts of this state, Bharatpur has good potential for fish culture. The present study is based on a cross-sectional primary data collected from 60 farmers from this district through random sampling method under two different categories *viz*., farmers having own ponds (n=30) and farmers with leased ponds (n=30). Besides, analysis was carried out in small sized (<1 ha) and large sized farms (>1 ha) for both categories for a better understanding of production economics. The study indicated that fish farmers followed a low input based traditional type of fish farming. Higher average cost per ha was observed in smaller farm size (< 1 ha) for both owned and leased ponds. It was observed to be Rs. 57 129 and Rs. 65 774 for owned and leased small ponds against Rs. 46 194 and Rs. 24 950 for owned and leased large ponds. Level of productivity also followed a similar trend and it was higher in smaller ponds for both owned (2 538 kg ha^{-1} yr^{-1}) and leased ponds (2 270 kg ha^{-1} yr^{-1}) against the productivity of large ponds (1 230 kg ha^{-1} $yr^{-1}$and 1 568 kg ha^{-1} yr^{-1} for owned and leased ponds respectively). Benefit cost ratio (BCR) was found to be 2.19 and 2.28 for owned and leased ponds respectively. BCR was higher in small owned ponds (2.34) when compared to small leased ponds (2.12). In the case of large sized ponds, it was higher in leased ponds (2.71) against owned ponds (2.00).

Keywords: Fish production economics, fish productivity, accounting profitability, economic profitability, benefit cost ratio

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Introduction

World aquaculture output has increased substantially, from less than 1 m t of annual production in 1950 to 63.6 m t in 2011, increasing at three times the rate of world meat production (2.7% from poultry and livestock together) in the same period (FAO, 2012). Freshwater aquaculture being a homestead activity in several parts of India, adds to the nutritional security, as well as brings additional income to rural households. This sector contributes to the livelihood of a large section of economically underprivileged population in the country. In India, about 14 million people are employed in fisheries sector either directly or indirectly (NCAP, 2008). It contributes about 1.5% to total GDP (Gross Domestic Product) and about 5.2% to the agricultural GDP. India witnessed an impressive growth in inland fisheries and the past ten years has witnessed both horizontal and vertical expansion, with total inland fish production increasing from 2.84 m t in 2000–01 to 4.86 m t in 2009-10, an increase of over 70% (Indiastat, 2011).

Rajasthan possesses a large area of inland water bodies which offer potential for development of both intensive and extensive system of aquaculture. Out of the 3.30 lakh ha inland water sheets available in the state, reservoirs (1.2 lakh ha), tanks and ponds (1.8 lakh ha) and rivers (0.30 lakh ha) have been identified for capture cum culture fishery. Besides, there exists 0.04 lakh ha brackishwater bodies and perennial flowing system, 214 km under Indira Gandhi Feeder Canal and about 500 km under Indira Gandhi Neher Pariyojana (IGNP) in North West Rajasthan. According to the Department of Fisheries (DoF), fish production was 24 000 t in 2007-08, from 35% of the total water area utilized for fish culture with average productivity of 203 kg ha^{-1}. It has grown at the annual rate of 12.2% during the last 8 years, which is above the national average of 8% (CIFE, 2010).

The information available on the economics of fish production in Rajasthan is vague and inadequate. Considering the potential of fish production in Rajasthan, a study on the economics of fish production of Bharatpur district was carried out.

Materials and Methods

The study was conducted during the period September 2009 to June 2010 in Bharatpur district of Rajasthan, India. Bharatpur district with an annual fish production of 1500 t was selected for this study on the basis of the area under culture and the availability of water resources. The study was conducted among a sample of 60 farmers randomly selected from three blocks of Bharatpur district *viz*., Sewar, Kaman and Bharatpur. Both leased and owned ponds were studied. Thirty leased ponds from Sewar and Bharatpur blocks and 30 owned ponds from Kaman block were randomly selected for the study. Kaman block was selected since this block has the highest number of private ponds which is nearly 85% of total private ponds in the district. The data used in this study were collected from both primary and secondary sources. The primary data were collected through personal interview method using structured schedules. Cross sectional data on fish production for the year 2008–09 were collected and used for analysis. The relevant secondary data were collected from various journals, magazines, reports of the state fisheries departments, perspective plan and strategies for fisheries development in Rajasthan conducted by Central Institute of Fisheries Education, Mumbai.

Economics of fish production was studied for both owned and leased ponds. Producers with own ponds (n = 30) and producers with leased ponds (n = 30) were used for finding out the average values for both input items (fixed and variable inputs) and output items (species-wise production). Economic analysis of fish production was carried out for the farmers with <1 ha water area and >1 ha water area for both owned and leased categories of ponds. Average and percentage analyses were used to examine the different variables pertaining to the respondents of the farm survey. Productivity, total return, gross return over variable cost, net return over total cost and benefit cost ratio (Dhondyal, 1989; Lekhi & Singh, 1999) in both accounting concept and economic concept were used for the analysis (Raju & Rao, 1993).

Besides the accounting profitability analysis, this study also included analysis of economic profitability. While studying the economic profitability, the opportunity cost (lease value) of pond as well as the imputed cost of family labour was considered. Total economic cost would be total cost (accounting) plus added value of approximated pond lease value and imputed value (opportunity cost, OC) of family labour.

Results and Discussion

The results of the profitability analysis of owned ponds are presented in Table 1. Considering the total average cost per ha per year for 30 respondent producers, benefit cost ratio was found to be 2.19. The average gross return (GP) and net return of selected fish producers were Rs. 76 240.90 and Rs. 61 618.47 respectively. Average yield of fish per ha per year (productivity) was found to be 1 920 kg. While analysis was carried out for two different categories of farm (i.e. farm with <1 ha water area and farm with >1 ha water area), it was found that the productivity is higher in former category (2 270 kg ha^{-1} yr^{-1}) than in latter category (1 568 kg ha^{-1} yr^{-1}).

The BCR of selected ponds was found to be 2.19 and it was found to be 2.34 and 2.00 for small and big ponds respectively. Gross profit and net profit per ha per year were also found to follow similar pattern with Gross Profit value of Rs. 94 774.95 and Rs. 57 588.88 ha^{-1} yr^{-1} and Net Profit value of Rs. 76 801.02 and Rs. 46 317.95 ha^{-1} yr^{-1} for the farm with < 1 ha and > 1 ha water area respectively. Economic cost and economic profit were worked out as Rs. 83 099.85 and Rs. 30 180.15 respectively while the BCR was 1.36.

The profit analysis worked out for leased ponds is presented in Table 2. The average BCR was found to be 2.28 while the average gross return and net return were Rs. 62 885.76 ha^{-1} yr^{-1} and Rs. 58 257.51 ha^{-1} yr^{-1} respectively. Average yield of fish per ha per year (productivity) was found to be 1 884 kg. It was found that the productivity was higher in <1ha category (2 538 kg ha^{-1} yr^{-1}) than in >1 ha category (1 230 kg ha^{-1} yr^{-1}).

The BCR was found to be 2.12 and 2.71 for small and big ponds respectively. It was also found that the gross return was Rs. 78 908.62 and Rs. 46 862.92 ha^{-1} $yr^{-1}$and net return was Rs. 73 815.05 and Rs.

Table 1. Profit analysis of owned pond (per ha per year)

A. Fixed Cost (FC)	Total Cost (Rs. ha^{-1} year^{-1})		
		Pond size	
	Average	> 1 ha	< 1 ha
1. Pond construction cost	8 893.52	6 705.56	11 081.50
2. Lease rent	0.00	0.00	0.00
3. Farm house/ farm building	1 122.41	1 235.56	1 009.26
4. Pumps/ motors	2 444.44	1 600.00	3 288.89
5. Nets	595.37	522.20	668.52
6. Interest @ 12%	1 566.69	1 207.59	1 925.78
Total Fixed Cost	14 622.43	11 270.93	17 973.93
B. Variable Cost (VC)			
1. Fish seed	9 916.67	9 233.32	10 600.00
2. Fertilizer	1 590.93	1 933.34	1 248.52
3. Feed	8 479.46	7 528.88	9 430.04
4. Lime	843.78	872.88	814.67
5. Medicine	68.33	78.89	57.78
6. Labour (No. of days)			
Family: Men:	0.00	0.00	0.00
Hired: Men	0.00	0.00	0.00
7. Fuel & electricity	10 911.10	10 488.90	11 333.30
8. Harvesting cost	0.00	0.00	0.00
9. Miscellaneous	2 485.19	2 200.01	2 770.37
Interest @ 8%	2 743.64	2 586.90	2 900.37
Total Variable Cost (VC)	37 039.10	34 923.12	39 155.05
Total Cost (TC = FC + VC)	51 661.53	46 194.05	57 128.98
C. Output			
Yield in kg (productivity)	1 920.00	1 568.00	2 270.00
Unit sale price in Rs. (per kg)	59.00	59.00	59.00
Total Return (Yield x price)	113 280.00	92 512.00	133 930.00
D. Indices			
Gross return over VC (Rs.)	76 240.90	57 588.88	94 774.95
Net Return over TC (Rs.)	61 618.47	46 317.95	76 801.02
Benefit Cost Ratio (BCR)	2.19	2.00	2.34

42 699.97 ha^{-1} yr^{-1} for the farm with < 1 ha and > 1 ha water area respectively. The payback period was estimated to be 1.54 years, rate of return 64.76%, net present value Rs. 13 274 and benefit cost ratio 1.345. This indicates the better feasibility of fish farming in leased ponds. Suresh (1996) also reported the economic feasibility of composite fish culture in leased village tanks of Kanyakumari district.

Economic cost was worked out as Rs. 66 060.17, economic profit Rs. 37 559.83 while BCR was 1.57. Adoption of composite fish culture has made fish farmers realize additional profits of atleast Rs. 15 000 - Rs. 20 000 per hectare per year, an increase of 8–10 times more than the traditional operations (Ranadhir, 1984). Present study showed an average production of 1920 kg ha^{-1} yr^{-1} for owned pond and 1 884 kg ha^{-1} yr^{-1} for leased pond in Bharatpur district, Rajasthan. The economic viability of the technology has been demonstrated under the All India Coordinated Research Project on Composite Fish Culture and Fish Seed Production at high level,

Table 2. Accounting profit of producers with leased pond (per ha per year)

A. Fixed Coast (FC)	Total Cost (Rs. ha^{-1} year^{-1})		
		Pond size	
	Average	> 1 ha	< 1 ha
1. Pond construction cost	0	0	0
2. Lease rent	3 139.30	3 243.26	3 035.35
3. Farm house/ farm building	0	0	0
4. Pumps/ motors	0	0	0
5. Nets	993.07	473.66	1 512.48
6. Interest @ 12%	495.88	446.03	545.73
Total Fixed Cost	4 628.25	4 162.95	5 093.57
B. Variable Coast (VC)			
1. Fish seed	13 777.02	3 258.59	24 295.45
2. Fertilizer	0	0	0
3. Feed	5 595.54	4 723.66	6 467.42
4. Lime	388.78	282.62	494.94
5. Medicine	0	0	0
6. Labour (No. of days)			
Family: Men:	0	0	0
Hired: Men	5 463.41	1 882	9 044.82
7. Fuel &electricity	6 773.48	6 342.42	7 204.54
8. Harvesting cost	5 718.65	2 758.01	8 679.29
9. Miscellaneous	0	0	0
Interest @ 8%	3 017.35	1 539.78	4 494.92
Total Variable Cost (VC)	40 734.23	20 787.08	60 681.38
Total Cost (TC = FC + VC)	45 362.48	24 950.03	65 774.95
C. Output			
Yield in kg (productivity)	1 884	1 230	2 538
Unit sale price in Rs. (per kg)	55	55	55
Total Return (Yield x price)	103 620	67 650	139 590
D. Indices			
Gross return over VC (Rs.)	62 885.76	46 862.92	78 908.62
Net Return over TC (Rs.)	58 257.51	42 699.97	73 815.05
Benefit Cost Ratio (BCR)	2.28	2.71	2.12

intermediate level and low level of inputs with production ranges of 8 000–10 000 kg ha^{-1} yr^{-1}, 4 000–6 000 kg ha^{-1} yr^{-1} and 2 000–3 000 kg ha^{-1} yr^{-1} respectively. It indicated that the fish farmers of the study area followed a low input based traditional type of fish farming.

Srivastava et al. (1985) observed that depending on the area, cost varied from state to state and present study showed higher average cost per ha in the case of smaller farms, both for owned and leased ponds. It was observed to be Rs. 57 129 and Rs. 65 774 for owned and leased small ponds (< 1 ha) against Rs. 46 194 and Rs. 24 950 for owned and leased large ponds (> 1 ha) respectively. It may be due to the fact that the level of inputs per unit water area used in larger ponds was relatively lesser than that was used for smaller pond for both owned and leased ponds. And hence, the productivity was found to be higher in case of smaller pond than that of larger pond both in owned and leased categories. Finally,

it has affected the level of productivity for small and large ponds. It was found to be higher in smaller pond for both leased and owned pond (2 538 kg ha^{-1} yr^{-1} and 2 270 kg ha^{-1} yr^{-1} respectively) against the productivity of large ponds (1 230 kg ha^{-1} yr^{-1} and 1 568 kg ha^{-1} yr^{-1} respectively). Jayaraman (1997) found similar pattern in productivity of carp culture in Thanjavur district, Tamil Nadu which showed a declining trend with increase in pond area. Results of same study by Jayaraman (1997) revealed that total variable cost formed 78.40% of total cost, while fixed cost accounted for the rest. Present study showed that variable cost formed 71.69% and 83.14% of total cost for owned and leased ponds respectively. In the present study, the relatively higher benefit cost ratio in terms of economic profitability analysis was observed in case of leased pond (1.57 for leased pond against 1.36 for owned pond). It may be due to the fact that the opportunity cost of leasing out the pond was found to be an important component in economic analysis besides the imputed value of family labour.

Fish culture practices of the study area were mainly extensive type based on low level of input application. Lower average productivity level was found in both owned and leased ponds. Benefit cost ratio was found to be 2.19 and 2.28 for owned and leased ponds respectively. BC ratio was higher in small owned ponds (2.34) against small leased ponds (2.12), whereas it was higher in large sized leased ponds (2.71) against large owned ponds (2.00). Average yield of fish per ha per year (productivity) was found to be higher in smaller ponds (<1 ha) for both owned and leased categories than that of large ponds (> 1 ha). Economic profitability analysis of fish culture showed higher BCR for leased ponds than that of owned ponds. This study revealed that there is a scope for increasing productivity and profitability of fish culture activities in Bharatpur district of Rajasthan.

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