

GROWTH PERFORMANCE AND FEED CONVERSION RATIO (FCR) IN HYBRID FISH (*CATLA CATLA X LABEO ROHITA*) FED ON WHEAT BRAN, RICE BROKEN AND BLOOD MEAL

UM-E-KALSOOM, M. SALIM, T. SHAHZADI AND A. BARLAS¹

Department of Zoology & Fisheries, University of Agriculture, Faisalabad;

¹Animal Sciences Division, Pakistan Agriculture Research Council, Islamabad, Pakistan

ABSTRACT

Growth performance and feed conversion ratio (FCR) of wheat bran, rice broken and blood meal were evaluated in hybrid fish *Catla catla* x *Labeo rohita*. Two replicates for each treatment (ingredient) were followed. The feed was supplied at the rate of 4% of wet body weight of fish fingerlings twice a day. The fish gained higher body weight (1.60 ± 0.14 g) on wheat bran, followed by rice broken (1.51 ± 0.07 g) and blood meal (1.24 ± 0.09 g). The body weight of fish on wheat bran and rice broken was significantly higher ($p < 0.05$) than those fed blood meal, while the difference between the former two groups was non significant. The total length obtained by the fish averaged 5.06 ± 0.03 , 5.05 ± 0.09 and 4.96 ± 0.32 cm on wheat bran, rice broken and blood meal, respectively, the difference being non significant. Feed conversion ratio (FCR) was highest (poorest) on blood meal (1.68 ± 0.96), followed by that of rice broken (1.64 ± 0.64) and wheat bran (1.59 ± 0.71). The FCR value for wheat bran was significantly better than that for rice broken and blood meal. It was concluded that efficacy of wheat bran was better for the growth of hybrid fish and this supported the inclusion of this ingredient in the diet of hybrids.

Key words: Growth performance, FCR, wheat bran, rice broken, blood meal.

INTRODUCTION

Hybridization in fish is a natural phenomenon and the hybrids have better growth rate and high resistivity against unfavorable ecological conditions (Reddy, 2000). Hybrids of major carps are being successfully produced in public and private hatcheries and are available for farming.

Major carps, *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla* and their hybrids are reared on the simple dietary combination of one or two feed ingredients. The formulation of nutritionally balanced and compatible feed for optimal growth of fish is possible only if information regarding feed conversion ratio and its digestibility in fish is available. It is well known that these two parameters play a key role for the development of artificial feed for fish. Artificial feed plays an important role in semi intensive fish farming, where it is required to maintain a high density of fish than the natural carrying capacity of water (Jhingran, 1991).

Feed conversion ratio (FCR) is calculated from the number of Kg of feed used to produce one Kg fish. Two additional terms are used by farmers, the biological feed conversion ratio and economic feed conversion ratio. The feed conversion ratio values of various feed ingredients for carps under controlled conditions have been estimated by many workers (Jhingran, 1991; Shabbir *et*

al., 2003; Jabeen *et al.*, 2004; Ali and Salim, 2004; Saeed *et al.*, 2005; Inayat and Salim, 2005; Gul *et al.*, 2005). However, data regarding feed conversion ratio in hybrid fingerlings is not available. Therefore, the present work was conducted to evaluate the growth performance and feed conversion ratio (FCR) of hybrid fingerlings (*Catla catla* x *Labeo rohita*) fed on three locally available ingredients viz. wheat bran, rice broken and blood meal.

MATERIALS AND METHODS

Hybrid fingerlings (*Catla catla* x *Labeo rohita*) were procured from the Government Fish Seed Hatchery, Faisalabad, Pakistan and acclimatized on rice polish in glass aquaria for two weeks. The experiment was conducted in six glass aquariums (total volume 45 L), each having working dimensions of 60 x 40 x 44 cm³. Each aquarium was filled with water up to level of 25 cm and this level was maintained throughout the experimental period.

Ingredients

The three ingredients (wheat bran, rice broken and blood meal) used as experimental diet, were dried and grinded in powder form. The chemical composition of three ingredients was analyzed following AOAC (1995) and is shown in Table 1.

Table 1: Chemical composition of three feed ingredients

Ingredients	Dry matter (%)	Crude protein (%)	Crude fat (%)	Gross energy (Kcal/kg)
Wheat bran	93.10	14.52	12.77	1786
Rice broken	93.03	8.24	1.11	3373
Blood meal	94.31	65.41	1.51	2767

Treatments

After acclimatization, fingerling hybrid fish were randomly transferred in each aquarium at the rate of 20 fingerlings for each treatment. Two replicates were followed for each treatment. The average body weight of fingerlings at stocking was 0.58g in each treatment. Feed was given to the fish @ 4% of fish body weight throughout the experimental period, twice daily (morning and evening) in two equal meals. Dissolved oxygen and pH of water in each aquarium were monitored daily. Continuous air was supplied to the aquarium by using air pump. The temperature of each aquarium was maintained at 22-26°C during the study period. Two hours after each feeding, water from aquaria was removed to collect the unconsumed feed. Each aquarium was filled with water again immediately after the removal of unconsumed feed. The collected feed was dried and the weight of the refused feed, thus recorded was used to calculate the actual amount of feed consumed by the fish. The fingerlings from each aquarium were weighed on weekly basis to record their morphometric characteristics i.e. body weight (g) and total length (cm). The feed was stopped a day before the weight was recorded. The FCR was calculated following Jhingran (1991).

Statistical analysis

The data on body weight, total length and feed conversion ratio were statistically analyzed by factorial design. The differences in the mean values were compared by Duncan's Multiple Range test (Steel *et al.*, 1996). The statistical software MSTATC was used for the analysis of data.

RESULTS

During the first week, mean body weight of fish on three ingredients was non-significantly different from each other. However, during the second week, the fish weight was highest for rice broken and lowest for blood meal ($P < 0.05$). In the third week, mean body weight of fish on wheat bran showed non significance difference with rice broken but it was significantly higher than the fish fed on blood meal. The difference in mean body weight of fish fed on rice broken and blood meal was non-significant. In the fourth and the fifth weeks, mean fish body weights did not differ significantly among groups. During sixth week, fish on wheat bran and rice

broken showed non-significant difference in body weight but fish of both groups were significantly higher compared to those fed on blood meal (Table 2).

During first week of feeding, total length of hybrids on wheat bran and blood meal were non-significantly different from each other, while both grouped had higher value compared to rice broken ($p < 0.05$). In second week, total length of fish fed on wheat bran was non-significantly different from those fed on rice broken but it was significantly higher than for blood meal. In the third week, total length of fish fed on rice broken was higher than those fed on wheat bran or blood meal, the difference between the latter two groups was non-significant. During fourth week, total length of hybrid fish on wheat bran and rice broken was significantly higher than fish fed on blood meal. The total length in fifth and sixth weeks for fish fed on wheat bran, rice broken and blood meal was non-significantly different from one another (Table 3).

The overall mean FCR of hybrid fish (Table 4) was better (lower) for wheat bran (1.59 ± 0.71) than rice broken (1.64 ± 0.64) and blood meal (1.68 ± 0.96), the difference between the latter two groups was non-significant. Better FCR value of wheat bran indicated that fish had consumed comparatively less diet but gained higher body weight than the fish fed on rice broken or blood meal. The weekly detail revealed that the FCR during first week for wheat bran and blood meal was significantly better ($p < 0.05$) than that for rice broken, the difference in FCR between the former two groups was non significant. In the second, fourth, fifth and sixth week, FCR values for three ingredients were non-significantly different. The FCR during third week was significantly higher (poor) for rice broken than for wheat bran and blood meal.

DISCUSSION

The fingerling hybrids (*Catla catla x Labeo rohita*) gained higher body weight on wheat bran, followed by rice broken and blood meal. The overall growth pattern of fingerlings also remained higher for wheat bran. The weight gained by hybrids on wheat bran ($1.60 \pm 0.14g$) was higher than the *Cirrhinus mrigala* reported by Shabbir *et al.* (2003). They reported that *Cirrhinus mrigala* gained $0.19 \pm 0.2g$ weight on wheat bran. The difference in body weight gained by hybrids and *Cirrhinus mrigala* may be due to difference in crude protein contents in wheat bran used in these two studies. Crude protein contents in wheat bran used in the present study was comparatively higher (14.52%) than the wheat bran (13.81%) used for *Cirrhinus mrigala*. However, body weight gained by *Labeo rohita* ($3.39 \pm 0.001g$; Najia, 2003) was higher than the value recorded for hybrids. The possible reason for this difference might be the difference of feed used. In the present study, single ingredient was fed, whereas in the study of Najia (2003),

balanced diet comprising different feed ingredients was used.

The next higher body weight of hybrid was on rice broken (1.51 ± 0.07 g). Seema *et al.* (2002) observed that *Cirrhinus mrigala* gained 0.3g body weight on rice broken which was lower than the weight gained by the hybrids. The difference in body weight of hybrids and *Cirrhinus mrigala* may possibly be due to difference in crude protein contents of rice broken. The crude protein content of rice broken was 8.24% in the present study, whereas in reported study it was 7.6%. Protein level in the diet can affect its apparent digestibility coefficient (Gul *et al.*, 2007). Hayat *et al.* (2007) recorded highest weight gain for *Catla catla*, followed by *Labeo rohita* and *Cirrhina mrigala* ($P < 0.05$).

The overall feed conversion ratio (FCR) was poor

(higher) for blood meal and rice broken compared to wheat bran. It shows that a greater quantity of both these ingredients was used for a unit weight gain of fish compared to wheat bran. The FCR values of wheat bran and rice broken of the present study are lower (better) than the values reported by Najia (2003), who observed higher values of FCR of wheat bran (6.064) and rice broken (4.85) for *Labeo rohita*. The FCR value of rice broken (2.7) reported by Seema *et al.* (2002) is also higher compared to 1.64 ± 0.64 recorded in the present study. This difference might be due to preference of feed ingredient by different fish species. The present findings seem to indicate that growth performance and the feed conversion ratio of hybrid (*Catla catla* x *Labeo rohita*) was comparatively better than the *Labeo rohita* and *Cirrhinus mrigala* reported in studies referred to above.

Table 2: Weekly variations of mean body weight (g) of hybrids (*Catla catla* X *Labeo rohita*) fed on three ingredients

Week	Feed ingredients		
	Wheat bran	Rice broken	Blood meal
0	0.58 ± 0.00	0.58 ± 0.00	0.59 ± 0.00
1	0.69 ± 0.00^a	0.68 ± 0.00^a	0.69 ± 0.00^a
2	0.96 ± 0.01^b	1.02 ± 0.05^a	0.72 ± 0.05^c
3	1.05 ± 0.04^b	1.07 ± 0.05^{bc}	0.95 ± 0.06^c
4	1.25 ± 0.09^a	1.18 ± 0.00^a	1.09 ± 0.04^a
5	1.43 ± 0.13^a	1.38 ± 0.04^a	1.15 ± 0.01^a
6	1.60 ± 0.14^a	1.51 ± 0.07^a	1.24 ± 0.09^b

Mean values with different superscripts within a row differ significantly ($P < 0.05$).

Table 3: Weekly variation of mean total length (cm) of hybrids (*Catla catla* X *Labeo rohita*) fed on three feed ingredients

Week	Feed ingredients		
	Wheat bran	Rice broken	Blood meal
1	3.10 ± 0.00^a	2.95 ± 0.03^b	3.05 ± 0.03^a
2	3.78 ± 0.02^a	3.65 ± 0.10^{ab}	3.50 ± 0.00^b
3	4.05 ± 0.03^b	4.22 ± 0.12^a	4.08 ± 0.01^b
4	4.55 ± 0.03^a	4.58 ± 0.15^a	4.38 ± 0.05^b
5	4.60 ± 0.07^a	4.65 ± 0.14^a	4.46 ± 0.04^a
6	5.06 ± 0.03^a	5.05 ± 0.09^a	4.96 ± 0.32^a

Mean values with different superscripts within a row differ significantly ($P < 0.05$).

Table 4: Weekly variation of feed conversion ration (FCR) values of hybrids (*Catla catla* x *Labeo rohita*) fed on three feed ingredients

Week	Feed ingredients		
	Wheat bran	Rice broken	Blood meal
1	0.76 ± 0.05^b	0.90 ± 0.18^a	0.79 ± 0.00^b
2	1.33 ± 0.02^a	1.00 ± 0.04^a	1.59 ± 0.01^a
3	0.78 ± 0.03^b	0.90 ± 0.041^a	0.85 ± 0.12^b
4	2.08 ± 0.22^a	2.36 ± 0.01^a	2.12 ± 0.12^a
5	2.47 ± 0.97^a	2.38 ± 0.07^a	2.36 ± 0.00^a
6	2.37 ± 0.04^a	2.26 ± 0.09^a	2.36 ± 0.01^a
Mean	1.59 ± 0.71^b	1.64 ± 0.64^a	1.68 ± 0.96^a

Mean values with different superscripts within a row differ significantly ($P < 0.05$).

Conclusion

The higher growth and better (lower) feed conversion ratio for fish fed on wheat bran supported the inclusion of this ingredient in the diet of hybrids.

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