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Studies on economic impact of low cost supplementary fish feed under composite fish culture

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Abstract

In aquaculture, feed accounts for 60-70% of the total cost of production and holds the key for success in farming .Cost of feed is one of the highest recurring cost in intensive and semi intensive aquaculture. So it is necessary to formulate low cost fish feed from locally available feed ingredients that are economically beneficial for fish farmers. A trial had been done on low cost supplementary fish feed in composite fish farming under real farming situations in the year 2009-10. On Farm Trials were conducted at village ponds of Chaka block of Allahabad district in U.P. Two treatments were assigned; Traditional practice (use of cow dung at the time of pond preparation without using of inorganic fertilizer & fish feed) and Supplementary feeding (mustard oil cake + rice bran @ 2% of body weight of fish) as T_1 and T_2 respectively. The selected Indian major carp species were Rohu (*Labeo rohita*), Catla (*Catla catla*) and Mrigal (*Cirrhinus mrigala*), and exotic carp species were Silver carp (*Hypophthalamichthys molitrix*), and common carp (*Cyprinus carpio*). The studies revealed that growth of Silver carp among Exotic Carps and Catla among Indian Major Carp was better than that of other fish species under composite fish culture in T_2 pond. Fish yield was 33.50 q/ha in T_2 and 23.50 q/ha in T_1. Percent yield of fish increase to 42.55 %. Benefit-cost ratio of 2.35 and 2.56 were observed in T_1 pond and T_2 pond respectively. Favorable cost benefit ratio is self-explanatory for economic viability of the trial and convinced the farmers for adoption of interventions. The results showed that feeding technology was suitable for enhancing the productivity of fish and supplement the income of fish farmer also.

Keywords: OFT**,** Composite Fish Culture, low cost Supplementary feed, Yield, Benefit-cost ratio

Introduction

Fish is high class protein rich edible commodity and its farming and production is capable of generating means of employment besides supply of protein rich food (Lakra 2010). Aquaculture has established itself as an effective livelihood for a large section of economically under-privileged population in India. Asian aquaculture is dominated by semi-intensive freshwater, earthen pond culture systems. In these systems natural productivity is enhanced with fertilizers and the fishes are provided with supplemental feeds (De-Silva & Hasan 2007). India is the second largest aquaculture producer in the world. Aquaculture contributed 45 % of the country's total fish production of 6.98 million tonnes in 2006. Most carp production in India is made through extensive polyculture systems. The three Indian major carps, namely Catla (*Catla catla*), Rohu (*Labeo rohita*) and Mrigal (*Cirrhinus mrigala*) contribute the bulk of production of over 3.02 million tonnes (FAO 2006) followed by Silver carp, Grass carp and Common carp forming a second important group.

Aquaculture is one of the fastest growing industries in the food sector. According to Food and Agricultural Organization (FAO) report, the average consumption of aquaculture products related to total per capita fish for human consumption which rose from 14% in 1986 to 47% in 2006 and it can be expected to reach 50% in the next few years (Desriac *et al*. 2010). Supplementary feed is known to increase the carrying capacity of culture system thereby enhancing fish production by several folds (Nazish & Mateen 2011). In aquaculture, feed

accounts for 60-70% of the total production cost and holds the key for success in farming (Mukhopadhyay 2000). Since cost of feed is one of the highest recurring cost in intensive and semi intensive aquaculture, so it is necessary to formulate low cost fish feed from locally available feed ingredients that are economically beneficial for fish farmers (Chakrabharty *et al.* 1973, Jafri *et al.* 1992). This cost depends on many factors such as protein level, the source, type of ingredients that could be derived from plant or animal resources and manufacturing practices. The cost of production is likely to be reduced if growth performance and feed efficiency are increased in commercial aquaculture. It is also found that if the survivility of the fishes increase, then their overall production cost would be remarkably reduced.

The specific objectives of the study were-

I. To compare fish production between culture systems using low cost supplementary feed and traditional practice.

II. To study the economic indicators of OFT on low cost supplementary feed in fish farmers pond.

Methodology

District Allahabad

Allahabad is situated in the South-Eastern part of the State Uttar Pradesh. It lies between the parallels of 24^0 77' and $25^0$47' north latitudes and 81^0 19' and 82^0 21' east longitudes. Topographically, the district of Allahabad belongs to the central plane zone of Uttar Pradesh. It has tropical climate that the average maximum temperature ranges between 43^0C - 47^0C which may go as high as 48^0C during peak summers. The minimum average temperature is 2-4^0C which may fall as low as 1.5^0C during peak winter months (Dec.-Jan.) The average rainfall of the district is 960 mm and the monsoon season is spread between July-September.

PRA survey and problem identification in composite fish culture

During PRA survey by KVK Allahabad, while interacting with fish farmers of the village, there was general consensus amongst the fish farmers that low yield of fish needs to be increased. Problem diagnosed that low yield of fish in composite fish farming system due to lack of natural fish food i.e. plankton in pond water.

Study area

Krishi Vigyan Kendra, Allahabad, has conducted On Farm Trial (OFT) onfeed management of pond by use of Supplementary feedin composite fish farming under real farming situations between 2009-10 at Chaka block of Allahabad district in Uttar Pradesh .

Details of Technologies Selected for assessment/refinement:

The level of natural food organisms in the fish culture ponds cannot be maintained to the required extent even after manuring. Hence, supplementary feeding with diets rich in protein and carbohydrates etc. is essential for high rate of fish growth**.** (Anonymous, 1985).Package practices of composite fish culture were conducted as per guideline of CIFA, Bhubaneswar **(**Anonymous, 2005).

T_1 – Traditional practice (use of cow dung at the time of pond preparation. No use of supplementary feed and inorganic fertilizer).

T_2 – Supplementary feeding (Mustard oil cake and Rice bran)in the ratio of 1:1 by weight @ 2% of body weight of fish.

Source of technology: NDUAT – Faizabad, 2005

A visit for the farmers and the extension functionaries were organized at OFT ponds to

disseminate the message at large. Yield data were collected from T_1 (Farmer's practice) and T_2 (OFT) ponds. Cost of production, net income and benefit cost ratio were computed and analyzed also.

Thematic area: Composite fish culture (semi intensive culture), low cost feed management.

Production technology*:* The ponds were prepared by repairing the dikes and drying the pond bottom in sunlight for a week and liming at a rate of 200 kg/ha. Ponds were filled with canal water and then cow-dung was applied. After five days all the ponds were stocked at the rate of 6,000 fry/ha with the selected indigenous carp species Rohu (*L. rohita*), Catla (*C. catla*) and Mrigal (*C. mrigala*) and exotic carp species, Silver carp (*H. molitrix*), Common carp (*C. carpio*) (Table 1). Chemical and biological conditions of pond soil and water were regularly monitored during the study period. Bag feeding methods applied for fish feeding. Feeding frequency @ 2 times per day.

Table 1. Stocking density of carp species.

Carp Species	Feeding Habit	Average Initial Wt (g)	Stocking Ratio (%)	No. of Fish/ ha-
Catla catla	Surface feeder	26.25	30	1,800
Labeo rohita	Column feeder	20.05	30	1,800
Cirrhinus mrigala	Bottom feeder	22.15	10	600
Hypophthalamichthys molitrix	Surface feeder	20.35	15	900
Cyprinus carpio	Bottom feeder	34.58	15	900
Total stocking			100	6,000

Data for yield were collected from T_1 and T_2 ponds and cost of production, net income and benefit cost ratio were computed and analyzed.

Data Analysis

1. $\%\ \text{Change in Yield} = \frac{\text{Yield Demo.-Yield Check}}{\text{Yield Check}} \times 100$
2. Net Return = Gross Return - Cost of Production.
3. $\text{B. C Ratio} = \frac{\text{Gross Return}}{\text{Cost of Production}}$

Results and Discussion

Yield performance of OFT onlow cost supplementary feeding composite fish culture:

Present study revealed that, application of supplementary feed (T_2) in Composite Fish Culture has many advantages over farm practice (T_1) of fish culture. The yield performances are presented in Table 2. The studies revealed that growth of Silver carp among Exotic Carps and Catla among Indian Major Carp was better than that of other fish species under composite fish culture in T_2 pond. Fish yield was 33.50 q/ha inT_2 and 23.50 q/ha in T_1. Study revealed that supplementary feeding plays an important role in semi-intensive fish culture. It also offers the best means of fish production within shortest possible time in ponds. Supplementary feeding increases the carrying capacity of culture systems and can enhance fish production by manifold (Hepher 1975, Devaraj *et al.* 1986).

Table 2 Yield performance of OFT onlow cost supplementary feedin composite fish culture

Yield (q/ha)		Change in yield (q/ha)	% Change in yield
T_1	T_2	T_2 -- T_1	T_2 - T_1
23.50	33.50	10.00	42.55

Economic indicators of OFT onlow cost supplementary feeding composite fish culture:

Table 2 indicates that change in yield of fish production was 10.00q/ha and percent yield of fish increased to 42.55 % was recorded. The study showed that low cost supplementary feed was helpful to increase fish production.

Economic indicators i.e. cost of production, gross returns, net returns and BC ratio of OFT for low cost supplementary feed in Composite Fish Culture system are presented in Table3. The data clearly revealed that, Cost of production was Rs 65,000 and Rs 85,000 per hectare from T_1 andT_2 pond. Gross return was Rs1, 52, 750 and Rs 2, 17, 750 per hectare from T_1 and T_2 pond. The net profit of Rs.87,750 and Rs.1,32,750 per hectare was found in T_1 and T_2 pond and benefit-cost ratio of 2.35and 2.56 were observed inT_1 and T_2 pond respectively. The results showed that the feeding with low cost supplementary feed was suitable for enhancing the income of fish farmer.

Table 3 Economic indicators of OFT onlow cost supplementary feeding composite fish culture.

Technologies	Cost of production (Rs/ha)	Gross return (Rs/ha)	Net profit (Rs. / ha)	BC Ratio
T_1	65,000	1,52,750	87,750	2.35
T_2	85,000	2,17,750	1,32,750	2.56

Conclusion

The results of OFTs convincingly brought out that the yield of fish could be increased by average 42.55 % with the intervention on cheaper and easily available supplementary feeding in the Allahabad region. Favorable benefit cost ratio is self-explanatory of economic viability of the trials and convinced the farmers for adoption of intervention imparted. The technology suitable for enhancing the productivity of fish, supplement the income of fish farmer.

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