

RESEARCH ARTICLE



An economic analysis of production in pangasius fish (*Pangasius bocourti*) in plain area of Chhattisgarh, India

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* **Corresponding author.**

omprakashsonvane@gmail.com

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O P Sonvane^{1*}, **B Nightingale Devi**², **K K Choudhary**³

¹ Part Time Teacher, College of Fisheries, Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Kawarhdha, Kabirdham, 491995, Chhattisgarh

² Assistant Professor, College of Fisheries, Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Kawarhdha, Kabirdham, 491995, Chhattisgarh

³ Professor, College of Fisheries, Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Kawarhdha, Kabirdham, 491995, Chhattisgarh

Abstract

Objectives: To estimate the cost and return of pangasius fish (*Pangasius bocourti*) in plain area of Chhattisgarh, India. **Methods:** The study was conducted during the year 2018-19 covering two crop in pond culture system. Sample survey of four progressive fish farm namely Lucky Fish Farm, Dahadha (Kurud), M. M. Fish Company, Ushalapur (Bemetra), Tarapada Fish Farm, Arjunda (Balod), and Mohammad Imran Khan Fish Farm, Nagri (Dhamtri) were randomly selected on the basis of its maximum production of fish in the area. The primary data were collected from fish producers through personal interview method using semi-structured questionnaire about its production. The objectives were achieved using exponential function, percentages and average method. **Findings:** The total cost of fish farming was found to be ₹2959094.28/ha. in selected farms. The result indicates that the variable cost ₹2242823.44/ha (75.79 per cent) of culture. The higher cost incurred on culture was feed ₹1894536.00/ha.(64.02 per cent) followed by Capital investment was found to be ₹581400.00/ha.(19.65 per cent). The input-output ratio estimated was 1:1.10. The progressive farmers reported that 100 per cent high cost in feed cost & capital investment in initial. **Application/ Novelty:** Need to increase the profitability from fish farming by the use of low cost culture system and effective extension along with conducive policy measures. Feed processing unit and ice factory should be open in near to the village and to provide the financial support of farming of fish.

Keywords: Cost and returns of pangasius fish farming; cost of production and input output ratio

1 Introduction

Aquaculture not only supplies dietary essentials for human consumption, but provides excellent opportunities for employment and income generation, especially in the more economically backward rural areas. Sixty million people are directly engaged, part-time

or full time, in primary production of fish, either by fishing or in aquaculture, supporting the livelihoods of 10-12 per cent of world population. China, with world's one fifth of population produces one-third of total fish harvested and two-thirds of fish cultivated⁽¹⁾. Aquaculture currently accounts for over 50 per cent of the global food fish consumption Globally India stands second in culture fisheries production⁽²⁾. The possible targeted production level achieved will 15 million tonnes during 2015-16 to 2019-20 in inland sector. The average fish productivity from ponds and tanks would increase to 4-10 tonne/ ha/year from the current level of about 3.0 tonnes/ha/year⁽³⁾. Andhra Pradesh, West Bengal, Bihar and Chhattisgarh are among the top producers of freshwater fish through aquaculture⁽⁴⁾. In Chhattisgarh, India the total area of water resources under fish production is 1.82 lakh ha in which 1.71 lakh ha (94.20 per cent) area are under fish culture. Chhattisgarh is in 6th position in fish production with total production of 4.57 lakh tonnes in India. Chhattisgarh plain has highest fish production area as compared to Bastar Plateau and Northern Hills of Chhattisgarh. Chhattisgarh plain area district are Mahasamund district ranked first in terms of fish production followed by Raipur, Janajgir-chapa, Bemetra and Rajnandgaon in the state⁽⁵⁾. Fish production has increased from 0.09 lakh tonnes in 2000-01 to 3.42 lakh tonnes in 2015-16 in Chhattisgarh state. The top ten districts in the state contribution 69 per cent of the total fish production are Janjgir, Mahasamund, Rajnandgaon, Raigarh, Balodabazar, Raipur, Bilaspur, Dhamtari, Korba and Balod. All top ten districts belong to Chhattisgarh Plain area⁽⁶⁾. Prevailing culture system are composite carp culture with three Indian major carps and three exotic carps viz. Common carp, Silver carp and Grass carp form the basis of carp poly culture system practiced by farmer in pond culture system and earned low production. The average fish production in rural/village ponds is 3055 kg./ha/year against the national average of 2000 kg./ha/year⁽⁷⁾. It was noticed that low productivity in village pond culture system. The fish production system in Chhattisgarh plains are through major progressive aqua-farms. During 2008-2010 phenomenal growth was shown in the culture of exotic catfish pangas, *Pangasianodon hypophthalmus*. In Andhra Pradesh around 10 per cent of the area in Krishna- Godavari delta has been occupied by this single species. Major sources of seed are from Bangladesh through our porous border and from West Bengal. Many other states including Chhattisgarh, Jharkhand and Bihar have shown enthusiasm to culture of pangas. Production levels of the species ranges from around 15 to 50 tonnes ha/year⁽⁸⁾. Progressive fish farm was found to be the one that follow scientific major pangasius fish culture by farmers. Henceforth, such fish farms were considered for the study. The preliminary survey revealed that price fluctuation of produce, transportation costs and storage facility, insufficient of market organization and operation of marketing system etc. are some of the problems that hinder their activities.

2 METHODOLOGY

A. Selection of farms

Sample survey of four progressive fish farms namely Lucky Fish Farm, Dahadha (Kurud), M. M. Fish Company, Ushalapur (Bemetra), Tarapada Fish Farm, Arjunda (Balod), and Mohammad Imran Khan Fish Farm, Nagri (Dhamtri) were purposely randomly selected on the basis of its maximum production of fish in the area.

B. Analytical tools

1. Breakeven Point

The breakeven point is a point at which total cost and total revenue intersect each other or total cost and total revenue are equal.

$$\text{Formula : Breakeven point} = \frac{\text{Fixed cost}}{\text{Fish per quintal} - \text{Variable cost per quintal}}$$

3 RESULTS AND DISCUSSION

1. Cost and returns of pangasius fish farming at the sampled farms

The overall, total cost incurred by farmers in pangasius culture was ₹943516/ha.⁽⁹⁾ The total variable cost involved in pangasius culture as 90 per cent and fixed cost to be 10 per cent⁽¹⁰⁾. The average total cost and return were ₹351287.06 and ₹478891.55 in selected treatment. The required feed cost was highest in pangasius catfish in monoculture⁽¹¹⁾. The input wise cost and returns of pangasius fish farming is presented in Table 1. It reveals that total cost of fish farming was found to be ₹2959094.28/ha. at selected farms. The higher cost incurred on culture was feed ₹1894536.00/ha. (64.02 per cent) followed by capital investment was found to be ₹581400.00/ha (19.65 per cent).

Table 1. Input wise cost and returns of pangasius fish farming (₹/ha.)

Particulars	Quantity Used	Unit (₹/Piece)	Cost	Total (₹/Piece)	Cost	Percentage share to total cost
A. VARIABLE COST						
1. Seed	26966.00 piece	3.00		80898.00		2.73
2. Feed	67662.00 kilogram	28.00		1894536.00		64.02
3. Chemical/protection	a. Bromix	56.25 liter	200.00	11250.00		0.38
	b. Panga Premix	14.06 kilogram	90.00	1266.00		0.04
	c. Biosol aqua	30.00liter	200.00	6000.00		0.20
	d. Bottom Cleaner	100.00 kilogram	20.00	2000.00		0.07
	e. Activil gel	9.37 liter	528.00	4950.00		0.17
	f. Lime	125.00 kilogram	7.00	875.00		0.03
	g. Zeolite	125.00 kilogram	7.00	875.00		0.03
4. Manure & fertilizer	a. Mahua cake	80.00 kilogram	15.00	1200.00		0.04
	b. Mustard cake	14.00 kilogram	14.00	196.00		0.01
	c. DAP	25.00 kilogram	25.00	625.00		0.02
	d. SSP	25.00 kilogram	8.80	220.00		0.01
5. Tharmocol	32.00 piece	23.00		736.00		0.02
6. Ice cost	782.00 kilogram	4.00		3128.00		0.11
7. Nets	2.00 piece	2500.00		5000.00		0.17
8. Hapa	3.00 piece	500.00		1500.00		0.05
9. Electricity				3334.00		0.11
10. Labour	a. Family human labor	344manday	150.00	51600.00		1.74
	b. Hired human labour	670manday	150.00	100500.00		3.40
	c. Machine labour			4140.00		0.14
	Total labour cost			156240.00		5.28
11. Transportation				13332.00		0.45
12. Miscellaneous				20000.00		0.68
13. Interest on working capital @ 4 %				100151.40		3.38
Total variable cost				2242823.44		75.79
B. FIXED COST						
1. Capital investment				581400.00		19.65
2. land revenue	₹12/ha			12.00		0.00
3. Rental value of own pond	₹54000/ha			54000.00		1.82
4. Depreciation				34000.00		1.15
5. Interest of fixed capital @7%				67859.84		2.29
Total fixed cost				716270.84		24.21
Total cost (A+B)				2959094.28		100.00

The contribution of total labour cost for culture of fish was found to be ₹156240.00/ha (5.28 per cent). The average total human labour share to total cost for culture was observed as ₹152100.00/ha. which was 5.14 per cent to the total cost of culture, which was higher at hired human labour ₹100500.00/ha. followed by family human labour ₹51600.00/ha. The contribution of total chemicals/protection and manure & fertilizer estimated was ₹29457/ha. (0.99 per cent). The net and hapa cost was found to be ₹6500/ha. (0.22 per cent). The total fixed cost was found to be ₹716270.84/ha. at selected farms which was 24.21 per cent of the total cost. The Rental value of own pond for fish production was observed as ₹54000.00/ha. (1.82 per cent). The figure shows that capital investment cost higher; it is initial cost for fish farming.

2. Yield, cost and return of pangasius fish farming at the sampled farms

The yield, value of output per hectare and cost of production per quintals of pangassius fish on the sample farms have been worked out in Table 2 . It indicates that the yield per hectare of fish came to 34.16tonnes/ha. The gross return estimated was ₹3245200.00/ha. The net return was calculated as ₹286105.72/ha. The gross income and yield per hectare across all farms were ₹1381044 and 36.31 tonnes⁽⁹⁾. The yield and income of pangasius fish were found to be 15.21 tonnes/ ha. and ₹760500/ha. in one crop season⁽¹²⁾.

Table 2. Yield, cost and return of pangassius fish farming at the sampled farms

S.N.	Particulars	₹or qtl/ha
1	Total cost (₹)	2959094.28
2	Yield (tonnes)	34.16
3	Gross return (₹/ha)	3245200.00
4	Net return (₹/ha)	286105.72
5	Cost of production (₹/qtl)	8662.45
6	Input-Output ratio	1:1.10

The cost of production was found to be ₹8662.45/qtl. and input-output ratio estimated was 1:1.10. In case of fish farming was obtained low input-output ration in initial stage of fish farming and should be rise continue year to year.

3. Breakeven point of pangasius fish farming

The breakeven point of pangasius fish farming have been presented in Table 3. The study was found to be 24.41 tonnes in the study area. The study was revealed that initial costs higher and achieved breakeven point at 2 to 3 crop seasons in the pangasius fish farming.

Table 3. Break Even Point of pangasius fish farming on the sampled households

S.N.	Particulars	Price (₹)
1.	Total fixed costs	716270.84
2.	Price per quintal of product	9500.00
3.	Variable cost per quintal	6565.64
4.	Break Even Point (tonnes)	24.41

4. Major constraints faced by the farmer’s in pangasius fish farming

The progressive farmers reported that 100 per cent highly construction & initial, seed, feed and lack of insurance facilities major constraints faced in farming of fish. Received the funds from financial institution by 70 per cent farmers. The input-related, social and environmental constraints of aquaculture in India need to be tackled through horizontal and vertical expansion, technology as well as climate change mitigation and adaptation, for sustainable development⁽³⁾. Financial limitations which found more stringent in case of selected all farm size⁽⁹⁾. The selected 65 per cent farmers reported high wage rate of labour and high cost in other inputs such as tools and implements⁽¹³⁾. The selected farmers reported that insufficient fund to purchase different inputs and non-availability of labour during the farming of fish (50.00 per cent) followed by insufficient alternative source of water facilities and loses of production by insect and diseases on fish (25 per cent) (Table 4).

Table 4. Constraints in farming of fish (In Per cent)

Sl. No.	Constraints	Per cent of Respondents (Yes)
1.	High construction and initial cost	100.00
2.	High seed and feed cost	100.00
3.	Lack of insurance facilities for farming of fish	100.00
4.	Have you received the funds for farming of fish from financial institution?	75.00
5.	Have you sufficient fund to purchase different inputs for farming of fish	50.00
6.	Have you problem of availability of labour during the farming of fish?	50.00
7.	Have you sufficient alternative source of water facilities?	25.00
8.	Loses of production by insect and diseases on farming of fish	25.00

4 Conclusion

In view of findings of this study, it may be suggested that there is need of feed processing unit, ice factory near the villages and financial support for fish farming. There is also a need of skill oriented training/demonstrations of the least cost production technologies and minimum losses inputs & farm products.

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