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Utilization of Resources by Integrating Fish and Poultry Farming- A Case Study

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***Abstract*:** The integration of aquaculture with livestock or crop farming provides quality protein food, resource utilisation, recycling of farm waste, employment generation and economic development. On farm waste recycling, an important component of integrated fish farming is highly advantageous to the farmers as it improves the economy of production and decrease the adverse environmental impact of farming. Aiming to evaluate the utility and efficacy of integrated fish and poultry farming for self-employment and nutritional security purpose, the integrated model of Fish cum Poultry Farming in 1 hectare (ha) fish-pond with composite carp culture and rearing 1000 White Leghorn poultry birds in a shed constructed (24 x 36 ft) over the fish pond was studied in 2022. From the conducted study, it was assessed that farmer is earning a net profit of approximately 6.78 lakh rupees annually from 1 ha of integrated fish and poultry farming. Hence, the results prove the efficacy of integrated fish cum poultry farming as a profitable venture for the farmers and in addition, could address the issues of sustainability and livelihood security effectively.

Keywords: Environment friendly, Fish, Integrated farming, Poultry, Profitability

Aquaculture is a farming system which can go a long way in augmenting animal protein production and generating gainful employment. The modern fish culture technologies have immense potential for increasing fish production, but they push up the prime cost due to higher input cost, intensive use of protein rich quality feed and mineral fertilizers etc (Bhagawati and Tamuli 2020). Substituting the tradition farming practice with integrated farming system can be a profitable approach that involves crop cultivation, dairy, poultry, fishery, vegetable and fruit production etc. together for higher efficiency. Integration of different enterprises/crop by utilizing farm's available resources is one of the best multidisciplinary approaches to reduce the input cost and enhancing the farmers' income (Singh et al 2020). For the betterment and upliftment of farming community, Government of India is campaigning the flagship programme for “doubling farmer's income (DFI) by 2022” and in this regards, many interventions have been suggested including IFS for ensuring higher farm productivity and profitability for sustainable economic growth for farming communities in India (DFI 2017). Out of all the integrated farming systems, fish cum poultry is the most trending one (Sharma et al 2016). Fish cum livestock farming is considered as an excellent innovation for judicious recycling of organic waste and optimum production of high-class protein at low cost (Ayyappan et al 2011). This is also one of the best methods of both waste disposal and waste utilization (Bhagawati and Tamuli 2020). Integrated farming has immense potential to emerge out as an effective tool for the improvement of rural economy due to low investment and high profitability (Nanda and Bandopadhyay 2011).

In aquaculture, formulated feed costs about 60-70 % of the total production cost and the use of animal manure can considerably reduce the operational costs and make it possible for low to medium income fish farmers to profitably engage in the enterprise (Nath et al 2020). Direct use of livestock wastes is one of the most widespread and conventionally accepted forms of integrated fish farming. This practice increases the efficiency of both livestock and fish culture through the profitable utilization of animal and feed waste products. About 80 per cent of the chicken dropping represents undigested food stuffs due to very short digestive tract of chicken Sharma et al 2016). Under the fish cum poultry integrated farming system, nutrients from poultry waste gets recycled in the pond that allows for escalation of production and income while reducing the effluents along with the dumping of the wastes would have bad impact on the environment (Singh et al 2014, Misra et al 2016). Hence, in this study, the economics of integrated fish cum poultry farming system was assessed.

MATERIAL AND METHODS

Farm location: The study was conducted in village Alkara (30.5003° N, 75.2960° E) of district Barnala (Punjab), on

integrated fish cum poultry farming model (Fig. 2). This case study involves comprehensive assessment of a social microscope comprising person, group, social institution, district, or community (Burgess 1993, Young 1996). Primary data for the study was collected from the farmer through interview and farm visit.

Pond management: In the fish-pond, 6 species of carps including IMCs and CMCs (*Catla, Labeo rohita, Cirrhinus mrigala, Hypophthalmichthys molitrix, Ctenopharyngodon idella, Cyprinus carpio*) were stocked with 10,500 individuals of size ranging from 50-100g. Fish was stocked in the ratio of 3:4:3 (surface feeder : column feeder : bottom feeder) @ catla (2000), silver carp (1150); rohu (2500), grass carp (1700); mrigala (2000), common carp (1150) following the composite carp culture practice for aquaculture. For maintaining water quality, a four paddle-wheel aerator is installed in the pond for aeration, operated daily at the dawn or as per necessity. Addition of fresh water, pH evaluation (using digital pH meter) are the routine practices over there. Pond water is used by the farmer for irrigating fruits and vegetables grown at the pond dyke. To prevent the entry of piscivorous birds, nylon thread is used to cover the pond. A mannequin is installed at the pond dyke for prevention of the same. Application of potassium permanganate (bimonthly) and CIFAX (thrice a year during Feb/March, June/July and October/November) is done to reduce the chances of disease occurrence in fish pond.

Livestock Rearing

Housing of birds: Fully vaccinated 1000 White Leghorn birds is reared in a concrete poultry shed constructed over the pond with concrete pillars. The poultry birds are kept under intensive system (Fig. 1) and are confined entirely to the house and 100-110 g of feed per bird is provided daily. The poultry eggs are collected twice a day.

Horticulture: For utilising the area of pond dyke, he planted seasonal vegetables such as carrot, radish, turnip, spinach, capsicum, green pepper, bottle gourd etc. for household consumption. Fruit like Guava, Kinnow, Indian blackberry

Fig. 1. Poultry shed constructed over fish pond

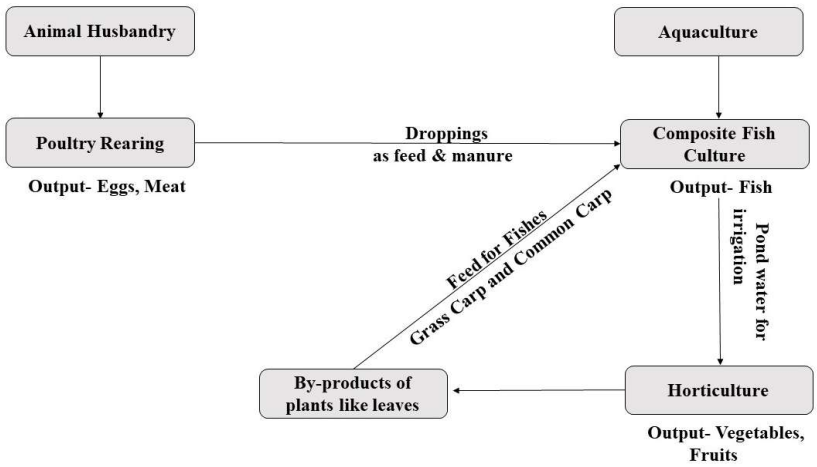

Fig. 2. Flow diagram of the studied integrated farming system model

(Jamun) are also grown near the pond dykes. They are irrigated with pond water and are organically grown without the use of additional fertilizers.

RESULTS AND DISCUSSION

Economic analysis of integrated fish cum poultry farming was made to evaluate the sustainability of the existing integrated farm (includes year-round variable cost and net profit). With absolute dependency on poultry droppings, the total fish production from one ha fish pond was 6.3 tonnes (average production of 2.52 tonnes in 0.4 ha). The percentage return on total expense was 49.67 % in the present study and the average annual net income was Rs. 6.78 lakh rupees with an average of Rs. 56,500.00 per month (Table 1). Robiul et al (2009) also observed higher growth rate and fish production in integration with poultry farming. Bhuiyal et al (2014) documented that the integrated farming system has the potential to improve the efficiency of small and marginal farmers for enhancing their production and income. Sharma et al (2016) conducted a study to evaluate the performance of fish cum poultry cum horticulture integrated farms in comparison to non-integrated fish farms in district Udham Singh Nagar, Uttarakhand. The overall results of the study revealed that the integrated pond management with fish, poultry and horticulture was an excellent approach for sustainable production, income generation and employment opportunity of the resource poor rural households. Misra et al (2019) assessed the utility of integrated fish cum poultry farming system in Arunachal Pradesh for self-employment and observed high cost-benefit

Table 1. Economics of fish cum poultry integrated farming model (One ha)

Parameter	Unit amount	Cost (in Rs.)
1. Expenditure		
A. Fixed Cost		
Pond excavation		3,00,000.00
Poultry shed		80,000.00
Total fixed cost		3,80,000.00
B. Variable cost		
II. Fish pond		
Fish fingerling	12000	36,000.00
Supplementary feed	-	-
Medicines, electricity and miscellaneous	50,000	50,000.00
Labour	Rs. 12,000 per month (Full time)	1,44,000.00
Sub total (I)		2,30,000.00
III. Poultry unit		
Poultry birds	1000 (Rs. 300/bird)	3,00,000.00
Feed	1 Quintal per day	7,40,000.00
Sub total (II)		10,40,000.00
Total variable cost (I+II)		12,70,000.00
C. Total cost		
Variable cost		12,70,000.00
Depreciation on fixed capital @10% per year		38,000.00
Interest on fixed capital @15% per year		57,000.00
Grand total		13,65,000.00
IV. Gross income		
Fish harvesting	6.3 tonnes (Rs. 110 per Kg)	6,93,000.00
Eggs	Rs. 180 per tray	13,00,000.00
Meat	Rs. 50 per bird	50,000.00
Total Income		20,43,000.00
V. Net income (Gross income – Total cost)		6,78,000.00
Average income per month		Rs. 56,500.00

ratio in the integrated system as compared to traditional farmer's practice. The study suggested that integrated fish and poultry farming system is a viable option to increase the income of small and marginal farmers.

CONCLUSION

Case study shows the success of fish cum poultry Integrated Farming System (IFS) model of the farmer with zero waste generation. IFS model is a profitable venture for the farmers to earn more profit in comparison to traditional farming. It can also be easily adopted by young people for income and self-employment generation.

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