Seed Production of *Macrobrachium rosenbergii* in Backyard Hatcheries - An Economic Analysis

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A study on the economic aspects of seed production of the giant freshwater prawn, *Macrobrachium rosenbergii* (de Man) is conducted. The data were collected from two hatcheries around Kochi. The technology adopted is feasible and cost-efficient. The cost of production of 1000 seeds is found as Rs. 15.86. But the cost of production of 1000 seeds from the wild is reported to be Rs. 250.00 to Rs. 300.00. This study reveals that the operation provides profit @90.33% on the capital investment. The managerial aspects of the hatchery is also discussed.

Macrobrachium rosenbergii (de Man) is the giant fresh water prawn whose population is found to be on the decline in recent times in natural habitat due to various reasons. Mary John (1957) reported that this species was abundant in Kuttanad waters. However, its population size is dwindling fast in these water bodies (Kurup, *et al.,* 1989). It is also reported that this species is found only in the backwaters north of Cochin region and the rivers north of Pamba in Kerala (Jayachandran, 1987 and Jayachandran & Joseph, 1989). Taking into account such a diminishing rate of growth of the species, there is enormous scope for the artificial production and supply of its larvae. Hatcheries functioning at present at different parts of the country cannot support a steady supply of the seeds to meet the growing demand. Perfection of a simplified hatchery technology is also a problem faced in this area. The College of Fisheries, Kochi, Kerala has set up a hatchery with this motive and has already succeeded in perfecting a viable technology. A few entrepreneurs of Cochin have already come forward for seeking the technical advice of College of Fisheries. The present report is the economic analysis of two of the functioning hatcheries.

Materials and Methods

The data for the present analysis were collected from two backyard hatcheries under the management of fish farmers in Kochi. The observations were conducted during 15-9-1989 to 14-1-1990 and the present data were gathered from three simultaneous culture operations performed during the above period. The duration of a single culture operation was found to be 30-35 days. The method of seed production from these types of hatcheries are described by Nair *et al.,* (1989).

Indoor hatcheries are favoured in the culture system under study. An area of 50 m^2 was impounded adjacent to the house and was roofed with transparent tarpaulin (silkpaulin). Data on capital investments such as cost of Fibreglass Reinforced Plastic (FRP) tanks (1.2 tonne capacity), hatchery shed, generator, compressor, sieves, mixer, freezer, etc and the cost of variable inputs such as cost of berried females, feed (prawn meat, egg and *Artemia*), power, chemicals, diesel, oil etc were recorded.

The data collected from the two

hatcheries were found to be almost the same and therefore, averages were taken for the present analysis. Besides the economic tools, management accounting techniques like break-even analysis (Amey & Egginton, 1973), payback period (Lindley et al., 1978), straight line method of depreciation calculation (James & Joel, 1973) are also employed in evaluating its economic viability. The economics of the operation was analysed adopting the model of Bhowmick (1957).

Results and Discussion

The average survival rate of larvae obtained from the data was 51.5% and a total of 2,06,000 seeds were produced in a hatchery and both the hatcheries together produced 4,12,000 seeds.

For analysing the economics of M. rosenbergii seed production the investments and costs were worked out and classified conveniently by employing the economic and accounting tools. For the sake of simplification, the results were standardized for a single culture cycle. Accordingly the fixed requirements of a hatchery unit have been worked out and depicted in Table 1. The

Table 1. Average investment in fixed assets of a backyard hatchery unit

Particulars	Cost (Rs.)
Generator (3.5 KVA)	25,000
Generator (I HP)	10,000
Four 1 tonne capacity FRP tanks @ Rs. 3,500/-	14,000
Freezer	7,000
Construction costs	1,500
Test Sieves	1,500
Oxygen cylinder with regulator	1,800
Pumps	
(i) 1 HP water pump	1,500
(ii) Fraction HP larval transfer pump	1,500
Miscellaneous	1,000
Total	64,800

fixed and variable costs incurred in the operation were computed on the basis of the 1989 market prices and is shown in Table 2. The depreciation cost of fixed assets has been worked out assuming the average life of the assets as 15 years and the scrap value as Rs. 5000/-.

Based on the operating costs (TFC +TVC) the cost of production of 1000 seed is computed to be Rs. 15.86.

Details regarding the income, benefit-cost ratio and the profitability of the operation is shown in Table 3.

It can be drawn from Tables 2 and 3 that the cost of production of 1000 seeds was Rs. 15.86 and was sold at the rate of Rs. 300/1000. On comparing the production costs from the wild (Rs. 250-300/1000) and from the hatchery (Rs. 25/1000) (Subrahmanyan, 1986) with the present analysis, it can be seen that the rate is far below than ever reported.

The average profit realised over the operating cost is Rs.. 58,532.00 approximately. The operating cost of Rs.3267.70 can be covered by selling 10893 seeds. This comes only 21.2% of the revenue from a single FRP tank.

The break-even analysis of the data shows that the hatchery unit attains break-even point by producing 3897 M. rosenbergii seeds. The contribution per unit shows that, each unit produced above this level will add 28.96 paise towards profit. As such, the net profit from the standardized hatchery unit is Rs. 58532.00. The computation of pay-back period indicates that the initial capital investments can be recouped by two culture operations @ 51.5% survival. Improvements in survival rates will enhance the profits further. From the above results it can be concluded that the technology used is feasible and cost-efficient.

Table 2. *The average fixed and variable costs associated with an operation*

Particulars	Cost (Rs.)	Percentage of total cost
Fixed costs:		
(i) Depreciation of fixed assets	382/35 days	11.69
(ii) Opportunity cost* of capital investment @ 12 percent	746/35 days	22.83
(iii) Taxes and insurance	Nil	-
Total Fixed costs (TFC)	1128.70	34.54
Variable costs:		
(i) Cost of berry @ Rs. 40 (8 x 40)	320.00	9.80
(ii) Feed		
(a) Artemia cyst (1/2 kg x Rs. 750)	375.00	11.48
(b) Prawn meat (1/2 kg/day @ Rs. 7/kg)	123.00	3.77
(c) Egg (one egg/day @ 60 paise)	21.00	0.64
(iii) Power charges	300.00	9.18
(iv) Diesel and oil	50.00	1.53
(v) Labour costs (inputed)** (15 man days @ Rs. 30)	450.00	13.78
(vi) Miscellaneous	500.00	15.30
Total variable costs (TVC)	2139.00	65.46
Total cost (TFC + TVC)	3267.70	100.00

* Opportunity cost is the highest rupee return sacrificed by employing resources in some particular production process.

** Imputed cost are the costs which are not actually incurred but would have been incurred in the absence of employment of self owned factors

Table 3. *Average income and profitability of the seed production of M. rosenbergii*

Particulars	Income (Rs.)	Profitability
Income from the sale of seeds @ 30 paise each (2,06,000 x 30)	61800.00	
Net profit (Income-Total cost)	58532.30	
Benefit cost ratio with variable costs		27.36
Benefit cost ratio with total costs		17.92
Percentage of profit on fixed assets employed		90.33

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