

A Preliminary Study on the Effect of Feeding Frequency on Survival and Growth Rate of *Catla Catla* Post Larvae

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Introduction

Feed management is a very important part in larval rearing in terms of optimization of feeding rate and frequency is become imperative in the culture of marine and freshwater fishes and it has become one of the crucial areas of research in the field of aquaculture. By controlling the optimum feeding frequency, farmers can successfully reduce the feed cost and maximize growth and also able to manage other factors such as individual size variation and water qualities which are deemed important in rearing of fish in culture conditions. Different species of fish have been shown to have different optimum feeding frequencies. There are numerous reports available on the nutritional requirements and use of practical diets for Indian Carp species but limited information is available on feeding schedules for Catla (*Catla catla*). There is a need to know what feeding frequency is optimal, in terms of production. The objective of this study was to evaluate the effects of different feeding frequencies on growth performance and survival of Catla (*Catlacatla*) post larvae which will lead to better larval rearing management during the critical period of larval phase.

Methodology

Experimental trials were conducted at the National Aquaculture Development Authority, Carp breeding centre, Udawalawa. A total of 1500 (approximately) 5 day old Catla (*Catla catla*) post larvae (PL) obtained from hatchery jar of the breeding centre. Selected PL were divided equally into fifteen 50 l glass tanks and 100 fish were housed in each glass aquaria. Average wet weight was recorded as 0.0007 ± 0.000031 g and average total length recorded as 0.7 ± 0.042 cm. The stocking density was two PL per one liter of water. Post larvae in treatment F4 were fed four times a day while those of group F3, F2 and F1 were fed thrice, twice and once a day respectively. F0 was the controller and those larvae were not fed. The larvae were fed with soya bean milk up to 10 days and then up to 21 days they were fed with Prima commercial powder feed. Feed was offered at an allowance of 10% bodyweight (FAO, 2011) splitted equally among the allocated number of meals. Feed allowance was calculated once a week by using wet weight measurements. Satiation of feed was assumed. The duration of this study was 8 weeks and during the experiment water temperature was measured daily and pH and Nitrate concentration were measured once a week. Total length and wet weight body measurements were taken once a week and Number of survivals were calculated finally. Based on the average length, average weight increments and number of fish; the Specific growth rate, Weight gain, length gain, survival rates variables were calculated. All data were subjected to one-way analysis of variance (ANOVA) and differences between means compared by the Tukey test at a 95% confidence interval ($p < 0.05$).

Results and Discussion

Mean water temperature and pH level ranged from 27-30 °C and 6-8, respectively. The mean weekly values of the lengths and weights of post larvae at each feeding frequency are shown in Figure 1 and 2, respectively. Total length increased from an initial value of $0.7 \pm$ cm to final value 1.23 ± 0.1 cm in no feed group (F0) and 2.53 ± 0.11 cm in feeding frequency F4

group. Other feeding frequencies (F1-F3) had length values intermediate between the 2 extremes. There was a significant difference ($P < 0.05$) in length values between these feeding frequencies. For weight values feeding frequency F0 had the lowest final mean weight (0.0077 ± 0.0003 g) while feeding frequency F4 had the highest mean weight value (0.101 ± 0.001). Mean weight values for other feeding frequencies (F1-F3) ranged progressively between two extremes. There was also significant difference ($P < 0.05$) in final weight values at the different feeding frequencies.

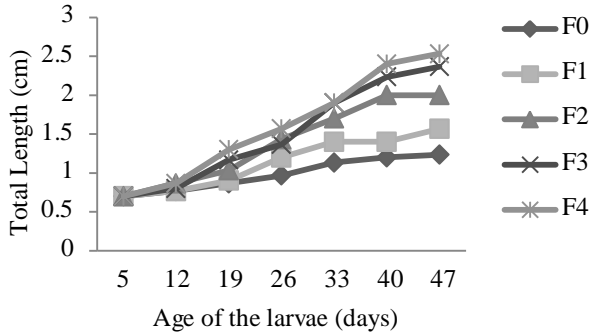


Figure 1. Mean Total length of Catla post larvae fed on different feeding frequencies over age of the post larvae.

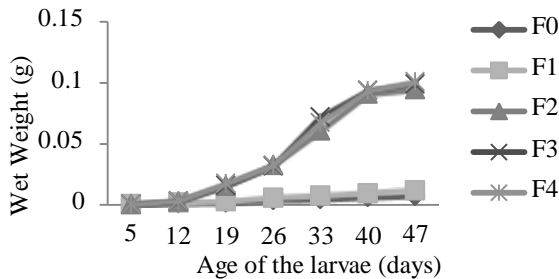


Figure 2. Mean wet weight of Catla post larvae fed on different feeding frequencies over age of the post larvae.

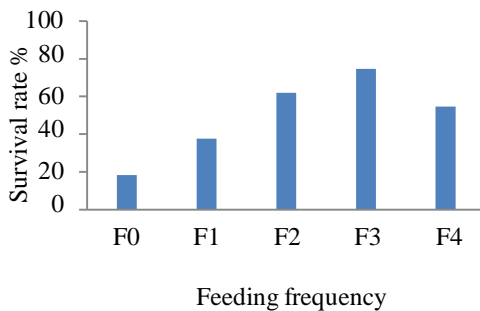


Figure 3. Mean survival rate (%) of Catla fry at the end of the experiment.

Specific growth rates (SGR) exhibited clear fluctuations ranging with mean values of 5.71 ± 0.11 , 6.74 ± 0.39 , 11.68 ± 0.09 , 11.80 ± 0.055 , 11.84 ± 0.024 % in groups; F0, F1, F2, F3 and F4, respectively. The growth data clearly indicated that the final live weight and SGR values of group F0 and F1 were significantly lower than those of other groups ($p < 0.05$). No significant

difference ($p < 0.05$) was found in the SGR between two, three and four times feeding frequencies. A significant difference was found in body weight gain (BWG) among Catla post larvae received three and four meals in a day (F3 and F4) with other two groups (F0 and F1). The highest BWG was observed in F4 (0.1003 ± 0.001) and the lowest BWG was observed in treatment F0 (0.007 ± 0.00036). Figure 3 exhibits the weight gain variations in Catla throughout the experiment against age of the post larvae.

Survival rate of the Catla post larvae was significantly different ($p < 0.05$) with feeding frequency (Figure 3). The highest mean survival rate was recorded in F3 (74.66 ± 4.72) and lowest mean survival rate was exhibited in F0 (18.33 ± 4.5). Although F4 showed highest growth performance mean survival rate had decreased (54.66 ± 7.57). Figure 3 shows the recorded survival rates at the end of the experiment. Studies conducted on other fish species have shown that feed consumption and growth generally increased with feeding frequency up to a given limit (Alanara, *et al.*, 1992). This is in agreement with present findings in this study that feeding frequency had a significant effect on survival rate and growth in Catla. Both feed consumption and growth rates appeared to increase with the number of meals per day up to four meals. Specific growth rate is at best at four times feeding in Post larvae. It shows that this feeding frequency is optimal for the condition of this trial suggesting that growth and survival are most efficient at this frequency of feeding. However, the inter-individual size variation of fish in the treatment group fed four times daily was much lower than in the other treatment groups. This supports the hypothesis that more frequent feeding yields fish of more uniform sizes (Davies *et al.*, 2006). This could arise because dominant individuals are less aggressive under such circumstances or because more food is distributed to locations occupied by subordinates. The same author equally stresses the need to determine different feeding rates and frequencies for each species and different sizes of the same species, under varying culture conditions.

Conclusions

Significant difference ($p < 0.05$) recorded in feeding frequency on survival and growth performances of Catla PL shows that the best feeding frequency for Catla post larvae to fry stage is thrice a day. Feeding more than once and twice a day (three times and four times) increased growth performance and survival rate.

References

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