

## EFFECT OF DIETARY PROTEIN LEVEL ON THE GROWTH OF DECCAN MAHSEER FRY *TOR KHUDREE* SYKES

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### ABSTRACT

Mahseer is one of the important food and game fishes in India. However, the importance of this fish has been realised only in recent years when this species faced near extinction due to indiscriminate fishing and destruction of favourable habitats in the rivers and streams. In the present work an attempt was made to collect some of the biological aspects of the Deccan mahseer *Tor khudree* (Sykes) based on the experiments conducted on the effect of different dietary protein level on the growth of early fry. Four formulated diets (Feed I, II, III, IV) were prepared with different combinations of rice bran, groundnut oilcake, wheat flour, prawn shell, fish meal, *Acetes* and mineral mixture.

The four feeds having different protein levels were separately tested on *Tor khudree* fry having an average length of 23.5 mm and weight 55 mg. The best average growth of 15.66 mg and 0.456 mm per day was obtained with Feed IV which comprised rice bran, ground nut oil cake, *Acetes*, wheat flour and mineral mix at the ratio of 1:1:1:0.7143:0.01428. These constitute 35.29% of proteins. The Feed II which comprised R.B + G.O.C. + prawn shell + wheat flour and mineral mix at a ratio of 1:1:1:0.7143:0.01428 contained 32.61% crude proteins. It provided a growth rate of 14.83 mg and 0.440 mm per day. The conversion rates were 38.258 and 37.776 for feeds IV and II respectively. Since Feed II is cheaper than Feed IV and provides almost equal growth rate, it can be used in the nurseries for intensive rearing of *Tor khudree* fry.

## INTRODUCTION

Mahseer, the noblest sport fish of India is known for its migratory habits in the streams and rivers for spawning. The importance of mahseer species has been realized only recently when the ichthyologists considered it as an endangered species due to indiscriminate fishing and the destruction of their spawning habitats. Thus a need has arisen to culture the mahseer in the controlled conditions to rehabilitate the mahseer fishery for food and sport fishing. Kulkarni (1971) and Kulkarni and Ogale (1976) succeeded in breeding the Deccan mahseer, *Tor khudree* by stripping the spawners in Maharashtra. Another species of mahseer, *Tor putitora* has been successfully artificially propagated by Tripathi (1978) in Nainital hills (U.P.). The dearth of quality fish seed is one of the constraints in freshwater aquaculture in the country. This involves the technology of successful nursery and rearing pond management to rear the early fry and raise them to fry and fingerlings with proper water management and feeds. The present study deals with the effects of dietary proteins at different levels on the growth, survival and food conversion ratio of the Deccan mahseer, *Tor khudree*.

## MATERIAL AND METHOD

Four test diets having different protein levels were formulated from various protein sources of plant and animal. The economy, easy availability and consistency were considered while selecting the ingredients for the feed, which comprised rice bran, wheat flour, groundnut oilcake, *Acetes*, fish meal, prawn shells and mineral mixture. These ingredients of the feed were initially sun dried and then ground into fine powder by a pulveriser. They were sieved through very fine mesh wire netting and finally formulated into four feeds with different dietary protein levels. The composition of the feeds is given below :

- Feed I : R.b + G.O.C. + W.f + M.m  
1 : 1 : 0.4761 : 0.0095
- Feed II : R.b. + G.O.C. + P.S. + W.f + M.m.  
1 : 1 : 1 : 0.7143 : 0.01428
- Feed III : R.b + G.O.C. + F.m. + W.f + M.m.  
1 : 1 : 1 : 0.7143 + 0.01428
- Feed IV : R.b + G.O.C. + A + W.f. + M.n.  
1 : 1 : 1 : 0.7143 : 0.01428

(R.b. = Rice bran, G.O.C. = Ground nut oilcake, W.f = Wheat flour, P.S. = prawn shell, A = *Acetus*, F.m. + Fish meal, M.m. = Mineral mix.)

The ingredients of Feed I to IV after their analysis for their proximate composition were mixed up thoroughly in the proportions mentioned above and made into a dough with sufficient quantity of water. These doughs were later cooked in a water bath for two hours and made into pelleted feeds by a pelletizer having 2mm mesh size. These pelleted feeds were sun dried and packed in air tight polythene bags for storage.

The experiments were conducted in rectangular fibreglass tanks. Each tank was filled with 100 litre of tubewell water, which was aerated by an oil free air blower. Each tank was stocked with 20 fry of *Tor khudree* with a mean length and weight of 23.7 mm and 55 mg respectively. The quantity of feed per day to be given in each tank was determined by assessing the dry weight of the leftover feed in the previous day. The feed was given once a day. The accumulated metabolites were siphoned off and the water was replenished by adding equal quantity of freshwater. The growth of the fry was recorded once in five days by taking the length and weight of 90% of the fish stocked in each tank. The absolute conversion rate and protein efficiency ratio (PER) of each feed were calculated as follows after continuous observation for 30 days.

$$\text{Absolute conversion rate} = \frac{\text{Dry weight of the feed given}}{\text{Increase in weight of fish}}$$

$$\text{Protein efficiency ratio} = \frac{\text{Weight gain in mg wet fish}}{\text{mg crude protein fed.}}$$

The water quality was monitored in all the four experimental tanks.

## RESULTS AND DISCUSSION

The ingredients of Feed I, II, III and IV after estimating their crude protein were mixed in different proportion so as to obtain different dietary protein levels in each of the formulated feeds. The highest amount of crude protein (60%) was present in *Acetes* while rice bran contained only 12.0%. The crude protein content of other ingredients ranged from 19 to 60%. The crude protein content in the formulated diet was 24.57, 32.65, 33.95 and 35.29% in Feed I, II, III and IV respectively.

### *Fish Growth, Absolute Conversion Rate and Protein Efficiency Ratio*

The diet IV with 35.29% of crude protein had the maximum effect on growth in the test organisms. The fish fed with this feed gained 470 mg in weight and 13.8 mm in length during the period of observation. The daily increment in weight and length was 15.66 mg and 0.45 respectively. The Feed II with a crude protein content of 32.65% yielded a growth rate of 14.83 mg in weight and 0.44 mm in length per day. The lowest growth rate of 11.5 mg and 0.293 mm per day was recorded with Feed I which contained only 24.57% of crude protein. However, a growth rate of 13.66 mg in weight and 0.36 mm in length per day was obtained with Feed III having a crude protein content of 33.95%. Thus in terms of daily growth rate and absolute conversion ratio, Feed IV proved superior to Feed I, II and III. According to Jauncey (1982) protein efficiency ratio (PER) value gives a better indication of the nutritional status of fish with respect to dietary protein than food conversion ratios (FCR). The protein efficiency ratio of the four diets estimated on the basis of the absolute conversion ratio was found to decrease with increasing level of dietary protein in the feeds. Accordingly maximum PER value of 1.77 was obtained for Feed I. It was 1.60, 1.51 and 1.50 for Feed II, III and IV respectively. Decrease in PER with increasing dietary protein level was also reported in the case of grass carp (Dabrowski, 1977), *Tilapia zilli* (Mazid et al., 1979), mirror carp (Jauncey, 1981) and *Sarotherdon mossambicus* (Jauncey, 1982).

### *Water Quality*

The water temperature fluctuated in between 18 and 21°C in the tanks. The pH was alkaline which varied in a narrow range of 7.0 to 7.5. The DO in the four tanks ranged from 6 to 8 ppm in general and remained in between 6 and 7, 7.2 and 7.8, 7.6 and 8.2, and 7.4 and 8.0 ppm in the four tanks with Feed I, II, III and IV respectively. The maximum and minimum total alkalinity of 158 and 140 ppm were recorded in tanks with Feed II and I respectively.

### *Cost of the Feeds*

Cost of each feed was worked out on the basis of the quantity of ingredients required to form one kg of feed. Feed II was found to be the cheapest of all costing only Rs.3.48 per kg

followed by Feed I, III and IV with a rate of Rs.3.56, Rs.4.02 and Rs.4.56 per kg. The Feed IV was the costliest since *Acetes*, one of the ingredients in it, was valued at Rs.7/- per kg. The mineral mixture was Rs.45/- per kg but since it was added at very low quantities, the cost was negligible. The cost of groundnut oilcake and wheat flour was Rs.4/- kg each whereas that of fish meal was Rs.5/- kg and prawn shell was Rs.3/- kg. The cheapest ingredient was rice bran at Rs.2.50/- kg. Feed IV was superior with the best average fish growth of 15.66 mg and 0.456 mm per day which was closely followed by a growth of 14.83 mg and 0.440 mm with Feed II. The cost of production of 1 kg fish with Feed II was Rs.6.60 whereas with Feed IV it was Rs.8.60. Therefore, it is advisable to use Feed II which is economically viable for large scale fry rearing operations.

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