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GROWTH PERFORMANCE OF MAJOR CARP, *LABEO ROHITA* FINGERLINGS ON COMMERCIAL FEEDS

M. S. Ahmed, K. Shafiq and M. S. Kiani

Department of Zoology, University of The Punjab, Quaid-E-Azam Campus, Lahore 54590, Pakistan
Corresponding Author: drshafiq.ahmed@gmail.com and shafiq61pk@hotmail.com

ABSTRACT

The influence of commercial feeds on growth performance of *Labeo rohita* (rohu) fingerlings was investigated in 42 days culture trials. Twenty fingerlings were maintained in well aerated 95 L glass tanks in triplicate. Three different commercial feeds, rice bran as control (T 1); Miracle (T 2) and Tokyo (T 3) were purchased from the local market. Fish were fed @ of 3 % of their wet body weight twice a day at 12 hours interval for 6 weeks. Fish growth parameters (length and weight) were taken weekly. The amount of feed was adjusted according to the average increase in biomass of fish in each tank of all treatments. There was a significant increase ($P<0.05$) in average wet body weight, FCR and gross fish production of fish fed with Tokyo (T 3) when compared with Miracle (T 2) and rice bran (T 1). These findings suggest that Tokyo appears to be sufficient for obtaining optimum growth in rohu.

Key words: Pelleted feed efficacy, commercial artificial feed, growth performance, *Labeo rohita*, fingerlings.

INTRODUCTION

The growth of biomass of fish under intensive culture depends upon various factors notably on feeding regime. One problem facing fish culturist is the need to obtain a balance between a rapid fish growth and optimum use of the supplied feed. In fish farming nutrition is critical because feed represent 40-50 % of production cost (Crag and Helfrish, 2002). Among cyprinids *Labeo rohita* (rohu) is the most popular fish species cultivated in Indian subcontinent. Rohu is highly delicious and prestigious fish species among other Indian major carps FAO (2000). The use of commercial feed has become inevitable for the success of cyprinid culture under intensive culture conditions particularly rohu alongwith other carps (Abid and Ahmed, 2009 a)

Because of rapid growth in human population has created unpredictable problem of food shortage in the world. This is more acute in regards to the proteinaceous food in underdeveloped and developing world. Fish and fish products contribute significantly for protein supply in general and white meat in particular. Aquaculture sector in Pakistan is striving hard to produce sufficient quantities of food from freshwater fishes but still our per capita intake of white meat (protein) is far from being satisfactory. The aquaculture development and increase in per unit volume of water depends upon the use of high quality and balance artificial feed (Shaheen, *et al*., 2000). Major carps are an important freshwater fish species normally cultured in Asia particularly in the Indian subcontinent (Khan, *et al.,* 2003, Abid and Salim, 2004, Khan, *et al.,* 2004). It is also an important fish in Pakistan, normally cultured under semi-intensive composite culture. Fish culture under intensive culture conditions (intensive use of artificial feeds) is the need of today to produce maximum fish biomass within a particular/limited time. Because of the lack of adequate information about the efficacy of market available commercial feed, the present study was conducted. The growth efficacy of Miracle and Tokyo, in comparison with rice bran among fingerlings of rohu has been evaluated.

MATERIALS AND METHODS

The present project was executed at Fish Biology Research Laboratory, Department of Zoology, University of the Punjab, Lahore. Single breed fingerlings of rohu, *Labeo rohita* measuring 15.0 ± 1.5 cm were purchased from a commercial fish farm, Himalaya Fish Seed Hatchery near Lahore. All fish were maintained at 12hrs light/dark regime in 95 L glass tanks for two weeks in a flow through system (flow rate 4-5 liters hour^{-1}) prior to experiment for acclimatization of fish. Twenty fingerlings were kept in each tank (in triplicates for each treatment). Three different commercial feeds: rice bran (T 1) as control, Miracle (T 2) and, Tokyo (T 3), were purchased from the local market. At the time of fish stocking the total average wet body weight of 20 fingerlings of each tank was 395.70 ±0.4 gm. The water quality parameters like temperature, 26.9 – 27.5 ºC, pH 7.1 – 7.2, hardness 140.3 – 143.1 mg/l and dissolved oxygen 7.0 – 7.2 mg/l were maintained throughout the experimental duration in all treatment tanks.

All fish from each tank (60 per treatment) were taken out of water with the help of clean hand net into a container with 0.02 % solution of 3-aminobenzoic acid ethyl ester

(MS-222, Sigma-Aldrich Chemical, St Louis, MO), until slowing of opercular movement. The fingerlings were washed in clean water, whipped off excess water with paper towel, weighed (g), measured for total length (cm) and released back into rearing tanks immediately. Fish were fed @ 3 % of their wet body weight twice a day (at 8 am and 8 pm) for six weeks. The increase in biomass was calculated weekly for each treatment and the amount of feed was adjusted according to the increase in biomass for all treatments. The feed used in this experiment were analyzed and their ingredients and proximate composition are given in table 1. At the end of the experiment, the final average wet body weight of the fish was recorded and total weight gain (TWG), food conversion ratio (FCR) and gross fish production (GFP) were calculated. One way Analysis of variance (ANOVA) followed by Duncan's new Multiple-Range test was used to evaluate the statistical significance of differences among the treatments. Most statistical analyses were conducted with SAS/ETS® Software (SAS Institute Inc. 2001). Differences between the treatment means were considered significant ($P<0.05$).

RESULTS

The initial average wet body weight of fish from each tank was 395.70 ±0.4 gm. The final average wet body weight of fish in treatment 1 (rice bran) was 482.35 2.2, treatment 2 (Miracle) was 574.75 gm and treatment 3 (Tokyo) was 779.88 gm at the end of experiment. The increase in fish biomass in treatment 1 was different and only significant on 6th week, in treatment 2 was significantly ($P<0.05$) different during the third and forth weeks and highly significant ($P<0.01$) during fifth and sixth week when compared to initial weight and the treatment 1. In treatment 3 the increase in fish biomass was significantly ($P<0.05$) different during first and second week and highly significant ($P<0.01$) until end of the experiment when compared with initial weight as well as treatment 1 (table 2).

The FCR values calculated for three feeds reveals that Tokyo (T 3) showed the best value, 1.91 as compared to Miracle (T 2) and rice bran (T 1). No mortality was observed in any tank of all treatments throughout the study period because of optimum rearing conditions were maintained in the glass tanks.

Table 1: Ingredients and the proximate composition of commercial feeds used in different feeding treatments.

Ingredients	Feeds		
	Rice bran (T 1)	Miracle (T 2)	Tokyo (T 3)
Rice polish	100	-	-
Glutton (30 %)	-	9.69	4.05
Soy bean meal	-	-	-
Sunflower meal	-	-	-
Fish meal	-	3.16	16.26
Wheat meal	-	-	25.29
Canola meal	-	-	3.38
Soybean oil cake	-	21.11	-
Linseed oil cake	-	11.84	-
Rice bran	-	21.11	22.09
Corn	-	-	27.94
Shrimp meal	-	32.09	-
Wheat bran	-	-	-
Vitamin premix	-	1.0	1.0
Total	100	100	100
Proximate Composition			
Crude protein	12.3	46.92	34.69
Fat	5.21	16.01	12.4
Moisture	0.88	13.5	7.7
NFE	42.1	18.36	19.32
Ash	15.0	7.79	5.39

Table 2. Growth parameters of rohu fingerlings fed with different commercial feeds.

Parameters	Feeds		
	Rice bran (T 1)	Miracle (T 2)	Tokyo (T 3)
Mean initial weight (g)	396.10 ±1.75	395.80 ±1.65	396.0 ±2.1
Mean final weight (g)	482.35 ±2.2	574.75 ±2.7*	779.88 ±1.9**
Mean weight gain(g)	85.25 ±1.9	178.95 ±2.1*	383.88 ±1.8**
% weight gain	17.88 ±2.3	31.14±0.1.4*	45.23 ±1.2**
Mean initial length (cm)	15.0 ±0.4	15.21 ±0.38	15.19 ±0.21
Mean final weight (cm)	19.34 ±0.29	23.78 ±0.31	31.23 ±0.22*
Mean length gain (cm)	4.34 ±0.15	8.57 ±0.21	16.06 ±0.14*
% length gain	22.45 ±0.33	38.92 ±0.45	51.36 ±0.6*
FCR	4.12 ±0.4	2.78 ±0.6	1.91 ±0.7*
Survival rate %	100 0. ±0	100 ±0.0	100 ±0.0
Gross fish production (g)	85.25 ±1.75	178.95 ±2.28*	383.88 ±1.9**

(n=60, *P<0.05, **P<0.01).

When all three feeds were compared regarding their efficiency for growth during six weeks, it was found that Miracle (T 2) was more efficient (P<0.05) than rice bran (T 1) while Tokyo (T 3) was the most efficient (P<0.01) than rice bran (T 1) and Miracle (T 2) (figure 1). The physico-chemical parameters were within the stipulated range throughout the experimental duration (table 3).

Table 3: Physico-chemical parameters of water in tanks where fingerlings were maintained under different feeding treatments

Parameters	Feeds		
	Rice bran (T 1)	Miracle (T 2)	Tokyo (T 3)
Temperature (ºC)	27.1 ± 0.1	26.9 ±0.3	27.3 ±0.21
Dissolved oxygen (mg/l)	7.2 ± 0.4	7.0. ±0.25	7.1 ±0.7
pH	7.2 ±0.2	7.1 ±0.1	7.12 ±0.15
Total hardness	140.3 ±2.7	143.1 ±2.9	142.6 ±1.7

(n=3, data is expressed as ± SEM)

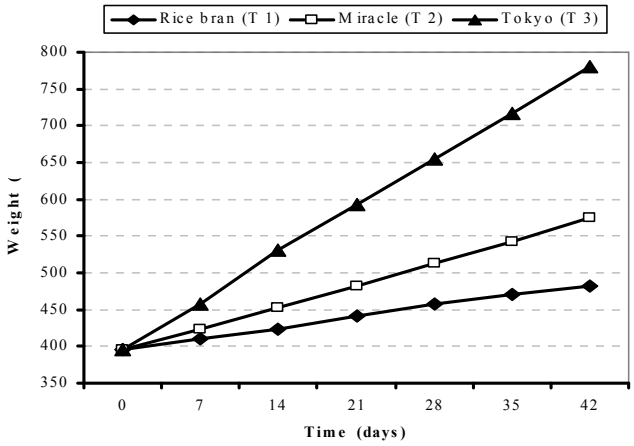

Figure 1: Growth performance (weight gain) in the fingerlings of rohu under the influence of commercial feeds at regular intervals.

DISCUSSION

Obtaining higher yield in terms of growth in fish accompanied with optimum qualitative characteristic of meat is main target of contemporary aquaculture processes. Fish growth is attributed as an increase in overall length and weight of fish under feeding regimen. The growth in the fingerlings of rohu was significantly higher at both treatments (T 2 and T 3) when compared to treatment 1 (rice bran, control group). However, there was no significant variations in total length seen among all treatments while a significant increase in weight gain (P<0.05) was observed in treatment 3 when compared to other treatments. These results are in corroborating with the findings of Ashraf *et al*., (2008) and Abid and Ahmed, (2009 a & b) whom worked on growth in fingerlings of rohu, *Labeo rohita* under the influence of artificially composed diets. A significant growth response was observed by Li *et al*., (2000) in channel catfish (*Ictalurus punctatus*) when given various protein rich artificial feed.

Similarly FCR and values of gross fish production also were significantly (P > 0.05) higher in treatment 2 & 3 as compared to T 1. Survival rate of fingerlings was 100% in all treatments; it is obviously under optimum rearing conditions. The present findings are in accordance with the findings of Seema *et al*., (2001), Inayat and Salim, (2005), Ashraf *et al*., (2008) and Abid and Ahmed, (2009 a & b). Similar reports of high survival rates in estuary grouper, *Epinephelus salmoides* was 99.1% (Teng and Chua, 1979), 99% in *Penaeus monodon* (Ali *et al.* (1999) and 90% in *Pisodonophis boro* (Narejo *et al.* (2002), are well documented. Our observations of FCR are also in agreement with the report of Webster *et al*. (1992) in cage-reared channel catfish, in hybrid sunfish (Wang *et al*. 1998), mrigal, *Cirrhinus mrigala* (Abid and Salim, 2004, Ashraf *et al*, 2008,) and rohu (Abid and Ahmed, 2009 a & b). Physico-chemical parameters like temperature, dissolved oxygen, pH and hardness of water in tanks for different feed treatments did not show any significant variations. The recorded values were within the optimum range for cyprinid fingerlings rearing (Ali, *et al*., 2000, Abid and Ahmed, 2009 a&b).

These findings have practical importance in maximizing the growth and survival of fingerlings by feed managers during fingerlings rearing. The present study reveals that commercial feeds available in the local market are good to enhance growth in the fingerling of rohu and Tokyo (T 3) which was tested as treatment 3 was found the best among three feeds. As regards the gross production of fish for consumption, the present finding gave encouraging results which can support fish farmers and can improve the economics of the fish farming sector significantly.

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REFERENCES

Abid, M. and M. S. Ahmed (2009 a). Growth response of *Labeo rohita* fingerlings fed with different feeding regimes under intensive rearing. J. Animal & Plant Sci., 19(1): 2009, 45-49

Abid, M. and M. S. Ahmed (2009 b). Efficacy of feeding frequency on growth and survival of *Labeo rohita* (Ham.) fingerlings under intensive rearing. J. Animal & Plant Sci., 19(2): 2009, 111-113

Abid, M. and M. Salim (2004). Efficacy of varying dietary protein levels on growth, feed conversion and body composition of *Cirrhinus mrigala* fingerlings. Pak. J. Life Soc Sci., 2(2): 91-94

Ali, M. S., A. F. M. Shafiquzzoha and S. U. Ahmed (1999). Effect submerged aquatic vegetation on growth and survival of *Penaeus monodon* (Fab). Bangladesh J. Fish Res., 3:145-149

Ali, M., A. Salam, A. Azeem, M. Shafiq and B. A. Khan (2000). Studies on the effect of seasonal variations on physical and chemical characteristics of mixed water from River Ravi and Chenab at union site in Pakistan. J. Res. (Sci.), 11: 11-17.

Ashraf, M., M. Ayub and A. Rauf (2008). Effect of different feed ingredients and low temperature on diet acceptability, growth and survival of Mrigal, *Cirrhinus mrigala* fingerlings. Pakistan. J. Zool., 40 (2): 83-90.

Craig, S. and L. A. Helfrich (2002). Understanding Fish Nutrition, Feeds and Feeding. Department of Fisheries and Wild Life Sciences, Virginia Tech., 420-456 pp

FAO. (2000). Fishery Statistics (Aquaculture Production). Food and Agriculture Organization of the United Nations, Rome, 90(2): 22-131

Inayat, L. and M. Salim (2005). Feed conversion ratio of major carp, *Cirrhinus mrigala* fingerlings fed on soybean meal, maize and maize gluten. Pak. Vet. J., 25(1): 13-16.

Khan, M. A., A. K. Jafri, N. K. Chadha and N. Usmani (2003). Growth and body composition of rohu (*Labeo rohita*) red diets containing oilseed meals: partial or total replacement of fish meal with soybean meal. Aquaculture Nutrition., 9(6): 391-396.

Khan, M. A., A. K. Jafri and N. K. Chadha (2004). Growth and body composition of rohu, *Labeo rohita* (Hamilton), fed compound diet: Winter feeding and rearing to marketable size. J. Appl. Ichthyol., 20: 265-270.

Li, M. H., B. G. Bosworth and E. H. Robinson (2000). Effect of dietary protein concentration on growth and processing yield of channel catfish (*Ictalurus punctatus*). J. World Aquaculture. Soc., 31: 592-598.

Narejo, N. T., M. M. Haque and S. M. Rahmatullah (2002). Growth performance of snake eel, *Pisodonophis boro* (Hamilton) reared experimentally with different food items. Bangladesh J. Train, Dev., 15: 221-225.

SAS Institute Inc. (2001). SAS/ETS® Software: Changes and Enhancements, Release 8.2, SAS Institute Inc., Cary, North Carolina, USA.

Seema, R., M. Salim and M. Rashid (2001). Performance of major carp *Cirrhinus mrigala* fingerlings fed on rice polish, maize oil cake and rice broken. Ont. J Agri. Biol., 4: 195-196

Shaheen, T., M. Ayub, S. Hayat, S. Z. A. Abidi and S. Tahir (2000). Impact of different levels on the survival and growth of *Labeo rohita* at constant level of protein. Pak. J. Fish., 1(1): 95-102.

Teng, S. T. and T. E. Chua (1979). Use of artificial hides to increase the stocking density and production of estuary grouper *Epinephelus salmoides* (Maxwell) reared in floating net cages. Aquaculture, 16: 219-232.

Wang, N., R. S. Hayward and D. B. Noltie (1998). Effect of feeding frequency on food consumption, growth, size variation and feeding pattern of age hybrid sunfish. Aquaculture, 165: 261–265.

Webster, C. D., J. H. Tidwell and D. Yancey (1992). Effect of protein level and feeding frequency on growth and body composition of cage-reared channel catfish. Prog. Fish Cult. 54: 92–96.