Effects of different feed items on the growth and survival of endangered riverine catfish *Rita rita* (Hamilton)

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Abstract: The study was conducted to determine a suitable feed for the desirable growth of riverine catfish *Rita rita* (Hamilton) from January 2006 to December 2006. The experiment had three treatments with three replicates. Nine chambers of the raceway each of size 1.83 × 1.12 sq meter were used. Local prawn, chicken viscera and commercially available formulated feed (CP) were supplied in treatment T_1, T_2 and T_3, respectively at the rate of 7% body weight. Feed was supplied twice in a day in the early morning and in the evening as the fish is nocturnal. The initial average weight of fish was 24.93±0.05g, 24.99±0.04g and 24.95±0.04g in T_1, T_2 and T_3, respectively. The final weight of the fish under three treatments was 425.05±1.04g, 425.68±1.05g and 177.61±1.45g respectively. The initial length was 8.48±0.02, 8.49±0.02 and 8.50±0.01 in T_1, T_2 and T_3, respectively. The final length was 25.22±0.06 cm, 25.21±0.14 cm and 14.87±0.13 cm in T_1, T_2 and T_3, respectively. The mean final weight and length was significantly ($p<0.05$) higher in T_1 and T_2 compared with T_3. However, there was no significant difference ($p>0.05$) between T_1 and T_2 in terms of final weight and length was concerned. Better growth performances, however, were observed in T_2 and T_1, where prawn and chicken viscera were supplied as feed respectively. Lowest growth performance was observed in T_3 where formulated feed (CP feed) was supplied.

Key Words: Riverine Catfish, Feed, Growth, SGR, Survival.

Introduction

Food is the main source of energy and plays an important role in determining the population levels, rate of growth and condition of fishes. It is very important to know the food and feeding habit of a particular fish species, especially the fish which is going to domesticated in the aquaculture system. *R. rita* is a riverine catfish which is critically engendered now (IUCN, 2000). The catfish *R. rita* is known to be highly predaceous and carnivorous in habit (Devi *et al.,*1992). Earlier attempts on the food and feeding habit of some freshwater catfishes have been undertaken by Majumder (1969), Bhatt (1970 &1971), Majumder & Das (1979), Qayyum & Qasim (1964), Ahmed *et al.* (1990), Anwar & Siddiqui(1992). Little information also can be found regarding high protein added feed which has been used for the culture of fresh water catfishes (David, 1963 & Sarder, 1992). Khan (1934) and Das & Moitra (1956) published brief accounts of the food and feeding habits of *R. rita.* However, no studies have yet been done about the culture of *R. rita* and its feed which can ensure the better growth performances under aquaculture. Therefore the present investigation has been undertaken to determine a suitable feed for the culture of riverine catfish *R. rita.*

Materials and method

Experiment site

The experiment was carried out for a period of one year from January to December 2006 in raceway located alongside Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh.

Preparation of chamber in raceway

The experiment was designed with three treatments designated as T_1, T_2 and T_3, with three replicates *i.e.* a total of 9 (nine) chambers were utilized for the experiment. The area of each chamber was 1.83 ×1.12 sq. meter. Each chamber was separated from each other with the nylon net attached by means of a wooden frame. Depth of water in the raceway was maintained at 1.2 meter which means all nine chambers of three treatments had equal depth of 1.2 meter. One third water was changed every two days after and the entire water was completely altered fortnightly.

Diet formulation and application

Chicken viscera, local prawn and commercially available formulated feed (CP) were supplied twice in a day in T_1, T_2 and T_3, respectively at the rate of 7% body weight. Chicken viscera and local

prawn were collected from neighboring market and chopped before applied. Percentage of protein in chicken viscera, local prawn and formulated feeds were 47.58, 45.75 and 43.50, respectively (Table-1). As the fish is nocturnal half of the feed was supplied early in the morning and remaining half was supplied in the evening. Feed was supplied near the shelter made for the fish.

Table 1: Proximate composition of the ingredients (% dry matter basis) used in preparation of the diet for monoculture of *Rita rita* in the raceway

Treatment	Feed used	Protein (%)	Lipid (%)	Ash (%)	Dry matter (%)
T_1	Chicken viscera	47.58	15.78	6.74	16.71
T_2	Prawn	45.75	13.45	5.65	13.80
T_3	Formulated feed	43.50	6.45	9.50	21.75

Source of juveniles and rearing system

Seventy juveniles of *R. rita* were collected from the river old Brahmaputra in the month of April 2005. Then they were maintained in the cistern with water flow for about one month to acclimatize when they were fed with earthworms and tubificid worms. After acclimatization, 54 juveniles of 65 survivors were used for the experiment. Only one stocking density (6 juveniles/chamber) was assigned to the treatments. Juveniles of similar weight were used to stock in all the chambers. The mean initial weight of the juvenile, however, was 24.93±0.05g, 24.99±0.04g and 24.95±0.04g in T_1, T_2 and T_3, respectively.

Sampling

Monthly sampling was done and adjusted the required amount of feed for the fishes. After each sampling, length (cm) weight (g), survival rate, specific growth rate (SGR), and net fish yield were also calculated. The survival rate, SGR, and yield in different treatments were measured by using following formulae.

Survival (S%) = (N_e / N_i) x 100

Where, N_i= Number of fish stocked and
N_e= Number of fish at harvest.

SGR = [Ln (final weight)-Ln (initial weight) x 100]/ culture period (days).

Net yield = (W_e – W_i)/A

Where, W_e = Fish at harvest (kg),
W_i= Fish at stock (kg) and A= Area

Feed conversion ratio (FCR) = Weight gain / By using per kg feed

Analytical methods and statistical analysis

The proximate composition of the diet ingredients was analyzed according to AOAC (1990). Growth (length and weight) data were analyzed using one-way analysis of variance (ANOVA) followed by Duncan's multiple range test (DMRT) at the 5% level of significance to detect differences among treatment means. All statistical analyses were performed by SPSS (Windows version 11.5). Standard error ($\pm$ SE) of treatment means was calculated from the residual means square in the ANOVA.

Results and Discussion

The growth performance values in terms of weight gain (g), specific growth rate (SGR, % day), food conversion ratio (FCR), survival (%) and production of *Rita rita* in different treatments are shown in Table 2. The body weight increased with the progress of study period. The significantly ($p<0.05$) highest growth (in weight) was observed in T_1 (425.68±1.13g) followed by T_2 (425.05±1.03g) and the lowest growth was observed in T_3 (177.61±1.45g) which is shown in the Table 2.

Table 2: Growth and survival of riverine catfish *Rita rita* fed with different feeds.

Parameters	T_1	T_2	T_3
Initial weight (g)	24.93±0.05[a]	24.99±0.04 [a]	24.95±0.04[b]
Final weight (g)	425.05±1.04[a]	425.68±1.13[a]	177.61±1.5[b]
Weight gain (g)	400.12±0.67[a]	400.69±1.05[a]	152.66±0.66[b]
% Weight gain	1604.97	1603.40	611.86
Initial length(cm)	8.48±0.02[a]	8.49±0.02 [a]	8.50±0.01[b]
Final length(cm)	25.21±0.14[a]	25.22±0.06[a]	14.87±0.13[b]
Length gain(cm)	16.73±0.82[a]	16.73±0.07[a]	6.37±0.64[b]
% Length gain	197.29[a]	197.05[a]	72.39[b]
Survival rate (%)	100	100	88.8
ADG	1.10[a]	1.10[a]	0.42[b]
SGR (%)	109.62[a]	109.78[a]	41.82[b]
Feed conversion ration (FCR)	0.40[a]	0.40[a]	0.15[b]
Yield (kg/m²)	1.17[a]	1.17[a]	0.45[b]

All values were reported as mean standard error (±S.E.) of the mean Figures in the same row having the same superscripts are not significantly different ($p>0.05$) and having different superscripts are significantly different ($p<0.05$).

The body length also increased during the study period. The significantly ($p<0.05$) highest growth (in length) was observed in T_2 (25.22±0.06cm) followed by T_1 (25.21±0.14cm) and lowest growth (14.87±0.13cm) was observed in T_3 which is shown in Table 2.

However, the mean final weight (g) and length (cm) was significantly (p<0.05) higher in T_1 and T_2 compared with T_3. But there was no significant difference (p>0.05) between T_1 and T_2 in terms of final weight and length was concerned. Likewise, average daily growth (ADG), specific growth rate (SGR %), feed conversion ration (FCR) and yield (kg/m^2) showed significantly higher in T1 and T_2 compared with T_3 (Table 2). However, the survival rate was 100% in T_1 and T_2 and 88.8% in case of T_3 which was significantly lower (p< 0.05).
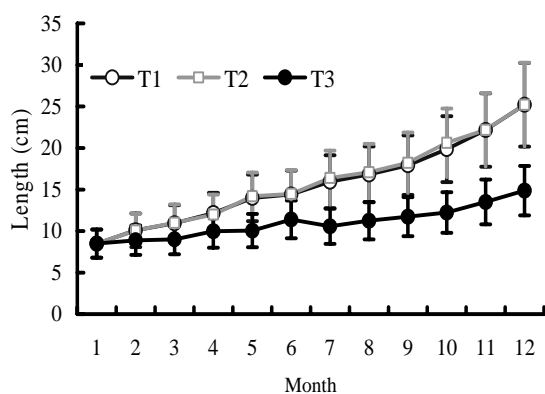

Fig. 1: Monthly length (cm) increment of *Rita rita* when reared using chicken viscera (T_I) local prawn (T_2) and commercial feed (T_3)
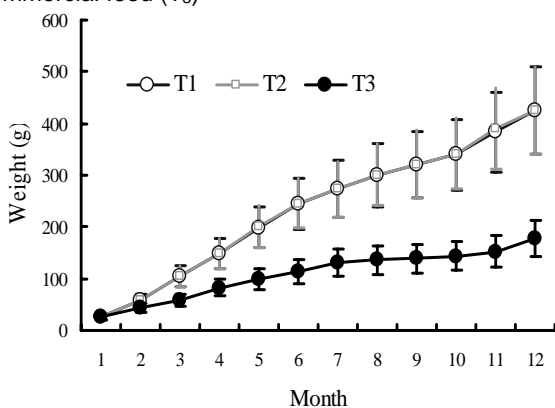

Fig 2. Monthly weight (g) increment of *Rita rita* when reared using chicken viscera (T_I) local prawn (T_2) and commercial feed (T_3)

R. rita is a riverine catfish found all over Bangladesh. Its abundance has been reported to be declining day by day for various reasons applicable to many other species, inhabiting Bangladesh. One of the probable mitigating measures that can be taken against the extinction of this species is to domesticate under aquaculture. Aquaculture of this critically

endangered fish can be an *in* situ strategy for its conservation. Commercial aquaculture might be possible, if farming technique is available and the nature of supplementary is determined under aquaculture. The farming of this fish may be profitable as the fish are comparatively high price in the market. In the present study, it has been observed that though the protein percentages were more or less same (Table-1) in all the treatments but better growth performances have been found in case of prawn and chicken viscera which were supplied as feed. But lower growth performance has been found in case of T_3 (Fig. 1 & 2) where formulated feed was used.

It was observed that the fish easily took prawn and chicken viscera as feed but it was not happened when formulated feed was provided. It might be due to the fact that the fish are used to inhabit around the rocky areas of the river basin and not habituated on traditional supplementary feed as widely used in polyculture system in Bangladesh. The fish have also been reported to be dependent on the fauna of their surroundings, namely insects' larvae, insect nymphs, crustaceans, gastropods, lamellibranchiates and fish (Devi *et al.,*1992). Khan (1934) also reported that *R. rita* fed mostly on insects, their larvae and prey fish. Rahman *et al.* (1997) conducted an experiment on effects of different feeds on the growth of Clarias *batrachus* and found best result fed using 40% protein containing feed. Similar results also obtained by Henken *et al.* (1986) in case of *Clarias gariepinus*. Nahar *et al.* (2000) and Winfree & Stickney (1984) found to be the best results using 58% protein containing feed. The findings of the present experiment are more or less similar to those mentioned above. Finally it might be concluded that among three feeds 'chicken viscera' is available and also cheap in comparison to other experimented feeds while 'local prawn' is available but comparatively costly to be used as feed. So prawn will not be economically viable for the culture of riverine catfish *R. rita* and growth performance with the formulated feed is not satisfactory. Therefore chicken viscera can be recommended for culture of riverine catfish *R. rita*.

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