Niger Agric. J. 32 (2001): 119-128

AN ANALYSIS OF INTEGRATED FISH-POULTRY FARMING

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(Accepted August 2001)

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ABSTRACT.

This study was designed to compare the performance of a polyculture of C. gariepinus and O. niloticus in integration with broiler chickens and without integration with broiler chicken. In physical and economic terms the integrated polyculture performed better. The yield of C. gariepinus and O. niloticus in the integrated polyculture was 133. 08kg and 45.3kg respectively compared to a yield of 20.76kg for C. gariepinus and 26.20kg for O.niloticus in the non-integrated polyculture. The integrated polyculture produced 3841 fingerlings and 4544 fry for O. niloticus while the non-integrated polyculture produced 941 fingerlings and 2230 fry. The gross margin for integrated polyculture was positive while the gross margin for non – integrated polyculture was negative.

Therefore while integrated polyculture increased the profit of the whole farm. non-integrated polyculture reduced it. Integrated polyculture is recommended not only because it makes a positive contribution to the profit of the whole farm, but also because it ensures the diversification of the farm business which minimizes the risk of total loss.

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INTRODUCTION

The success of fish culture practices and improved techniques in agriculture generally has been attributed to improved access to extension services. Farmers who maintain regular contact with the extension service are usually more productive since they usually put into practice techniques learnt and information gathered from the extension service (Haught, 1995).

Wilsson and Wetengere (1994) posit that the most important factor influencing the adoption of semi – intensive fish farming by farmers is contact with the extension service. Extension advice turns information into knowledge, which helps the farmer to increase his output and productivity. As a result, studies for instance, Cooche et.al (1994) have indicated the need to give the extension service in aquaculture greater priority.

Aquaculture practices integrated with other farming activities are systems well suited for promotion by the extension service. The integrated approach seeks to reach beyond the few existing fish farmers and to find additional roles for aquaculture in improving the economic status of many a small-scale farmer.

Integrated fish farming are fish culture integrated with other on farm activities in terms of both inputs and outputs. Generally integrated fish farming is a relatively new culture technique with great potential for maximizing the efficiency and productivity of small-holders farmers (Mukherje, 1995; Little, 1995; Nguyen et. al; 1995; Gongfu, 1995; Kang-min and Reizhen, 1995 Onuoha, 1999). Integration with livestock enterprises is probably the most common form of integrated fish farming. Chicken manure and unutilized feed contribute directly to the fish diet and, indirectly enhance plankton production in the water. Fish production has however remained the major activity in most of the integrated systems.

In Asia and other developing countries, integration has enhanced productivity per hectare and increased farmers incomes. In Nigeria, there is limited empirical information to show what impact integration will make on farmers output and incomes. This study is designed to achieve this objective.

Objectives of the Study

The specific objectives of the study will be to:

determine and compare the yield of fish in integrated polyculture with the yield in non – integrated polyculture.

determine and compare the contribution of each enterprise – integrated and non – integrated polyculture and poultry to the profit of the whole farm.

make recommendations on the profitability or otherwise of integrated fish farming.

METHODS

Two ponds each of size 0.1ha were used for the study at the African Regional Aquaculture Centre (ARAC), Aluu Port-Harcourt, Nigeria from March – December 1993. A poultry cage of size 5m x 2m x 1.2m was constructed over one of the ponds to house 150 broiler chickens. The pond with the poultry cage represent the first treatment – a polyculture of C. gariepinus and O. niloticus with supplementary feeding integrated with broiler chicken. The other pond represents the second treatment – a polyculture of C. gariepinus and O. niloticus with supplementary feeding without integration.

The ponds were stocked at the rate of 1.5 fish per m^2 i.e. two O – niloticus to one C. gariepinus. The O. niloticus was introduced into the ponds one month earlier than C. gariepinus to avoid predation of the former by the latter and also to allow O. niloticus to produce fry to the advantage of the predatory habit of the C. gariepinus. The fish seed was obtained from the hatchery unit of ARAC.

Day old broiler chickens weighing 0.40 – 0.44 kg were procured and brooded for 3 weeks before being transferred to the poultry cage. The chickens were fed on commercial poultry diet – top feed starter fed with 212% protein and finisher with 19% protein at the rate of 25kg of starter feed per 100 birds per week for the first four weeks and 50kg finisher feed per 100 birds per week from four weeks to market weight. The birds were sold off at the market weight of 1.6 – 1.72kg. two batches of broiler chickens were raised.

The pond with poultry cage received manure directly from the poultry cage. Manure loading of the pond was monitored twice weekly by weighing droppings from twenty randomly selected and weighed chickens. The mean weight of the droppings was taken as the average loading for the week. The pond without poultry cage used for non-integrated polyculture was fertilized with dried chicken droppings collected from poultry houses with battery cage system. the droppings were supplied at 25kg/week/ pond at the crib corner until a desirable plankton bloom was observed (assessed visually by how green the pond water was).

Data Collection and analysis

Data on size and weight of fish were collected bi-weekly to assess the growth of the fish over the culture period. Observations were recorded for twenty samples of fish of each species. The parameters observed include standard length, total length and weight. For poultry the weight of the birds were taken before they were sold. Data were also collected on the prices of inputs and outputs for both fish and poultry.

The analysis of objective one involved a physical assessment of integrated polyculture and non – integrated polyculture based on weight and number of fish to determine the yield of fish in each enterprise.

For objective two, the gross margin technique was used to determine and compare the contribution of each enterprise – integrated polyculture, non-integrated polyculture and poultry to the profit of the whole farm. The gross margin technique is based on the premise that the farm costs can be categorized into fixed costs and variable costs. While variable costs can be allocated to each enterprise in the farm, fixed costs cannot. The gross margin therefore is a measure of the difference between the gross returns and the total variable cost for each enterprise.

RESULTS AND DISCUSSION

Physical Assessment Of Integrated Polyculture With Supplementary Feeding And Non-Integrated Polyculture With Supplementary Feeding.

The yield of fish, fry and fingerlings in terms of number and weight are shown in the table below.The table above indicates that integrated polyculture produced a total yield of 133.08kg of African mud catfish (C. gariepinus) and 45.30kg of tilapia_(O. niloticus) with survival rate of 88.6% and 51.2% respectively. The individual weight of African mud catfish increased from an average of 9.0g to an

Table 1: Fish yield fry and fingerling production in integrated and non-integrated polyculture with supplementary feeding.

Treatment	Fish-type	Quantity stocked (Na)	Average Initial Individual wt	Average Final Individual wt	Average wt Gain (g)	Total Harvest (No)	% Survival	Fish yield (kg)
Integrated Polyculture	*C. gariepinus*	500	9.0	300.41	291.41	443	88.6	133.08
With supplementary feeding	O. niloticus	1000	45.0	88.5	43.5	512	51..2	45..31
								Fingerlings (941) fry (4544)
Non-Integrated Polyculture	*C. gariepinus*	500	17.5	101.25	83.15	210	42.0	20.76
With Supplementary feeding	*O. niloticus*	1000	15.0	63.75	48.75	411	41.1	26.20
								Fingerlings (941) Fry (2230)

Table 2: Gross Margin Analysis of Integrated and Non-Integrated Polyculture and

Activity		Integrated Polyculture	Non- Integrated Polyculture
A.	Variable Costs	Naira	Naira
i.	Fingerlings of C.	250.00	250.00
ii	Fingerlings of O.	300.00	300.00
ii.i	Fish feed	187.50	150.00
iv	Lime	20.00	20.00
v.	Diesel	1132.80	1132.80
vi.	Labour	100.00	100.00
vii.	Day old chicks	1635.00	-
viii.	Poultry feed	6299.00	-
ix.	Medication And	1263.00	
	Total	11, 187..30	1952.80
B.	Gross Revenue	(N)	(N)
i.	C gariepinus	2661.60	415.20
ii.	O. niloticus	13.59	7.86
iii.	Fingerlings of O.	1152.30	282.30
iv	Broiler	11,136.00	
	Total Gross Reve-	14963.49	705.36
	Total Variable Cost	11187.30	1952.80
	Gross Margin	3776.19	-1247.44

average of 300.41g indicating an average weight gain of 291.41g or over 3000%. For tilapia, average individual weight increased from 45g to 88.5g indicating an average weight gain of 43.5g or 96.67%.

The non – integrated polyculture produced a total yield of 20.76kg of African mud catfish and 26.20kg of tilapia with 42% and 41.1% survival rate respectively. Average individual weight gain was 83.75g or 476.6% for African mud catfish and 48.75g or 325% for tilapia. The integrated polyculture produced 3841 fingerlings and 4544 fry tilapia while the non – integrated polyculture produced 94 fingerlings and 2230 fry tilapia. These results suggest that integrated polyculture was better than non – integrated polyculture in terms of fish yield, survival rate, and the production of fry and fingerlings of tilapia. The non-integrated polyculture was better in terms of average individual weight gain for tilapia. Total yield for non integrated polyculture was less than that of integrated polyculture due to the lower survival rate. The higher survival of tilapia in integrated polyculture compensated for the poor individual weighty gain thereby making integrated polyculture better in terms of total fish yield.

Economic Assessment of Integrated and Non-Integrated Polyculture and poultry.

The costs and returns for integrated and non-integrated polyculture and poultry are presented in the table below.

Table 2 above shows that the gross margins for integrated polyculture, non-integrated polyculture were N3776.19 and N1247.44 respectively. While integrated polyculture and poultry made positive contributions to the profit of the whole farm, non-integrated polyculture made a negative contribution thus reducing the profit of the whole farm. The gross margin for non – integrated polyculture was negative probably because fish yield in the non – integrated polyculture was relatively low. The relatively higher fish yield in the integrated polyculture can be attributed to the presence of poultry chickens. Fresh chicken droppings may have been utilized by fish in the integrated polyculture as feed and may have also contributed to the abundance of plankton in the pond. This conforms with the findings of other studies (Engle and Skladamy, 1992; Rathanavaraha, 1992; Onuoha, 1999).

CONCLUSIONS AND RECOMMENDATION

In physical and economic terms, integrated polyculture yielded better results. Integration also ensures diversification of the farm business. Diversification provides the farmer with additional revenue and is also a strategy for minimizing risk. (Upton, 1973; Hazell et. al; 1985) Integrated polyculture is therefore more profitable than non-integrated polyculture and is recommended to boost farmers incomes.

ACKNOWLEDGEMENT

The Nigerian Institute for Oceanography and Marine Research (NIOMR) for financial support and the African Regional Aquaculture Centre (ARAC) Aluu for providing support staff.

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