



RESEARCH PAPER

Comparative economic analysis of fish cum pig and fish cum dairy integrated farming systems

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Abstract : Integrated fish farming is a system of producing fish in combination with other agricultural/livestock farming operations centered around the fish pond. The study was conducted in Kalong-Kapili NGO of Kamrup (Metro) district of Assam with the objectives of evaluating the cost and return aspects of fish cum pig and fish cum dairy farming systems and identifying the more profitable integration model which gives optimum utilization of given resources. A total of 44 farmers comprising of 24 fish cum pig farmers and 20 fish cum dairy farmers were randomly selected for data collection. Based on data collected, economic analysis of the integrated farming systems were done by using various cost and return concepts. Total operational cost (Cost C) in fish cum pig farming (Rs. 554832.18) was found lower than fish cum dairy farming (Rs. 632267.66). Net income (Rs. 787609.42) and benefit-cost ratio (2.42) were found higher in fish-pig integration, which clearly states that integrated fish cum pig farming is more profitable than integrated fish cum dairy farming.

Key Words : Integrated farming, Fish, Costs, Net return, BC Ratio

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INTRODUCTION

Farming system research is considered as a powerful tool for natural and human resource management in developing countries including India. This is a multidisciplinary whole-farm approach and very effective in solving the problems of small and marginal farmers. A farming system is the result of complex interactions among a number of interdependent components, where an individual farmer allocates certain quantities and qualities of four factors of production,

namely land, labour, capital and management to which he has access (Mahapatra, 1994).

The declining trend of per capita land availability poses a serious challenge to the sustainability and profitability of farming (Siddeswarn *et al.*, 2012). Due to ever increasing population and shrinking land resources in the country, practically there is hardly any scope for horizontal expansion of land for food production. Only vertical expansion is possible by integrating appropriate farming components that require lesser space and time

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to ensure reasonable periodic income to farm families (Gill *et al.*, 2009). Integrated Farming System is inter-dependent, inter-related and inter-linked production system. Farming systems consist of several enterprises like cropping system, dairying, piggery, poultry, fishery, beekeeping etc. when carefully chosen, planned and executed IFS gives greater dividends than a single enterprise, especially for small and marginal farmers.

Integrated fish farming refers to the simultaneous culture of fish or shell fish along with other farming system (Bora and Das, 2013). Over the years, integrated fish farming is accepted as a sustainable form of aquaculture and agriculture system such as fish-paddy, fish-pig, fish-poultry, fish-sericulture, fish-cattle with emphasis on their potential for increasing food production (Devraj, 1987). The production of fishes can be increased by use of animal manures particularly pig manure in fish pond. The integration livestock-fish farming is a practice which links together two normally separate farming systems, whereby the livestock and fish become sub systems of a whole farming system (Sahoo and Singh, 2015). The pig manure contains about 60-70 per cent of digestible food for fishes besides certain digestive enzymes. Recent trend of pig farming has increased the availability of pig manures which can be successfully used for integrating fish cum pig farming. The 30-35 pigs' waste may produce 1 tone of Ammonium Sulphate and 40-45 pigs are adequate to fertilize 1 ha water area under polyculture (Othman, 2006). Consequently the adaptation to fish cum dairy farming could be made quite easily by the farmer. For example, raw cattle dung could be used for fertilizing fish ponds and humus from the ponds, in turn, would make a good fertilizer for growing cattle fodder on dykes along with fish ponds (Dhawan and Singh, 2006).

The present study is an attempt to highlight the economic aspects of both fish cum pig and fish cum dairy farming system and make a comparison of benefit-cost ratio between the two farming systems. This paper attempts to evaluate the costs and returns of both the farming systems and identify the more profitable farming system which gives optimum utilization of given resources.

MATERIAL AND METHODS

The study was conducted in Kalong-Kapili NGO of Kamrup (Metro) district of Assam. A total of 44 farmers associated with the NGO were randomly

selected. The respondents were divided into two (2) groups based on their association with both the integrated farming systems. Out of the total 44 farmers, fish cum pig and fish cum dairy integrations were followed by 24 and 20 farmers, respectively. Based on the data collected, costs and returns of the integrated farming systems were analyzed by using the following cost and return concepts.

Cost concepts:

Different cost concepts used are as follows.

Cost A1:

Cost A1 includes value of hired human labour, value of fish seeds, piglet, cattle, value of feeds, value of manure and fertilizers, value of lime, depreciation on implements and interest on working capital, interest on fixed capital and value of land revenue.

Cost A2:

Cost A1 plus rent paid for leased in land.

Cost B:

Cost A2 plus imputed rental value of owned land plus imputed interest on fixed capital.

Cost C:

Cost B plus imputed value of family labour.

Returns:

Various types of farm incomes which were considered for the purpose of analyzing the returns are as follows.

Gross income:

Gross income from integrated fish farming system was computed by multiplying the output of various integrated fish farming system by their respective prices and adding the values thus calculated.

Farm business income:

Farm business income was calculated by deducting cost A1 from gross income.

Owned farm business income:

It was calculated by deducting cost A2 from gross income.

Family labour income:

Family labour income was computed deducting cost B from gross income.

Net income:

Net income was calculated by deducting cost C from gross income.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Profile of the farmers:

Distribution of farmers based on socio-economic characteristics across both the farming systems is given in Table 1. The sample farmers for each of the farming systems have classified based on the age group of 30-45 years, 46-60 years and above 60 years. For both fish cum pig and fish cum dairy integration the highest farmers were observed in the age group of 30-45 years (54.17% and 40%), followed by age group 46-60 years (33.33% and 35%) and age group above 60 years (12.50% and 25%), respectively.

It was observed that 37.50 per cent of the fish cum pig farmers had education up to class VII, followed by

16.67 per cent farmers who had primary education; whereas in fish cum dairy farming 30 per cent farmers had completed primary education, followed by 25 per cent farmers who had completed high school level education. Illiteracy rate was found 16.67 per cent and 10 per cent for both fish cum pig and fish cum dairy farmers, respectively. The data presented in the table highlights that 87.50 per cent farmers of fish cum pig farming were male, while 12.50 per cent were female. On the other hand, all the farmers of fish cum dairy farming were found as male.

In fish cum pig farming 45.83 per cent farmers had experience of 6-10 years, followed by 29.16 and 16.67 per cent farmers who had experience of 11-15 years and less than 5 years, respectively. Similarly, in fish cum dairy farming 40 per cent farmers had experience of 6-10 years, followed by 25 per cent farmers who had 11-15 years of experience.

Costs of production of integrated farming systems:

Costs of productions in fish cum pig and fish cum dairy farming are shown in Table 2. The table reveals that per hectare Cost A1 for both fish cum pig and fish cum dairy farming were Rs. 4,57,402.11 and Rs. 4,40,793.37, respectively. Cost A2 of Rs. 4,68,177.97 and

Table 1 : Distribution of farmers based on demographic characteristics

Variables	Categories	Integrated farming systems	
		Fish cum pig (n =24)	Fish cum dairy (n = 20)
Age (in years)	30-45	13 (54.17)	8 (40.00)
	46-60	8 (33.33)	7 (35.00)
	Above 60	3 (12.50)	5 (25.00)
Education	Illiterate	4 (16.67)	2 (10.00)
	Up to class IV	4 (16.67)	6 (30.00)
	Up to class VII	9 (37.50)	5 (25.00)
	HSLC	4 (16.66)	5 (25.00)
	HS	3 (12.50)	-
	Graduate	-	2 (10.00)
Gender	Male	21 (87.50)	20 (100.00)
	Female	3 (12.50)	-
Experience (in years)	Up to 5	4 (16.67)	-
	6-10	11 (45.83)	8 (40.00)
	11-15	7 (29.16)	5 (25.00)
	16-20	1 (4.17)	3 (15.00)
	Above 20	1 (4.17)	4 (20.00)

Table 2 : Costs of production of integrated farming systems (per ha)

Integrated farming systems	No. of respondents	Cost A1 (Rs.)	Cost A2 (Rs.)	Cost B (Rs.)	Cost C (Rs.)
Fish cum pig	24 (54.55)	4,57,402.11	4,68,177.97	5,16,466.87	5,54,832.18
Fish cum dairy	20 (45.45)	4,40,793.37	4,55,626.70	5,08,699.73	6,32,267.66

Rs. 4,55,626.70 were found for fish cum pig and fish cum dairy, respectively. Cost B for integrated fish cum pig and fish cum dairy farming were Rs. 5,16,466.87 and Rs. 5,08,699.73 per hectare, respectively. Finally cost C was found out by adding imputed value of family labour to the Cost B. Cost C of Rs. 6,32,267.66 per hectare per year for fish cum dairy farming was found higher in comparison to Rs. 5,54,832.18 per hectare per year for fish cum pig farming.

Production details:

It is found from Table 3 that per hectare fish production was 3150.45 kg/year in fish cum pig farming system, while the corresponding value for fish cum dairy farming was 3065.73 kg/year. Pig meat production of 710.93 kg/year and piglet production of 165.66 numbers/year were also recorded in fish cum pig farming. In case of fish cum dairy farming, per hectare milk and calf production were found 14,120 liters/year and 1.5 nos./

year, respectively.

Gross income:

Gross incomes earned by the farmers per ha per year in fish cum pig and fish cum dairy farming are depicted in the Table 4. The selling prices of fish, piglet and pig meat were Rs. 230.00/kg, Rs. 3000.00/number and Rs. 170.00/kg, respectively. On the other hand, selling prices of milk and calf were Rs. 45.00/ liter and Rs. 3500.00/number, respectively. Gross income per ha per year in fish cum pig and fish cum dairy farming were found Rs. 13,42,441.60 and Rs. 13,45,767.90, respectively.

Other farm incomes:

For the purpose of analyzing the returns from the farming systems various types of farm incomes were considered which include gross income, farm business income, owned farm business income, family labour

Integrated farming systems	Item	Production/ha
Fish cum pig	Fish	3150.45 kg
	Piglet	165.66 no.
	Pig meat	710.93 kg
Fish cum dairy	Fish	3065.73 kg
	Milk	14120.00 L
	Calf	1.5 no.

Integrated farming system	Item	Production/ha	Price (Rs.)	Gross income/ha
Fish cum pig	Fish	3150.45 kg	230.00/kg	7,24,603.50
	Piglet	165.66 no.	3000.00/no.	4,96,980.00
	Pig meat	710.93 kg	170.00/kg	1,20,858.10
Total				13,42,441.60
Fish cum dairy	Fish	3065.73 kg	230.00/kg	7,05,117.90
	Milk	14120.00 l	45.00/l	6,35,400.00
	Calf	1.5 no.	3500.00/no.	5250.00
Total				13,45,767.90

Integrated farming systems	Farm business income (Rs.)	Owned farm business income (Rs.)	Family labour income (Rs.)	Net income (Rs.)
Fish cum pig	8,85,039.49	8,74,263.63	8,25,974.73	7,87,609.42
Fish cum dairy	9,04,974.53	8,90,141.20	8,37,068.17	7,13,500.24

Integrated farming systems	Total operational cost (Rs.)	Gross return (Rs.)	B:C Ratio
Fish cum pig	5,54,832.18	13,42,441.60	2.42
Fish cum dairy	6,32,267.66	13,45,767.90	2.13

income and net income. The Table 5 reveals that the farm business income, owned farm business income and family labour income for fish cum pig farming were Rs. 8,85,039.49, Rs. 8,74,263.63 and Rs. 8,25,974.73 per ha, respectively. Whereas, for fish cum dairy farming farm business income, owned farm business income, family labour income were found Rs. 9,04,974.53, Rs. 8,90,141.20 and Rs. 8,37,068.17 per ha, respectively. Net income was found higher in case of fish cum pig farming which was Rs. 7,87,609.42 per ha, while it was found Rs. 7,13,500.24 per ha for fish cum dairy farming. The reason behind this lower net income in case of fish cum dairy farming was due to the higher costs incurred in cattle rearing. Kumar *et al.* (2017) had also reported very high expenditure in cattle rearing (47% of total per year) in crop + fish + cattle integration model.

Comparative Benefit-cost ratio analysis :

The economic analysis and benefit-cost (B:C) ratio of fish cum pig and fish cum dairy farming systems are presented in Table 6. It is found that total operational costs involved in fish cum pig and fish cum dairy farming were 5,54,832.18 and 6,32,267.66, respectively. Total gross return for both the systems were Rs. 13,42,441.60 and Rs. 13,45,767.90, respectively. Benefit-cost ratio in fish cum pig farming (2.42) was higher than in fish cum dairy farming (2.13) and hence it could be said that fish-pig integration is more remunerative than that of fish-dairy integration. Haobijan and Ghosh (2018) had also reported integrated pig-fish farming as a high income earning practice. According to them, fish-pig integration helps in getting higher growth of fish, optimum utilization of the given resources and net income.

Conclusion:

Due to increasing population and declining trend of per capita availability of land in the country it becomes necessary to intensification and diversification of farming with integration of allied enterprises. Integrated fish farming is well developed culture in Assam which is accepted as a sustainable form of aquaculture. The present study tried to highlight the cost and return analysis of two integrated fish farming systems *viz.*, fish cum pig and fish cum dairy. Total operational cost (Cost C) was found to be higher in case of fish-dairy farming

than fish-pig farming. Similarly, gross return was also found slightly higher in fish-dairy farming than the other model. The study clearly indicates that the fish cum pig farming is more profitable for gaining higher net income and higher benefit cost ratio (2.42) with comparatively lower operational cost to fish cum dairy farming.

REFERENCES

- Bora, J. and Das, A.K. (2013).** Cost and Returns of Integrated Fish Farming in Jorhat District of Assam. *Agric. Sci. Digest.*, **33**(4): 289-293.
- Devraj, K.V. (1993).** Integrated Fish Farming System - A Future Approach for increasing Production, UAS Technical Series University of Agricultural Science, India, **47**:33-37.
- Dhawan, A. and Singh, R.S. (2006).** Present status and scope of integrated fish farming in the North-West Plains of India. In: Integrated fish farming (Mathias, J.A., Charles, A.T. and Baotong, H. (Eds.). Taylor & Francis Publishing. pp. 295-306.
- Gill, M.S., Singh, J.P. and Gangwar, K.S. (2009).** Integrated Farming System and Agriculture Sustainability. *Indian J. Agron.*, **54**(2):128-139.
- Haobijan, J.W. and Ghosh, S. (2018).** Integrated pig-fish farming: A case study in Imphal West district of Manipur. *The Pharma Innovation J.*, **7**(1):495-499.
- Kumar, S., Samal, S.K., Shivani, D. and Manibhushan, S.K. (2017).** Enhancement in Productivity and Income Sustainability through Integrated Farming System Approaches for Small and Marginal Farmers of Eastern India. *J. Agri. Search*, **4**(2) : 85-91.
- Mahapatra, I.C. (1994).** Farming System Research - A Key to Sustainable Agriculture. *Fertilizer News*: **39**(11):13-25
- Othman, K. (2006).** Integrated Farming System and Multi-functionality of Agriculture in Malaysia. *Acta Hort.*, **655**:291-296.
- Sahoo, U.K. and Singh, S.L. (2015).** Integrated Fish-Pig and Fish-Poultry Farming in East Kalcho, Saiha District of Mizoram, North-East India: An Economic analysis. *Internat. J. Agric. & Forestry*, **5**(5): 281-286.
- Siddeswaran, K., Sangetha, S. P. and Shanmugam, P. M. (2012).** Integrated Farming System for the Small Irrigated Upland Farmers of Tamil Nadu. In: Extended Summaries Vol 3: 3rd International Agronomy Congress, held during 26-30 November 2012, New Delhi. pp 992-993.

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