J. Bangladesh Agril. Univ. 6(2): 375–380, 2008 **ISSN 1810-3030**

Culture possibility of scheilbeid catfish using formulated feed in natural pond

M.A. Razzaque[1], M.A. Mazid[2], M.N. Islam, M.A. Mansur
Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh -2202, Bangladesh
[1]Department of Fisheries, Ministry of Fisheries and Livestock, Govt. of the Peoples Republic of Bangladesh. Present place of posting Fisheries Farm Manager, Fulpur, Mymensingh, Bangladesh
[2]Director General, Bangladesh Fisheries Research Institute, Mymensingh- 2202, Bangladesh

Abstract

A research study was conducted to investigate the culture possibility of fresh water catfish *Pangasius pangasius* with formulated feed in natural ponds. The stocking density was chosen as 8000 fry/ha with an initial weight of 42.57± 2.51 g. The formulated feed contained 45% fishmeal, 30% mustard oil cake, 15% wheat bran and 10% rice bran to supply 40.48% protein in feed. The growth of *Pangasius pangasius* in terms of net weight gain was found as 266.49g, which was statistically significant ($p<0.05$). The food conversion ratio (FCR) observed during this research study was high (7.58). There was no variation in the biochemical composition of the fish as a result of such culture technique and experimental conditions. The whole experiment was conducted for a period of 10 months. Production of fish was found to be 2.13 tones/ha using this formulated feed.

Keywords: Culture, *Pangasius pangasius*, Formulated feed, Pond

Introduction

Cat fish is an important group of fish which is successfully being cultured in many countries of south Asia and South East Asia. Among the various species of cat fish *Pangasius* spp. are particularly important because of its size and taste. It is an open water fish migrates from the brackish estuarine delta to the middle or even rocky upper middle of the river Jamuna 1000-2000 km far from the estuaries. Its migratory behaviour is next to *Hilsa ilisha.*[1] *Pangasius pangasius* is known as a fluvial anadromous fish attain a maximum length of 134 cm and weigh of 26 kg.

Although commercial fish farming in pond and lake began with indigenous and exotic carp species in Bangladesh in last two decades the attempts for the culture of open water cat fish in such water bodies began recently (in last few years). *Pangasius pangasius* is such an open water catfish can be chosen by farmers for culture in pond and lake of Bangladesh considering the profit and market value, consumers acceptability or popularity as a delicious food. Hickling (1962)[2] reported a good production of *Pangasius spp*. in Kampuchea and Thailand. *Pangasius pangasius* is an omnivorous fish and takes crustaceans, insects, forage fish, mollusc, roots and other animal matters[3]. It generally grows in rivers, haor, baor, beels and flood plains with natural care. It is believed that culture of *Pangasius pangasius* would be successful and profitable in Bangladesh due to its fast growth, wider tolerance in water quality fluctuation, disease resistance and comparatively high market price as well as high demand. Another important fact is that this fish can easily be acclimatized to the artificial feed as it is an omnivorous fish in controlled conditions. In the past, this fish was abundant in natural water in Bangladesh. But due to ecological changes in the natural habitat, the production of this fish in natural water has declined seriously which necessitates the culture of this valuable fish on captivity. Culture of this fish was felt necessary for commercial profit as well as to save this valuable fish from the danger of extinction in this country.

Thus the present study was planned to carry out for the development of an appropriate culture technique of *Pangasius pangasius* in captivity. Although this fish is a riverine fish the literature are available in favour of its successful culture in captivity.[4-8] The specific objective of the present study was to develop or formulate an artificial feed for the culture of *Pangasius pangasius* in natural pond.

Materials and Methods

Study area and pond preparation

This experiment was conducted in natural ponds of Riverine station of the Bangladesh Fisheries Research Institute at Chandur. The area of each pond was 0.17 hectare and the depth of water was 1.30±0.22 meter. Each pond was rectangular in shape, with an inlet for water supply. The banks of each pond was high enough to prevent the inflow or overflow of water by heavy rain or flood. Undesirable vegetation were removed manually and weed fishes were removed by repeated netting. The ponds were mainly rain fed. However, underground water was supplied by deep tube-well during the dry season in winter.

Collection and stocking of fish fry

The fish fry of the species *Pangasius pangasius* were collected in the month of August from the Meghna river near Chandpur by the help of fisherman using box trap. The fish fry of almost similar size and of same batch were transported to the experimental area in large circular tank made of corrugated iron filled with river water. Transportation was done as quickly as possible without undue delay to reduce mortality. On arrival to the experimental area only the healthy and naturally moving fish fry were released into the previously prepared ponds. Each pond was of 0.17 hectare, rectangular shape. Before releasing into the ponds the fry were graded for the desired ones by keeping them in an arena made of nylon cloth which was placed in the experimental ponds. Length and weight of each fry was recorded before releasing into the ponds. This is initial length and weight of fish fry of this experiment the average of which was 17.2±2.01 cm and 42.57±0.51 g respectively. In each experimental ponds a number of 1360 fish fry were released maintaining a stocking density of 8000 fish fry per hectare.

Fish feed preparation and Feeding procedure

The fish feed was prepared by the locally available materials. Such materials were mustard oil cake, rice bran, fish meal and wheat-bran. The composition of fish feed is shown in Table 1. The ingredients were weighed by a laboratory balance. The required quantity of mustard oil cake was soaked in water for 24 hours. This was done to remove toxic matters in the oil cake. Required quantity of all of the ingredients were mixed well manually with sufficient water in a plastic bowl. The feed was prepared just before feeding fish. The proximate composition of prepared feed is shown in Table 1 which was determined by laboratory analysis according to the methods of A.O.A.C. (1965)[9].

After releasing into the experimental ponds the fish fry were allowed to acclimatize with the new captive environment for three days. During this time fish feed was not supplied to the ponds. Feeding began from the fourth day of releasing into ponds. The fish feed was supplied once a day in the morning between 9:00 to 10:00 am. at 5% (dry basis) of the body weight of fish in each pond. Feed requirement was re-adjusted once a month by measuring the growth of fish during this experiment.

Feed was prepared in moist form and supplied in the form of small ball on metal trays of 3' x 3' size. the trays were fixed at the two corners of each pond tied up with poles. The trays were placed at 0.6 m below the water surface. The required quantity of feed for each pond was supplied in two trays so that the fish did not have to crowd around one tray.

Fertilization of ponds

Pond fertilization was done by urea and Triple super phosphate (TSP) three times during this experiment. The urea and TSP fertilization was done at a dose of 90 kg/ha and 150 kg/ha respectively. The first fertilization was done 10 days before the release of fish fry into the ponds. Fertilizers were applied by spreading into the ponds.

Sampling procedure

Regular sampling was done to determine the growth of fish by catching fish form each pond by a seine net in every month. Sampling time was 9:00 am. in the morning. The growth in length and in weight was measured with the help of scale graduated in centimeters and a balance respectively. The date was recorded to determine the growth of fish.

Proximate composition analysis

Proximate composition of the feed ingredients (mustard oil cake, rice bran, fish meal, wheat bran) and of the experimental fish was carried out according to the methods of A.O.A.C. (1965)[9]. Proximate composition analysis included the determination of the percentage of crude protein, lipid, moisture, ash and crude fiber. From the data of proximate composition analyses the dry weight basis calculation of proximate composition of the feed ingredients were been calculated. This was calculated as percent dry matter basis (moisture free basis). Nitrogen free extract (NFE) was calculated as follows:

NFE % = 100 - (Moisture + crude protein + lipid + ash + crude fiber) %.

Limnological condition of pond water

Limnological condition particularly physico-chemical parameters of pond water was measured during this experiment. The following parameter were measured during this experiment Temperature-recorded by a centigrade thermometer at 9.00 am. pH recorded by a fisher Accument digital PH/ion meter (Model No. 420). Dissolved Oxygen was determined according and to the methods of APHA (1971).[10] Free carbondioxide of water was determined by the titrimetric method using phenolphthalein and standard NaOH as suggested by APHA (1971).[10]

Growth Performance

The growth performance was determined by average increase in length and weight. Specific growth rate (SGR%) was calculated from the data of initial weight (g), final weight (g), weight gain (%); and initial length (cm), final length (cm), increase in length (%). SGR (%) was the increase in weight (%) and increase in length (%). Statistical analysis was been carried out on the overall growth performance data by analysis of variance followed by Duncan's New Multiple Range Test.

Sampling and storage of fish for proximate composition analysis

At the end of the experiment three fish from each pond were collected by the previously stated sampling procedure. The fish collected from each pond was chopped, packed in a polyethylene packet and stored at -20°C for proximate composition analysis by AOAC (1965)[9] method.

Results and Discussion

The proximate composition of feed ingredients and that of prepared fish feed are shown in Table 1. The protein level of the formulated feed used in the present study for the culture of *Pangasius Pangasius* in ponds was 40.48% Fish meal and mustard oil cake were the main source of protein. The protein level was chosen on the basis of some previous studies where 40% protein in formulated feed demonstrated better growth of catfish (Cruz and Laudencia, 1976; Rahman *et al*., 1982; 1987; Sanaullah et al. 1986; Deyoe and Tiemeier, 1998)[11-15].

Table 1. Proximate composition of various feed ingredients and that of prepared feed (* % Dry Matter Basis; ** Data in bracket are on Dry Matter Basis)

Feed ingredient	Dry matter	Crude Protein	Lipid	Ash	Crude fibre	N-Free extract*
Fish meal	91.50	59.80 (65.35)	6.00 (6.55)	18.50 (20.22)	1.00 (1.09)	6.79
Mustard oil cake	84.96	32.98 (38.81)	17.5 (20.59)	8.75 (10.29)	12.97 (15.26)	15.05
Wheat bran	89.20	17.02 (19.08)	4.5 (5.04)	15.5 (17.37)	13.00 (14.57)	43.9
Rice bran	89.50	11.32 (12.64)	4.5 (5.02)	17.02 (19.01)	14.2 (15.86)	47.47
Prepared feed	11.00	40.48	9.07	14.97	7.71	16.72

During this experiment *Pangasius Pangasius* became accustomed soon to the experimental feed and were habituated in taking formulated feed actively. Experimental fish did not show any mortality during this study. The growth of fish cultured in natural ponds with the formulated feed is reported in Table 2. Data in Table 2 indicate that the growth of the experimental fish in the natural ponds is promising. This is true for the growth in terms of both by weight and by length. To elucidate the effect of initial fish weight, difference in weight gain of the experimental fish was calculated in percent weight gain. A reasonable result was obtained with such expression which was 626% weight gain as against a stocking density of 8000/ha, at the end of this experiment. The Production was calculated as tonnes per hectare water area, which was 2.13 tonnes/ha (Table 2). The food conversion ratio (FCR) obtained in this experiment was unexpectedly high which 7.58. Usually such high value of FCR indicates less response of fish to the formulated feed or cause unutilized waste of the feed.

Table 2. Growth of *Pangasius pangasius* fed on a formulated diet in natural pond

Growth Parameter	Result
Initial Weight	42.57g
Final Weight	309.06g
Weight gain	266.49g
% Weight gain	626
Specific Growth Rate (SGR % day)	0.65
Food Conversion Ratio (FCR)	7.58
Production/ha*	2.13 Ton

*Calculated Value

The limnological conditions particularly physico-chemical factors such as dissolved oxygen, free carbondioxide, temperatures, pH of water remained within the range suitable and productive for fish culture (Table 3). It is clear from the growth performance of the experimental fish that the above factors were within the tolerance limit of *Pangasius Pangasius.* The higher growth was obtained in summer season and lower growth during *winter.* It is worthwhile to mention that water temperature of 32^0C during summer fell of *Pangasius Pangasius.*

Table 3. Limnological condition of pond water (Dissolved oxygen, carbondioxide, pH and temperature of water)

Parameter	Result
Dissolved Oxygen (ppm)	4.2 to 6.0
Carbondioxide (ppm)	5.7 to 7.0
pH	7.1 to 7.5
Water temperature (^{o}C)	20.8 to 31.5

There was hardly any variations in proximate composition of fish. The crude protein, lipid, ash and moisture content of fish muscle were 18.27%, 2.89% 2.75% 76.29% respectively. Results are stated in Table 4. The lipid percentage of *Pangasius Pangasius* caught from open water is usually higher than that of the present study. This is expected as reasonable because of the average size of fish. In this experiment the final weight of fish was 310g as against 4-5 kg weight of this fish caught from open water. Another fact may be the stocking density of fish, which resulted desired production in terms of weight of fish per unit area but the average size of individual fish remained only 309g. Lipid is stored in fish muscle as well as in liver which is directly proportional to the size and age of fish.

Table 4. Proximate composition of *Pangasius pangasius* (whole fish) at the end of the experiment

Parameter	Result
Crude protein	18.27 %
Lipid	2.89 %
Ash	2.75 %
Moisture	79.29 %

On the basis of the results obtained in this experiment it can be concluded that the culture of freshwater catfish *Pangasius Pangasius* is possible using formulated feed of 40% protein level in natural pond. The growth performance is promising and the proximate composition of fish muscle is also in desirable condition.

References

David, A. 1963. Fisheries Biology of the scheilbeid catfish *Pangasius Pangasius* (Ham.) and its utility and propagation in culture ponds. *Indian. J. Fisheries.* 10 (24) : 521-600.

Hickling, C.F. 1962. Fish culture. London, Faber and Faber. pp. 295.

Ali, M.M., Dey, P.C., Islam, A. and Hanif, M.A. 1985. Food and feeding habit of *Pangasius Pangasius*. (Ham). of the river Bishkhali, Patuakhali. *Bangladesh. J. of Zoology.* 13 (1): 1-6.

Ling, S.W. 1967. Foods and feeding of warm water fishes in ponds in Asia and the far East. FAO Fish. Rep. 44.Vol. 3, 291-309.

Okamoto, R. 1969. Rearing of red sea bream larvae. *Bull. Jap. Soc. Sci. Fish*., 35:562-566.

Bardach, J.E., Ryther, J.H. and Malarney, W.O. 1972. Aquaculture the farming and husbandary of fresh water and marine organisms. New York, Wiley Inter Science, pp. 868.

Hannan, M.A., Alam, A.K.M.N., Mazid, M.A. and Humayun, N.M. 1988 Preliminary study on the culture of *Pangasius Pangasius* (Hamilton). *Bangladesh J. Fish.* 11 (1) : 19-22.

Rahman, M.K. 1989. Formulation of quality fish feeds from indigenous raw materials and its effect on the growth of catfish, *Pangasius Pangasius* M. Sc. Thesis. Dept. of Fisheries Technology, Bangladesh Agricultural University, Mymensingh . 49 pp.

A.O.A.C. 1965. Official methods of Analysis. Association of Official Agricultural Chemists. 10th ed. Washington, D. C.

A.P.H.A. 1971. Standard methods for the Examination of water and waste water. American Public Health Association. 13 the ed. New York. 874 pp.

Deyoe, C.W. and Tiemier, D.W. 1968. Nutritional requirements for channel catfish fingerling. *Feed stuffs*. 40 (945): 48.

Cruz, E.M. and Landencia, I.L. 1976. Primary study on the protein requirement of *Clarias batrachus. Fish. Res. J. Philippin.* 1 (2): 43-45.

Rahman, M.A., Gheyasuddin S. and Chakraborty, S.C. 1982. Formulation of quality fish feed from indigenous raw materials and its effect on the growth of catfish (*Heteropreustes fossilis*). *Bangladesh J. Fish.* 2-5 (1-2): 65-72.

Rahman, M.A., Ghyassuddin, S., Mazid, M. A. Zahir, M. and Hossain, M. A. 1987. Formulation of quality fish feeds from indigenous raw materials for intensive culture of catfish (*Clarias batrachus* linn). *Bangladesh J. Fish.* 10 (1)**:** 59-66.

Sanaullah, A.A.S., Mazid, M.A., Rahman, M.A., Gheyasuddin, S. and Chakraborty, S.C. 1986. Formulation of quality fish feeds from indigenos raw materials and their effects on the growth of catfish *Clarias batrachus*. *Bangladesh J. Fish.* 9 (1-2) **:** 39-46.