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Economic Analysis of Integrated Pig cum Fish Farming in Assam

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***Abstract:** Integrated fish farming refers to the simultaneous culture of fish or shell fish along with other culture systems. It may also be defined as the sequential linkage between two or more culture practices. Generally integrated farming means the production or culture of two or more farming practices. Fish culture can be integrated with several systems for efficient resource utilisation. 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. Integrated Fish Farming is one of the best examples of mixed farming. This type of farming practices in different forms mostly in the East and South East Asian countries is one of the important ecological balanced sustainable technologies.*

***Keywords:** Aquaculture, Livestock, Utilisation, Recycling, Integrated, Environmental*

Introduction:

Intregated farming technology involves a combination of fish polyculture integrated with crop or live stock production.The pig manure contains about 70% of digestible food for fishes besides certain digestive enzymes (Zhang et. al 1997). It also provides nutrient base for planktons which are ultimately used by the fishes as natural food. Recently, increasing trend of pig farming has increased the availability of pig manures which can be successfully used for integrating pig-cum-fish farming. The 30-35 pig's waste may produce 1 tonn of Ammonium Sulphate and 40-45 pigs are adequate to fertilize 1 ha water area under polyculture (Othman K., 2006). Each pig requires about 3-4 sq.m floor space. This system of integration is very common in China, Taiwan, Vietnam, Thailand, Malaysia, Hungary and some European countries. The White Yorkshire, Hampshire and Landrace are the popular breed of pig for integration with fish. Pigs need clean housing which should provide adequate protection from adverse climates, (Othman K., 2006). The pigs are fed on pig mash which is made up of rice bran, rice polish, wheat-bran, broken maize, ground-nut oil cake, fish- meal mineral mixture, salt etc. The spoiled vegetables can also be mixed in it. This system provides about 3000-4000 kg/ha/yr fish, 4500 kg/yr pig meat and 800 no. of piglets every year, (Sankhayan P.L., 1998).

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Materials and Methods:

To conduct the study of "Economic analysis of Integrated pig cum fish farming in Assam" during the year of 2016-2017. Scientifically, a suitable research design was evolved in order to arrive at an authentic conclusion. The farm is situated at Nagaon District of Assam having the GPS location signal 6^0-60'- 25'' E, 6^0-60'-35'' E and 2^0-20'- 27'' N, 2^0-20'-37'' N. The maximum temperature during summer rises around 39^0C, while minimum temperature during winter is around 100^0 C. The average temperature during most part of the year is around 30^0 C during day time.

The Plan of work sequence is:

Designing the Sampling Frame > Selection of two pig cum fish farm named by Station 1 and Station 2 at Nagaon District > Primary and secondary data collection > Drawing of Inference > Find out the Management > Strategies on the basis of the study.

Data collection were made by two ways; collection of existing data (secondary data) such as published literature, books, research articles and maps etc. of institutions. The present status, current problems and related legislation were collected from the literature survey. The collection of new data by filling of questionnaires was carried out. The collected data are later analyzed statistically by SPSS software application.

Results and Discussion:

The present dissertation gives a spectrum of information, identification of important input variables, threats and the required management for the sustainability of Pig cum fish farming. The value of construction cost in station 1 is Rs 2.4 lacs and in station II the expenditure of construction is Rs 2.9 lacs . For electric installation the cost is Rs 18,000 in station I and in station II the expenditure is 20,000. For watchmen shed the collected data is Rs 78,000 in station I and the expenditure is 9000 in station II as they repaired their own house for watchmen. The collected data on Lease amount in Station 1 is Rs 5 lacs and in station II is Rs 5.5 lacs. The collected data on Fertilise and productivity purpose is Rs 6.9 lacs and in station II is 7.4 lacs. The collected data on chemicals Station 1 is Rs 3 lacs and in station II is 3.5 lacs. For cost of seeds the collected data is Rs 16 lacs in staion I and 17 lacs in station II. The average cost of feed expenditure for both pig farm and fish farm for station I is 3 lacs and for station II is also 3 lacs. The collected data on Fuel charge in Station 1 is Rs 6000 in station I and 7000 in station II. The collected data on Electricity charge in Station 1 is Rs 34,000 and 37000 in station II. The collected data on Labour charges in Station 1 is almost 2.5 lacs and 3.7 lacs in station II.

Table 1 : Average Economics of Pig cum fish farming in Assam during 2014-15

Sl. No.	Particulars	Station I	Station II	Comments
A.	**Capital Cost**	**Amount (Rs.in lakh)**	**Amount (Rs.in lakh)**	
1	Construction	2.4	2.9	
2	Electric installation with electrification	0.18	0.20	
3	Equipments	1	1.2	
4	Miscellaneous	0.11	0.14	
5	Watchman shed	0.78	0.9	
6	**Total**	**4.47**	**5.34**	

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B.	Variable Cost	Amount (Rs.in lakh)	Amount (Rs.in lakh)	Comments
1.	Lease amount	5	5.5	
2.	Fertilize and productivity purpose	6.9	7.4	
3.	Chemicals	3	3.5	
4.	Cost of seeds (Fish + Piglet)	16	17	
5.	Cost of feed (Fish + Pig)	3	3	
6.	Fuel charges	0.06	0.07	
7.	Electricity charges	0.34	0.37	
8.	Labour charges	2.509	3.664	
9.	Annual maintenance and repairing cost	0.2	0.25	
10.	Miscellaneous	0.07	0.09	
	Total	**37.079**	**40.849**	
	Total Input (capital cost + variable cost)	**41.549**	**46.189**	

Table 2 : Total Production of Station I :

Sl no	Species name	Production (in quintal)	Rate@/que	Amount (in lakh)
1	Rohu	200	11000	22
2	Catla	180	13000	23.4
3	Mrigal	100	9000	9
4	Bata	100	9000	9
5	Pigs	130	6000	7.8
Total				**71.2**
Profit : (output-input)				**(71.2-41.549)**=29.651 lakh
P.I: output/inputX100				**71.2/41.549**X100=171.363

Table 3 : Total Production of Station II :

Sl no	Species name	Production (in quintal)	Rate@/que	Amount (in lakh)
1	Rohu	220	12000	26.4
2	Catla	210	14000	29.4
3	Mrigal	100	10000	10
4	Bata	100	10000	10
5	Pigs	158	7000	11.06
Total				**86.86**
Profit : (output-input)				**(86.86-46.189)**=40.671 lakh
P.I: output/inputX100				**86.86/46.189**X100=188.053

From Table 4, it depicted the bivariate inter-correlation among all the variables (average value calculated for 1 Ha area, in all the cases viz. Lease amount , Fertilize and productivity purpose, Chemicals ,Cost of seeds, Fuel charges , Electricity charges ,Labour charges ,Annual maintenance and repairing cost ,Miscellaneous ,Total Variable Cost ,Total Input ,Total Output, Profit under consideration .Firstly considering the correlation between **Lease amounts** Cost with electrification other variables there exist a significant high positive correlation with Annual maintenance and repairing cost ,Miscellaneous , moderate positive correlation with equipments , Miscellaneous, Chemicals ,Cost of seeds, Total Variable Cost, Total Input ,Total Output, Profit low positive

correlation with Fuel charges , Electricity charges, Labour charges. Secondly, considering the correlation between fertilize a Cost with electrification other variables there exist a significant high positive correlation with Miscellaneous ,Total Variable Cost , Total Output, Profit moderate positive correlation with Chemicals ,Cost of seeds Fuel charges , Electricity charges, Labour charges ,Annual maintenance and repairing cost. Thirdly considering the correlation between **Chemicals Cost** with electrification other variables there exist a significant moderate positive correlation with Fuel charges , Electricity charges, Labour charges ,Annual maintenance and repairing cost ,Miscellaneous low positive correlation with, Cost of seeds, Total Variable Cost ,Total Input ,Total Output, Profit. Forthly considering the correlation between **Cost of seeds** with electrification other variables there exist a significant high positive correlation with Cost of seeds Fuel charges , Electricity charges ,Labour charges , Total Variable Cost ,Total Input ,Total Output, Profit moderate positive correlation with Annual maintenance and repairing cost ,Miscellaneous. Fifthly considering the correlation between **Fuel charges** with electrification other variables there exist a significant high positive correlation with Electricity charges ,Labour charges , Total Variable Cost , Total Output, Profit low positive correlation with Annual maintenance and repairing cost, Miscellaneous . Sixth, considering the correlation between **Electricity charges** with electrification other variables there exist a significant high positive correlation with Labour charges ,Annual maintenance and repairing cost ,Miscellaneous ,Total Variable Cost ,Total Input ,Total Output, Profit low positive correlation with Annual maintenance and repairing cost. Seventh, considering the correlation between **Labour charges** with electrification other variables there exist a significant high positive correlation Total Variable Cost ,Total Input ,Total Output, Profit moderate positive correlation with Annual maintenance and repairing cost ,Miscellaneous. Eighth considering the correlation between **Annual maintenance** and repairing cost with electrification other variables there exist a significant high positive correlation with Profit moderate positive value correlation with Total Variable Cost ,Total Input ,Total Output. Ninth considering the correlation between **Miscellaneous** with electrification other variables there exist a significant high positive correlation with Total Variable Cost ,Total Input ,Total Output, moderate positive correlation with profit. Tenth considering the correlation between **Total Variable Cost with** electrification other variables there exist a significant high positive correlation with Total Input, Total Output, profit. Eleventh considering the correlation between **Total Input** electrification other variables there exist a significant high positive correlation with Total Output, profit. Twelvth considering the correlation between **Total Output** electrification other variables there exist a significant high positive correlation with profit.

Table 4: Correlation Matrix for Average Economics (unit 1Ha) comprising two bheri fisheries culture at Dhapa canal of East Kolkata during -2014 (June-Dec)

	Construction	Electric installation	equipments	Watchmanshed	Miscellaneous	Total capital coat	Lease amount	Liming and manure	Chemicals	Cost of seeds	Cost of Feed	Fuel charges	Electricity charges	Labour charges	maintenance/repairing cost	Miscellaneous	Total Variable Cost	Total Input	Total Output	Profit
Construction	1																			
Electric installation	.920	1																		
equipments	.87	.99	1																	

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	6	5																		
Miscellaneous	.997	.948	.911	1																
Watchman shed	.268	.62	.699	.343	1															

Total Capital Cost	.947	.997*	.985	.969	.563	1														
Lease amount	.723	.394	.300	.666	-.472	.463	1													
Liming and manure	.698	.923	.957	.752	.877	.891	.010	1												
Chemicals	.585	.856	.904	.647	.938	.815	-.137	.989	1											
Cost of seeds	-.077	.320	.413	.002	.940	.248	-.744	.661	.764	1										
Cost of Feed	.490	.109	.009	.420	-.708	.184	.957	-.282	-.420	-.90	1									
Fuel charges	.516	.810	.865	.581	.964	.763	-.220	.973	.997	.815	-.494	1								
Electricity charges	.997*	.947	.910	1.000**	.340	.969	.668	.750	.645	.000	.423	.579	1							
Labour charges	.366	.701	.769	.438	.995	.645	-.379	.922	.969	.900	-.632	.986	.435	1						
maintenance /repairing	.621	.879	.922	.681	.921	.840	-.092	.995	.999*	.734	-.378	.992	.679	.957	1					

Miscellaneous	.757	.953	.978	.806	.832	.927	.096	.996	.973	.597	-.198	.950	.804	.885	.982	1				
Total Variable Cost	.524	.816	.870	.590	.961	.770	-.209	.976	.997*	.809	-.485	1.000**	.587	.984	.993	.953	1			
Total Output	.617	.876	.920	.677	.924	.837	-.098	.994	.973*	.853	-.384	.992	.674	.958	1.000**	.981	.994	.999**	1	
Profit	.325	.669	.740	.398	.998**	.611	-.419	.904	.957*	.851	-.665	.978	.395	.999**	.943	.864	.976	.959*	.945	1

** Correlation is significant at the 0.01 level (2- tailed)
* Correlation is significant at the 0.05 level (2 tailed)

Conclusion: The integration of aquaculture with livestock or crop farming provides quality protein food, resource utilisation, recycling of farm waste, employment generation and economic development. Integrated fish farming is well developed culture practice in China followed by Hungary, Germany and Malaysia. Our country, India, is organic-based and derives inputs from agriculture and animal husbandry. The integrated fish farming is accepted as a sustainable form of aquaculture. For integration we can use recycled effluents from agro-based industries as well as food processing plants

The bheri fisheries, for which the wetland is known globally, has been constrained due to inadequate management of water regimes, technology integration and weak marketing, post marketing and value addition opportunities. Baseline data on fish farms collected by the authority indicate a relatively higher sewage access, productivity and net returns to the large farmers. The current farm management systems indicate a skewed incentive towards the large private farmers, as against the small and medium size farms. Despite living within a highly resource rich area, the communities living within East Kolkata wetland have high rates of poverty incidence. The average household income of the wetland communities still stands equivalent to less than 70 % of the state average. Attention is needed to educate the fishermen regarding the pond management and time schedule of harvesting for the overall development of bheri fisheries.

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