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Effect of three different feeds on the growth and survival of sailfin molly *Poecilia latipinna* (Lesueur, 1821)

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Abstract
The commercial value of ornamental fish is mainly dependent on fast growth and external body colouration. A study was conducted to evaluate the efficacy of three types of feed (Pellet feed, Groundnut oil cake and Dry *Tubifex*) in the rearing of Sailfin molly. Survival and growth parameters such as length, weight and specific growth rate (SGR) of the fish were determined to evaluate the performance of the feeds. Results showed that Sailfin molly performed better in terms of survival (100%) and SGR (2.8±0.01%) when fed with Dry *Tubifex* compared to the other feeds. Thus, Dry *Tubifex* proved to be the best feed for Sailfin molly for increasing the growth and survival of the fish, and has tremendous significance in the ornamental fish industry.

Keywords: *Ornamental fish, Sailfin molly, Feed, Survival, Growth, SGR.*

Abstrak
Nilai komersial ikan hiasan bergantung terutamanya kepada kadar pertumbuhan dan pewarnaan badan luar. Satu kajian telah dijalankan untuk menilai keberkesanan tiga jenis makanan (makanan Pellet, kek minyak kacang tanah dan tubifeks kering) dalam penternakan ikan Sailfin molly. Kelangsungan hidup, parameter pertumbuhan seperti panjang, berat dan kadar pertumbuhan spesifik (SGR) ikan telah ditentukan untuk menilai prestasi pemakanan. Keputusan menunjukkan bahawa ikan Sailfin molly mempunyai prestasi yang lebih baik dari segi kelangsungan hidup (100%) dan SGR (2.8 ± 0.01%) setelah diberi makan dengan tubifex kering berbanding dengan pemakanan lain. Tubifex kering terbukti menjadi makanan yang terbaik untuk ikan Sailfin molly untuk meningkatkan pertumbuhan dan kelangsungan hidup yang mempunyai signifikan dalam industri ikan hiasan.

Kata kunci: *Ikan hiasan, Sailfin molly, Pemakanan, Kelangsungan hidup, Pertumbuhan, SGR.*

Introduction

Ornamental fish keeping is a popular, easy and stress relieving hobby and enterprise. Today, estimates put global trade in ornamental fishes worth about 6 billion (Venkataramani 2010) and India's share in the global trade is USD 27,031 (Dash and Sahoo 2009). Thus an expanding domestic and world market together with availability of low-cost technology for ornamental fish production makes it a promising venture.

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Among all categories of ornamental fishes, the live-bearing category is very popular because they are brightly coloured, accept all kinds of food and breed prolifically to produce living free swimming young ones. The live bearing species such as guppies (*Poecilia reticulata*), mollies (*Poecilia latipinna, Poecilia sphenops*), swordtails (*Xiphophorus helleri*) and platies (*Xiphophorus maculatus*) are a popular group being produced in Singapore, Malaysia, Indonesia, Thailand, India and China (Chapman et al.1997). The sailfin molly, *Poecilia latipinna* is widely distributed around the world as a protein source (food) and also serves as biological control for insects (Al-Ghanim 2005).

The natural diet of this species has been studied only in introduced Asian populations, and there is only one investigation pertaining to its feeding behavior (Green et al. 1976). Feeding and palatability trials using commercial feeds suggest that very little is understood about the nutritional requirements of the

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fish. Formulated feeds are specifically designed for the productivity of ornamental fishes and are manufactured to result in optimal growth at minimal costs. They are subjected to extensive testing to ensure maximum performance and also include a feed conversion ratio.

In the present investigation, the effect of experimental diets consisting of Groundnut oil cake and Dry *Tubifex* were tested for a period of 30 days to evaluate survival, growth parameters like total length, weight gain and SGR of the Sailfin molly. Such a study would help in understanding the nutritional requirements, feeding and growth dynamics of an important ornamental fish and its implications for ornamental fish trade.

Materials and Method

The sailfin molly fish were purchased from GR Aquarium, Chennai-600106 and subjected to the laboratory conditions. The fishes were disinfected with 2% Potassium permanganate solution. Tap water was used for the experimental trials after dechlorination. The animals (10 fish/tank) were then stocked in 10 litre volume container in triplicates. The oxygen level was increased by using air diffusers upto 9 mg/l. The faecal matter and uneaten feed were removed at 8.30 am and 4.30 pm daily from the bottom of each container by siphoning. 50 % of the water volume was changed after every 2 days. The experiment was carried out for 30 days.

Fishes were fed twice a day *ad libitum* using the experimental diets. Group A composed of Pellets formed the control diet (commercial pellet feed-Taiyo) and was given to the first trial group. Group B comprising of Groundnut oil cake was fed to the second trial group and Group C consisting of Dry *Tubifex* was fed to the third trial group. The dietary treatments consisted of 3 replicates. The water quality parameters such as temperature, dissolved oxygen, and pH were monitored at weekly intervals. At the end of the growth trial, tank-wise mean total length, total weight, Specific Growth rate (SGR) and survival of fish were determined.

Calculations

Specific growth rate (SGR) of the fish was calculated using the formula, SGR = (lnWt-lnW0)*100/t

Survival = Nt/N0 x100

Wt and W0 were final and initial fish weights (g), respectively;

Nt and N0 were final and initial numbers of fish in each replicate, respectively;

t is the experimental period in days.

Statistical Analysis

The data obtained from the experiment were subjected to one-way analysis of variance (ANOVA) using SPSS Version 10.0 programme to find the efficacy between the three types of feed. ANOVA revealed significant differences among groups and hence multiple comparison tests were performed among the means using Tukey's test. Statistically significant differences were determined by setting the aggregate type I error at 5% ($p<0.05$).

Results

The water quality parameters such as temperature, dissolved oxygen, and pH were found to be 29±2 degree C, 6.13±33 mg/l and 7-8 respectively.

Mean length and mean weight, SGR and survival of Sailfin molly showed a statistically significant difference between the three groups (Table 2). It is evident that among the three diets, Group C (Dry *Tubifex*) showed the highest crude protein and lipid content. The sailfin molly, *Poecilia latipinna* fed on Group C (Dry *Tubifex*) showed a rapid growth and attained the highest final mean length and mean weight when compared to those which were offered with Group B (Groundnut oil cake) and Group A (Control). Analysis of One-way ANOVA for mean length and mean weight, SGR and survival of sailfin molly showed a statistically significant difference between the three groups (Table 2). Final mean length (cm) was found to be highest in Group C (3.33±0.02) followed by Group C (3.25±0.01) and Group A (3.17±0.00). The results of mean length revealed significant difference between Group C (3.33±0.02) and Group A (3.17±0.00), ($p<0.05$). However, there was not much difference between Group C (3.33±0.02) and Group B (3.25±0.01) ($p>0.05$).

Table 1: Proximate composition of the experimental diets

Composition	Group A Pellet feed (Control)	Group B Groundnut oil Cake	Group C Dry *Tubifex*
Crude Protein (g Kg^{-1})	35 %	38 %	52 %
Crude Lipid (g Kg^{-1})	5 %	1 %	7 %
Crude Fibre (g Kg^{-1})	6 %	7 %	8 %
Ash (g Kg^{-1})	9 %	5 %	7 %
Moisture	10 %	10 %	8 %

Table 2: Growth Performance and survival rate of *Poecilia latipinna* fed with four different experimental diets. Values (Mean±SD) with different superscripts in the same row are significantly different at the 5% level.

Growth Performance	Group A Pellet feed (Control)	Group B Groundnut oil Cake	Group C Dry *Tubifex*
Initial Length (cm)	1.95±0.02	1.95±0.02	1.95±0.02
Final Length (cm)	3.17±0.00^{cb}	3.25±0.01^{ac}	3.33±0.02^{ab}
Initial Weight (g)	0.11±0.01	0.11±0.01	0.11±0.01
Final Weight (g)	0.63±0.00^{cb}	0.83±0.00^{ac}	0.95±0.01^{ab}
SGR (%)	1.73±0.00^{cb}	2.4±0.01^{ca}	2.8±0.01^{ba}
Survival (%)	97±0.57^{cb}	93±0.57^{ca}	100±0.00^{ac}

Final mean weight (g) was found to be higher in Group C (0.95±0.01) when compared to Group B (0.83±0.00) and Group A (0.63±0.00) (Figure 2). The results of mean weight showed significant differences between Group C (0.95±0.01) and Group A (0.63±0.00) (p<0.05). Thus the final mean length and mean weight showed an increased body length and weight in all dietary treatment groups.

In the present study, higher SGR (%) value was observed in Group C showing an average of 2.8±0.01, followed by Group B (2.4±0.01) and Group A (1.73±0.00).

The mean survival rate of sailfin mollies fed with three different diets during the experimental period ranged from 93% to 100%. The results indicated highest mean survivability for Group C followed by Group A (97%) and Group B (93%).

Discussion

In the present study, results indicated enhanced growth performance of *P. latipinna* when fed with Group C (*Dry* Tubifex). Similar results of higher growth performance of fish fed with Dried *Tubifex* have been reported earlier by Mandal *et al*. (2010). This could be due to the high crude protein content (52%), feed acceptability and palatability, improved food intake and other factors which are responsible for higher growth rate and survival. According to Kruger *et al.* (2001) better growth performance in the ornamental fish, *Xiphophorous helleri* was attained when the diet contains at least 45% crude protein and 6% lipid level. Shim and Bajrai (1962) reported that 70% crude protein was found to be suitable food for the fry of *Poecilia reticulata*. Dahlgreen (1980) also reported that the guppy, *Poecilia reticulata* being omnivorous requires around 40% dietary protein.

Lower growth performance was observed in Group A (commercial pellet feed-control). Many hypotheses have been put forth to explain about the low performance of the dry diet as food for fishes. Goldblatt *et al*. (1979) reported that pelleted feeds lose vital nutrients like water soluble vitamins and amino acids within a short duration of exposure to water. Bergot (1986) substantiated that artificial feed changes the relationship between the animal and its environment.

In the present study when fish were offered with Group B (Groundnut oil cake) showed lesser growth rate when compared to Group C. Probably, this might be due to decreased level of protein content and absence of essential amino acids (Mohanty and Swamy 1986). Further, Maynard (1947) reported that high percentage of carbohydrate in groundnut oil cake reduces the digestibility. Hence, all these causes may be responsible for the poor performance in Group B.

Specific Growth Rate (SGR) was found to be highest when fed with Group C. Therefore, 52% protein diet is considered to be economical and optimal for rearing *Poecilia latipinna.* Similar findings have been reported by Shim and Chua (1986), with a crude protein level of 71%.

T.tubifex is the main constituent of '*Tubifex*' worms sold as live food at pet shops, principally for aquarium fishes. *Tubifex* has long been known to enhance growth and reproduction in some aquarium fishes (Shim 1986). It was also found that the SGR of the fish that fed with dry *Tubifex* feed ensured better growth rate in the Sailfin molly compared to the other two feeds. Survival was also significantly affected by feed. It was higher in Group C followed by Group A and Group B.

Conclusion

Results of this study have shown that the growth performance and survival of *P. latipinna* can be enhanced by feeding with Group C (Dry *Tubifex)* commercial diet. However, detailed studies on the nutritional requirements of *P. latipinna* are essential for maximum growth and survival which will provide a range of nutrients to ensure consistent growth. This study has significance and implications in ornamental fish trade.

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