

Economic analysis of cage culture of sea bass

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Introduction

Open sea cage farming can be referred to as the method of culturing aquatic organisms in enclosed cages made of various materials in the seas. The true cage farming is of recent origin and a well established practice in Southeast Asian countries. The practice developed independently in a number of countries, all in Southeast Asia. Presently, cage culture is developing fast and turning to a highly commercialized business activity in many Asian countries.

In India, pen culture and pond culture experiments were done along the southeast coast using the seed of rabbit fish, groupers and sand whiting. Similar trials were also done along Kerala and Karnataka coasts. In the recent years, open sea farming was done at Visakhapatnam and cage/pen culture experiments were conducted at Calicut and Vizhinjam Research Centre of CMFRI (CMFRI Annual Report, 2006, 07).

During 2008, fourteen cages were launched across the east and west coasts. The failure witnessed in the launch of the first cage during May 2007, formed the stepping stone of success later in the same place. The lacunae in the launching of the first cage were rectified and successfully re-launched during December 2007, which gave a substantial harvest of sea bass in April 2008.

Economic analysis

The success of the adoption of any innovation or new technology lies in its economic performance. The rate of

return per rupee invested is the economic indicator that guides the investor to choose a particular enterprise or practice. Besides, the analysis of the economic performance serves as an indicator for the investor to allocate his resources in the enterprises. This becomes very much essential, since the resources are scarce and the investor is interested to invest his scarce capital resource in that enterprise that gives the maximum return for his investment.

The economic performance of the cage culture experiment is worked out by calculating the annual fixed costs, variable costs and the annual total costs from the cost side. From the returns point of view, the harvest from the cage, the gross revenue from the sales of the harvest is worked out. Using the cost and returns figures, the following economic indicators are estimated to test the economic viability and financial feasibility of any enterprise.

Table 1 Indicators of economic performance of the cage culture enterprise

Sl.No.	Economic Indicators
1	Initial investment of the cage
2	Fixed cost (For crop duration of six months)a) Depreciation b) Insurance (2% on investment)c) Interest on Fixed capital (12%)d) Administrative expenses
3	Total Annual Fixed cost (A)
4	Operating costsa) Cost of seedlingsb) Cost of feeding and other labour chargesc) Interest on working capital (6%)

5	Total Operating or Variable cost (B)
6	Total cost of production [Row(3)+Row(5)]
7	Yield of sea bass (in kg)
8	Gross revenue [(7) * Price per kg]
9	Net income [(8)-(7)]
10	Net operating income [(8)-(5)]
11	Cost of production (Rs./kg)[(6)/(7)]
12	Price realized (Rs./kg) (8)/(7)
13	Capital Productivity (Operating ratio) (5)/(8)

The different economic indicators of the economic performance of cage culture enterprise are worked to

Table 2 Initial investment of the cage culture farm of 1061 m³

Sl. No.	Items	Investment (in Rs.)	% to total	Economic life (in years)
1	HDPE Cage frame	4,00,000	27.12	10
2	HDPE nets	3,00,000	20.34	10
3	Galvanized Iron Chains	80,000	5.42	10
4	Mooring equipments	60,000	4.07	10
5	Stone Anchors	1,50,000	10.17	50
6	Floats	1,50,000	10.17	10
7	Shock absorbers	25,000	1.69	10
8	Ballast	35,000	2.37	10
9	Ropes-HDPE	35,000	2.37	10
10	One time launching charges	2,40,000	16.27	
	Total Initial Investment	14,75,000	100.00	

Table 3 Details of Annual Fixed cost

Sl. No.	Details	Amount (in Rs.)
1	Depreciation	1,16,000
2	Insurance premium (5% of investment)	73,750
3	Interest on fixed capital	1,77,000
4	Administrative expenses (2%)	29,500
	Total fixed cost	3,96,250

Table 4 Details of Annual Variable cost of cage culture (for a crop duration of seven months)

Sl. No.	Details	Cost	% to total
1	Feeding	2,24,000	14.02
2	Seedling	1,50,000	9.39
3	Feed cost	9,00,000	56.32
4	Net cleaning	75,000	4.69
5	Underwater inspection	50,000	3.13
6	Net mending and Maintenance	25,000	1.56
7	Post crop overhauling	20,000	1.25
8	Security	1,00,000	6.26
9	Interest on working capital @6% for one crop duration	54,040	3.38
	Total	15,98,040	100.00

assess their performance in Table 1. This will serve as the guidelines to the institutional agencies who are extending the financial support to the enterprise.

Case studies

The detailed economic analysis of the **experimental cage culture practice** demonstrated in Visakhapatnam (Andhra Pradesh) and Balasore is given below to indicate how the economic analysis of the enterprise is done.

(A) Visakhapatnam

Table 5 Economic indicators of the cage culture of *Lates calcarifer*

Sl.No.	Details	Amount (in Rs.)
1	Annual fixed cost	3,96,250
2	Annual Variable cost	15,98,040
3	Annual total cost	19,94,290
4	Gross revenue (after harvesting from 5 th to 7 th month)	37,50,000
5	Net operating income	21,51,960
6	Net income (profit)	17,55,710
7	Capital Productivity (Operating Ratio)	0.43
8	Annual Rate of return to capital	119%

(B) Balasore

At Balasore, the initial investment for a 6m diameter cage worked out to Rs.3,00,000. The fixed costs for the culture period of six months was calculated at Rs.54,000. The variable costs of the culture operation worked out to Rs. 2,31,750. Thus the total cost of production to the participants worked out to Rs.2,85,750 (Table 6).

economic parameters indicate that this open sea cage farming of sea bass is economically viable.

Conclusion

Thus it is seen from the above results that the economic analysis of the experimental cage culture farm has worked out successfully with higher net operating income and net income in a crop period of seven to nine months. It is to be

Table 6 Economic analysis of the experimental cage culture demonstration at Balasore

Sl. No.	Details of cost and returns	Amount (in Rs.)
1	Initial investment for a 6m diameter cage	3,00,000
2	Fixed cost (For crop duration of six months)a)Depreciation b)Insurance (2% on investment)c) Interest on Fixed capital (12%)d) Administrative expenses	30,0003,00018,0003,000
3	Total Fixed cost (A)	54,000
4	Operating costsa) Cost of seedlingsb) Cost of feeding and other labour chargesc) Interest on working capital (6%)	50,0001,75,0006,750
5	Total Operating cost (B)	2,31,750
6	Total cost of production (Six months)	2,85,750
7	Yield of sea bass (in kg)	3,032
8	Gross revenue from 3032 kg	5,75,760
9	Net income (8)-(5)	2,90,010
10	Net operating income (Income over operating cost)	3,44,010
11	Cost of production (Rs./kg) (6)/(7)	94.24
12	Price realized (Rs./kg) (8)/(7)	189.89
13	Capital Productivity (Operating ratio) (5)/(8)	0.50

The culture of sea bass yielded 3.03 tonnes of sea bass during the harvest conducted at the end of six months, thus earning a gross revenue of Rs. 5,75,760 to the participants. The culture of sea bass earned a net operating income of Rs. 3,44,010 at the end of six months and a net profit of Rs.2,90,010 at the end of the same period. The cost of production per kg of sea bass worked out to Rs.94.24 against the value realization of Rs.189.89per kg. The capital productivity measured through operating ratio worked out to 0.80. These

noted that once the practice is further expanded to many areas and farms, the cost will decline due to the economies of scale of operation. Thus it could be concluded that the open sea cage farming is a viable alternative and economically & financially feasible mariculture operation for the stake holders to make use of. The State Fisheries Departments and the Development Organizations like NFDB can promote the concept of cage culture on a large scale with their institutional and financial support availing the technical expertise developed at CMFRI.