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EFFECT OF DIFFERENT RATION LEVELS ON THE GROWTH AND THE GROSS CONVERSION EFFICIENCY IN A SILUROID CATFISH, *HETEROPNEUSTES FOSSILIS* (BLOCH)

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R. P. Singh and A. K. Srivastava (1985) Effect of different ration levels on the growth and the gross conversion efficiency in a siluroid catfish, *Heteropneustes fossilis* (Bloch). *Bull. Inst. Zool., Academia Sinica* **24**(1): 69-74. *Heteropneustes fossilis* were fed on different ration levels-0.5, 1.0, 1.5, 2.0 and 2.5% of their wet body weight daily. Their growth and gross conversion efficiency were studied. Increase in the ration level was associated with the increase in the growth rate but ration above 1.5% could not enhance the growth significantly. Reduction in the gross conversion efficiency was also noticed at higher levels of ration.

Heteropneustes fossilis, found in the shallow fresh water areas, ponds and lakes, is omnivorous in nature (Das and Moitra, 1955). Because of their hardy nature and little risk involved in their management (Dehadrai, 1978), they are now-a-days preferred in mono-cultures under semi-intensive and intensive systems (Jhingran, 1982). Intensive culture of the fish needs artificial feeding and the daily rate of food consumed is an important factor for growth (Brett, 1971a, Trzebiatowski *et al.*, 1978). On the other hand over feeding in an aquatic media is not beneficial because it is very difficult to recover the uneaten food which reduces the conversion efficiency (Lovell, 1976). High food supply has also been seen to cause some weight depression in carps (Huisman, 1976) and mortality (Singh and Pandey, 1981), thus adversely effecting the production cost.

The present investigation was, therefore, undertaken to find out the effect of different ration levels on the growth and the conversion efficiency in *H. fossilis*.

MATERIALS AND METHODS

Young and healthy fish were procured from the Ramgarh lake situated near the Gorakhpur University campus and were acclimated to captivity for one month. The fish were sorted out for equal length ranging between 8.5-10.8 cm and weight 6.8-8.3 g. The fish were transferred to well washed round bottom glass aquaria and were trained to adapt to pellet feeding. Shrimp was used as food because of its high protein quality and good protein digestibility (Singh and Pandey, 1980a, 1980b). Pellets were prepared by mixing the shrimp powder in gelatin solution and pressing over iron sieve. The long sticks obtained were cut into small pellet of 3-5 mm in length and dried overnight at 45°C. A week

before the commencement of the experiment the actively feeding fish were transferred to the experimental glass aquaria of 9″×12″ in dimension which were numbered 1, 2, 3, 4 and 5. During experimentation, fish of aquaria number 1, 2, 3, 4 and 5 were given 0.5, 1.0, 1.5, 2.0 and 2.5% pellets of their wet body weight, respectively. Fish were acclimated for their experimental ration levels for one week before experimentation. In the course of the experiment, the calculated amount of food was weighed separately and was dropped in respective aquaria. The amount of food was adjusted according to the total weight change of the group every week. The weight of the fish was taken separately after drenching them over filter paper and no food was given on the day of weighing. The half of the aquaria water was siphoned daily in the morning and was replaced by the stored tap water. The experiment was repeated three times and 75 fish were used in each replicate. No mortality occurred during the experiment. The water temperature of aquaria was recorded 25.0±1.03°C. The feeding time was five weeks.

The data obtained was finally subjected to student's *t*-test for testing the level of significance and the correlation analysis was done.

RESULTS

The slowest growth was obtained in the fish fed 0.5% food per day; next were those given 1.0% ration while the fish provided 1.5, 2.0 and 2.5% daily ration gained maximum weight indicating no marked difference among

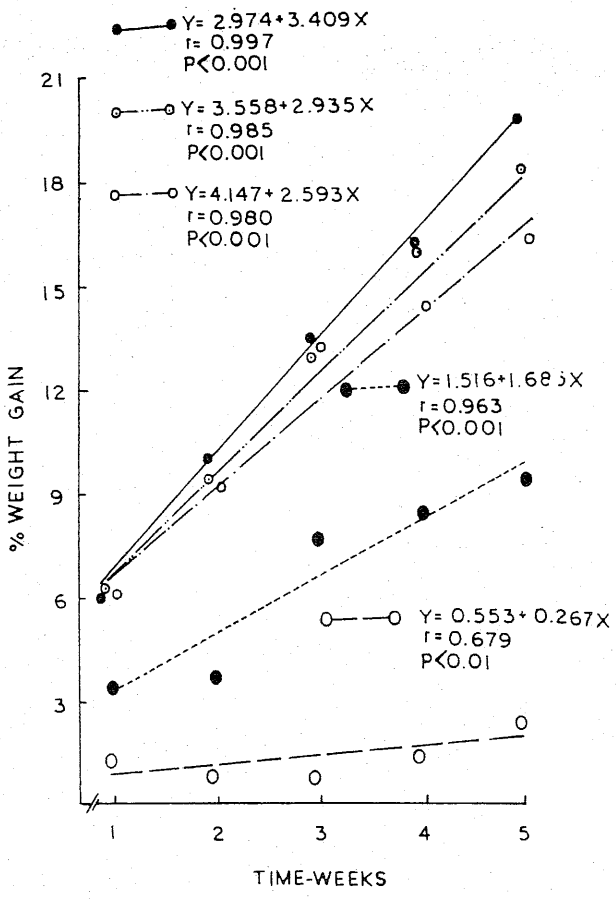

Fig. 1. Graphic representation of the weight gain and time in the fish fed on different amount of daily ration. Symbols used (- - -), 0.5%, (·····) 1.0%, (—•—) 1.5%, (—••—) 2.0%, (——) 2.5%.

TABLE 1
Weight, weight gain and gross conversion in fish fed different ration levels per day

Ration/Day % body weight	Initial weight (g)	Final weight (g)	% Growth per day	*t*-value	Gross conversion $G=\frac{W_g}{R}\times 100$
0.5%	6.33±0.80	6.48±0.83	0.08±0.05		15.27±4.82
				5.05 $p<0.001$	
1.0%	6.85±1.46	7.50±1.59	0.32±0.07		30.32±5.32
				3.88 $p<0.001$	
1.5%	6.50±2.33	7.55±3.66	0.54±0.08		34.66±7.57
				0.69 p=NS	
2.0%	5.43±0.94	6.35±0.87	0.58±0.06		25.95±4.26
				1.89 p=NS	
2.5%	5.67±1.30	6.81±1.65	0.67±0.05		22.84±5.07

NS=Not significant. W_g=Weight gained. R=Total food consumed.

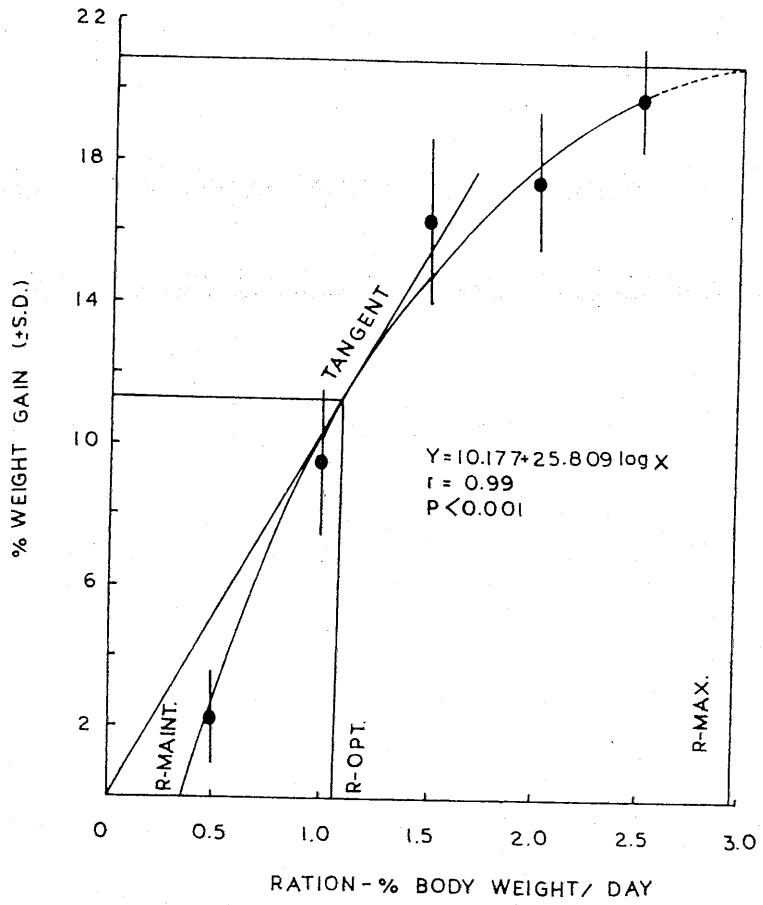

Fig. 2. Weight gain of the fish in relation to ration provided. Geometrically derived, growth parameters are indicated on X axis.

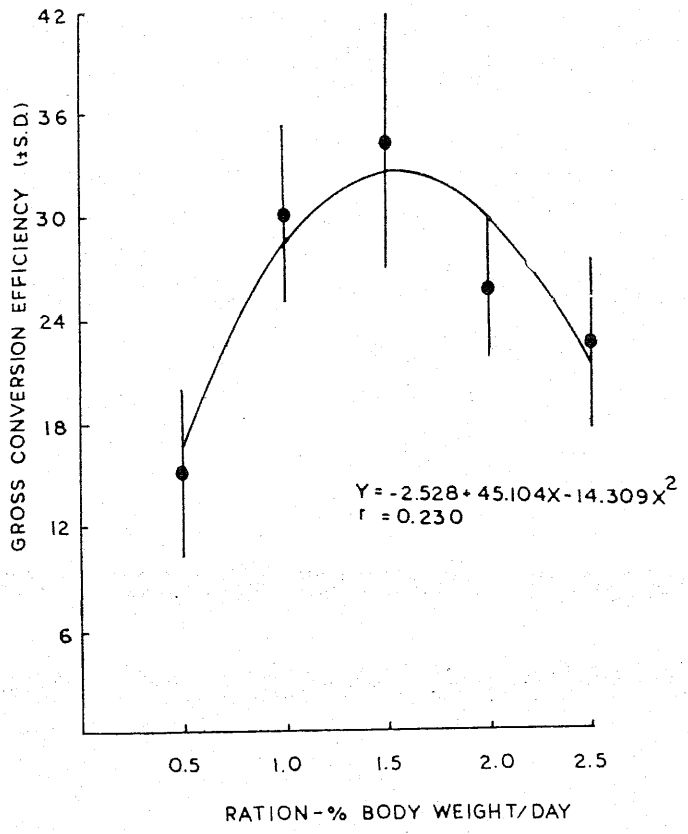

Fig. 3. Relationship between the gross conversion and the ration level.

them in the first week of the experiment. The difference in the weight gain of different groups of fish became more pronounced with the passage of time and the coefficient of correlation was maximum in the fish getting 2.5% daily ration followed by 2.0, 1.5, 1.0 and 0.5% ration (Fig. 1). However, no significant difference was obtained among the weight gained by the fish kept at 1.5, 2.0 and 2.5% daily food (Table 1).

When the overall growth was plotted against daily ration provided, a non-linear exponential curve was obtained (Fig. 2) and from this various growth parameters were obtained (Brett *et al.* 1969). These growth parameters were maintenance ration, optimum ration and the maximum ration (Fig. 2).

The gross conversion efficiency was calculated for different ration levels using the formula described by Brett *et al.* (1969) and Brett (1971b). The curve relating the gross conversion to ration levels was dome shaped indicating the decrease in the conversion efficiency above 1.5% ration level (Fig. 3).

DISCUSSION

Fig. 1 shows the weight gained by the fish with time, reared on the different levels of daily rations. Group provided 0.5% food depicted slowest growth and the correlation with time was weak, but as the ration was increased the correlation coefficient also increased and the fish given 2.5% daily food revealed highest value of 'r' and 'b' (Fig. 1). The slowest growth at 0.5% ration suggests that the fish of this group are able to get food slightly above the maintenance ration which is found to be 0.35% in this case (Fig. 2). From the growth ration curve it is apparent that with increase in the ration, the growth increased linearly up to 1.0% ration and above

this level the growth rate slowed down to give a non-linear shape. This decrease was so much that the difference between the growth of the fish above 1.5% daily ration was found to be insignificant (Table 1). Similar type of non-linear growth-ration relationship has also been observed by Brett (1969), Edward *et al.* (1972) and Allen and Woolton (1982). Such type of growth-ration relationship indicates that the fish under this experimental condition are not able to utilize the food efficiently above 1.5% daily ration. This is also evident by the fall in the conversion efficiency above this level of ration (Fig. 3). The reduction in the conversion efficiency might be due to the decrease in the efficiency of assimilation and digestion at higher ration level (Werner and Blaxter, 1980). This is also supported by the non-linear relationship between the consumption and nitrogen retention (Savitz *et al.*, 1977).

The result thus obtained in the present investigation suggests that the growth of the fish is associated with the increase in the ration but at higher ration level advantage is slight and the gross conversion efficiency is also found to decrease markedly. Thus, under present experimental condition 1.5% daily ration of the wet body weight of the *H. fossilis* is best suited for the optimum growth and maximum conversion.

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不同之投餌率、對於 Siluroid catfish, *Heterpneustes fossilis* (Block) 其生長及轉換效率之影響

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Heteropneustes fossils，每日依其體重之 0.5, 1.0, 1.5, 2.0 及 2.5%餵食，研究該種鯰魚之生長及轉換效率。發現投餌率與生長速度成正比，但在 1.5% 以上該種魚無顯着之生長，在高投餌率時，轉換效率下降。