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Influence of Live and Dry Diets on Growth and Survival of Goldfish *(Carassius Auratus)*

Zoology

KEYWORDS : Goldfish, mosquito larvae, growth performance, survival.

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ABSTRACT

The effects of three different diets (dry pellets, pellets plus mosquito larvae and mosquito larvae) on specific growth rate, weight gain, food intake and survival of goldfish were investigated for 30 days. The average final weight of the goldfish feed on the mixed diet (pellets plus mosquito larvae) (16.95 ±1.18 g) was significantly larger than that of fish feed on the dry pellets (14.12 ±1.74 g) and mosquito larvae (12.48 ±3.27 g, p<0.01). The specific growth rate was the highest in the goldfish fed on pellets plus mosquito larvae (56.5%) and the lowest in the goldfish feed on mosquito larvae (41.6%). Food intake was higher in the mixed diet feed groups than in the fish feed on dry pellets and mosquito larvae. Survival rate was 100 % in all the three different feeding groups.

The goldfish feed on dry pellets plus mosquito larvae shows significant weight gain, length, specific growth rate etc. No mortality occurred during the experiments in any group.

INTRODUCTION

Ornamental fish keeping is one of the most popular hobbies in the world today. With the expansion of global ornamental fish trade, increased attention is being paid to the nutritional requirements of ornamental fish. Nutrition is one of the key factors in improving production efficiency of ornamental fish. The other factors include growth, health, body colour and breeding of these fishes. Nutritional requirements and feed management needs in ornamental fish are determined mainly based on information of these and the experiences of successful aquarist in the line.

Goldfish is good model for conducting basic research work in laboratory conditions. In addition to its aesthetical characteristics goldfish acquired relatively recent interest as a biocontrol agent for mosquitoes in shallow ponds and pools because of its strong larvivorous nature of feeding (Gupta and Banerjee 2009). As a dietary source, live feeds play a significant role in ornamental fish nutrition. However, live feed alone is often nutritionally deficient and if not stored properly can act as the transmitter of infectious diseases (Pannevis 1993).

MATERIALS AND METHODS

Goldfish was obtained from Aquarium shop, Aurangabad (M.S.). Goldfish weight range 7 - 13 g and length 10-19 cm. Uneaten feed was removed daily from the aquarium to avoid fouling of the water. Water quality parameters were analysed weekly following APHA (2005). For Statistical analysis all the data were subjected to one-way analysis of variance to determine significant differences between the treatments.

A total of 18 goldfish were divided equally into three groups 50-L tanks: six fish were housed in each tank. All aquarium tanks were in parallel. In total there were 3 experimental feeding regimens utilizing 1 tanks/treatment. The duration of this study was 30 days, during which water quality parameters were observed. Glass aquaria (90 × 30 × 36 cm) were used in this experiment. An aerator was provided in a aquarium. The experiments was carried out during the month of October, 2012. The fish were divided equally three group equally three aquariums (n 6). Fish were fed one of three diets that comprised of (i) first group feed only on commercial pellet diets (ii) group second feed on commercially available pellet diet plus mosquito larvae in the proportion (1:1) and (iii) group third feed on only mosquito larvae. Mosquito larvae collected different tanks, pools, water storage tanks etc. A standard commercially available goldfish flake food (Taiyo grow, Japan made) was offered daily 2% fish bodyweight. The composition of the three diets was: (i) mosquito larvae (Protein (% dry wt) 42.2, Fat (% dry wt 16.1), Calcium (% dry wt) 0.79, Phosphorous (% dry wt) 1.07, Ca:Phos Ratio 0.73) (Bernard and Allen 1997) (ii) commercial feed (fish meal, wheat, flour, soybeam meal, corn meal, yeast, vitamins & minerals) crude protein min. 20%, crude fat min. 4%, crude fiber max. 5%, moisture max. 10% (figures supplied by the manufacturers). On a daily basis, the aquariums were siphoned and uneaten food and fecal matter removed. The siphoned material was examined to determine the presence of uneaten mosquito larvae and pellet. The uneaten food was separated, dried for 24 h and weighed. To determine the effects of diet on fish length and weight, samples were taken every 15th day. These fish were removed prior to the first feed of that day. Fish lengths were determined. Each fish was also weighed. Excess water was blotted from each fish prior to weighing. The effect of diet on survival was assessed at the conclusion of the 30 days trial through the proportion of remaining live fish. In order to calculate and monitor various growth parameters and predict a daily feed ration, fish were individually weighed and measurements were taken before the start of the trial and then every 15th days. Length from the mouth to caudal peduncle and depth from the deepest point of the body to the base of the dorsal fin were measured (cm). Fish were then placed in a beaker of tank water on a balance for body weight measurements before being returned to their original tank. Both fish and feed weight data were used in order to calculate the specific growth rate and food conversion ratio using the equations below:

RESULTS AND DISSCUSSION

Daily examination of waste matter revealed no significant differences in the quantity of uneaten mosquito larvae and commercial feed across the treatments for the duration of the trial. Length data showed that at the conclusion of the trial, goldfish fed on mixed diet (mosquito larvae plus commercial pellet diet) were significantly longer than goldfish fed on commercial diets and mosquito larvae.

Goldfish at day 30 that were fed on mixed diet mosquito larvae and commercial diet were found to be significantly heavier than goldfish fed on commercial feeds and mosquito larvae alone.

The mortality data for 30 days revealed that goldfish fed on three different combination diets showed no mortality during the study periods. Growth data are displayed in **Table 1**. Limited data exist for growth parameters of ornamental fish including goldfish, although some information is available for carp species. Specific growth rates of calculated from this investigation were high compared with those published for the closely related common carp (*Cyprinus carpio*), which were between 2.81–2.92 (Przybyl 2004) and 2.6 for the Indian Major Carp (*Catla catla*) (Murthy and Naik 2000). Feed conversion ratios from this study were directly comparable with those found by Moza et al (1995) for the Goldfish. Relatively high FCRs (of up to 3) have also been reported in Striped Bass (*Morone saxatilis*), which was attributed to body size and non optimal thermal conditions (Duston et al 2004).

Table 1. Effects dry and live diets on growth and survival of goldfish, *Carassius auratus.*

Sr. No.	Parameters	Types of Diets		
		Commercial dry pellets	Commercial dry pellets + Mosquito larvae	Mosquito larvae
1.	Initial weight (g)	65.23	54.27	60.25
2.	Final weight (g)	146.95	155.92	135.15
3.	Mean weight increase ± SD	14.12 ±1.74	16.95 ±1.18	12.48 ±3.27
4.	Body weight increase (g)	14.12	16.95	12.48
5.	Specific Growth Rate (%)	47.06	56.5	41.6
6.	Body weight gain (g)	423.6	508.5	374.4
7.	Survival %	100	100	100

Mean ± SD (n=6). ANOVA, P<0.001.

Table 2: Physicochemical parameters of aquarium water during the experiments.

Sr. No.	Parameters	Range
1	Temp.(^{0}C)	16-29
2	Dissolved oxygen (mg/l)	2.5-10
3	pH	7 - 9
4	Salinity (mg/l)	300-500
5	Total dissolved solids (mg/l)	500-700
6	Total solids (mg/l)	1900-2300
7	Total suspended solids (mg/l)	2400-3000

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