

Unit 13: Aquaculture Economics

Aquaculture economics

As aquaculture has expanded, biological and technical problems have received most of the attention because biologists have by and large been the principal researchers. Biologists have focused and are continuing to focus on ways to overcome constraints to production and to modify and/or intensify traditional systems. Some biological issues such as induced breeding of fish in captivity, prevention of disease, nutritional requirements of indigenous and exotic species, and selective genetic improvement are being studied.

In spite of this ever-increasing biological research activity, inadequate attention has been devoted to other, equally important, problem areas and to the interplay among them. The viability of aquaculture technology involves more than the study of its biology and technology. Economics must be used to determine efficiency or resource allocation. Reliable information on the economics of existing aquaculture systems and the economic viability of the new technology is often lacking. In addition to the economics of production, evaluation of markets including demand, marketing infrastructure and marketing channels is important. Aquaculture Economics is a relatively new area of study. The economic study of aquaculture provides a basis for decision making for fish farmers and assists in the formulation of public policies. The potential scope for aquaculture economics research is wide. As aquaculture develops, economists will be called upon to analyse current production and marketing practices, particularly in the private sector and to evaluate improved husbandry techniques as they are developed. Economic studies can help appraise the current practices and potential of aquaculture by analyzing the production and marketing aspects of both experimental and existing culture systems, assessing the role and contributing of aquaculture as compared with other sectors in national economics and international trade and evaluating development projects and the institutional and cultural environment in which aquaculture development is expected to take place.

Cost concepts

Cost: Refers to the total amount of funds used in production

Cost of production: Cost means the total efforts, sacrifices and exertion involved in the production of a commodity.

Two major categories of cost namely (i) fixed cost and (ii) variable costs

Fixed cost

Fixed costs are those which do not change with the level of output and the incurred even when production is not undertaken.

Fixed cost items – DIRTI-5

Fixed costs are those which are not a function of output. Hence they do not vary with the level of output. Total Fixed Cost (TFC) is the sum of the fixed cost items like depreciation, interest on capital, repairs and upkeep, taxes and insurance.

Variable costs

Variable costs are the costs of using the variable inputs which vary with the level of production. Higher the production more will be the variable costs, lower the production, lower will be the variable costs. These costs include items such as cost of seed, feed, manures, fertilizers, fuel, electricity, wages paid to labour etc. It is this cost that affects production more than the fixed costs.

Total costs = fixed cost + variable cost

Money value of all the inputs used on a farm during a given period, season or year is termed as the total cost. The sum of fixed and variable costs is total cost. Total cost is required for computing the net revenue.

Total returns

Total returns are equal to total production times the price. $TR = Y \times P_y$

Net returns are equal to the total returns less all costs. $NR = TR - TC$

Net returns (Variable cost basis)

Equal to the total returns over the total variable costs.

$$NR = TR - TVC$$

Factors affecting the economics of aquaculture

The producers profit or net income per unit (Y) is determined by production (Q), the cost of production and marketing (C) and the price received (P) as shown in the equation.

$$Y = QP - C$$

Increases in yield, reduction in costs and increases in price are the major means of increasing profits.

The major factors affecting the productivity per unit area are the stocking rate, survival rate and growth rate. A fish pond can only support a certain quantity of fish because of its limited space and natural food called as the maximum stocking crop. Stocking rate can be increased by fertilization and feeding, polyculture, stock manipulation and aeration.

Fertilization and feeding

Production is usually much higher with fertilization and feeding than without. Although the total cost of production is higher with fertilization and feeding than without, the production cost per unit of fish may be lower and the additional revenue generated may be higher than the additional cost involved.

Significant increases in the stocking rate can be obtained through polyculture, which is rearing or several species together to make more efficient use of the growing space and the total pond environment composite fish culture in India.

Polyculture increases production per unit area and generate more profit than monoculture.

Increase in farm prices

In a competitive market price is determined by the supply and demand for fish.

Improvement in the quality of fish

Fish is highly perishable. Poor quality, spoilage and waste reduce the average price that farmers receive. Quality of fish can be improved by proper preservation during transportation and marketing. Cost of preservation should be less than the additional revenue obtained. Graded fish usually command a higher price and live fish marketing increase the price.

Price fluctuates seasonally. Increase in price is possible by phased stocking and periodical harvesting.

Co-operative marketing and different markets and products

Individual farmers are in a weak bargaining position and often receive a very low price. By formation of farmers co-operatives and farmers associations their bargaining position may be

improved. Allocating fish to different markets and selling them in different forms (fresh, frozen, salted and smoked etc.) may increase the price and maximized revenue.

Reduction in costs of production and marketing

Major production costs in aquaculture are cost of feed, fertilizer, seeds, labor, fuel, electricity, cost of marketing etc.

Cost of feed and fertilizers

Feed and fertilizer are most costly items in aquaculture. In many cases feed accounts for more than 50% of costs. Cost of feed can be reduced by an improvement in the conversion ratio or by lowering the unit price of feed or a combination of both. The amount of feed should be at a level where the additional cost of feed equals the additional revenue beyond which it is uneconomic. Integrated fish farming increases the production of animal protein from the same unit area, reduces the cost of feed and or fertilizer.

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Cost of seed

Seed accounts for a high percentage of total variable costs, particularly for species in which artificial hatching has not been successful. When the supply depends on natural sources, availability fluctuates and price increases. Ultimate solution appears to be breeding in captivity. Price of fingerlings is higher than that of fry, but the survival rate is also high. Cost of seed per unit of marketable fish would be lower if the growth period is less and if one stocks larger fingerlings than small fry.

Cost of labor

Labor cost is one of the major expenses in aquaculture because mechanization has not yet been developed to replace labor. Harvesting, feeding and maintenance are the major labor

consuming tasks. Therefore efficient management of use of labor is essential in reducing the cost of product.