

EFFECTS OF DIFFERENT LIVE FEEDS ON GROWTH PERFORMANCE OF FIGHTER FISH (*BETTA SPLENDENS*) LARVAE

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Introduction

Fighter fish (*Betta splendens*) is listed among highly demanded freshwater ornamental fish in Sri Lanka. Although successful breeding techniques have been developed for this species, high rate of mortality at the larval production stage is a critical issue. Fish larvae are usually very small, extremely fragile, and generally not physiologically fully developed (Lavens and Sorgeloos, 1996). Combination of factors including nutrition, water quality, pathogens and stress decide the larval survival. In terms of larval nutrition, many studies revealed that live feeds had a better growth and survival than that of fry fed dry feed (Kerdchuen and Legendre, 1994; Hung *et al.*, 2002; Faulk and Holt, 2009). Live feeds are readily consumed, efficiently digested and that provide the required nutrients to support higher growth and health of fish larvae (Kumar *et al.*, 2008). Brine shrimp (*Artemia sp.*), *Moina sp.*, Copepods, *Brachionus*, *Chironomus* and various phytoplanktons are commonly used as live feed in ornamental fish farming. *Artemia* has extensively been used in fighter fish larval rearing in Sri Lanka as the sole source of live feed since it ensures high survival rate (Pers.com). But, high cost and occasional scarcity of *Artemia* makes it unsuitable for commercial aquaculture. Hence, identification of low cost live feed which can be used in larval rearing is very important to reduce the production cost as well as to ensure the sustainability of fighter fish trade. Therefore, this study was designed to evaluate the effects of different live feeds on growth performance of fighter fish larvae in order to select most suitable live feed.

Methodology

Two days old larvae and small glass aquaria (30 x20x20 cm) were used as experimental fish and experimental unit respectively. There were four treatments according to live feed offered; TR1: solely fed *Artemia* naupli, TR2: solely fed bread worms, TR3: solely fed copepods and TR4: mixture of former three live feeds. One of the four treatments each with three replicates was randomly allocated in to 12 glass aquaria (4 x 3) using a completely randomized design. Initial length and weight of fish larvae were measured at the beginning of the experiment and stocking density was 20 larvae per tank. Larvae fed to satiation twice a day and experiment was lasted for 28 days. Daily mortalities were recorded and final weights of fish in each treatment were measured at the end of the trial. Larvae were not sampled during the study period to avoid stress. Daily weight gain (DWG -mg day⁻¹) = [final weight (FW) – initial weight (IW)] / number of days; Specific Growth Rate (SGR %) = (ln FW –ln IW) / number of days x 100; Survival rate (SR) (%) = Number of fish at the end / number of fish stocked x 100 were computed. The data were subjected to one-way

ANOVA, followed by Turkey's Multiple Range Tests to evaluate the mean differences among treatments at 0.05 significant levels.

Discussion and Conclusion

Initial mean length and mean weight of fish larvae were 3.8 ± 0.2 mm and 0.54 ± 0.09 mg respectively. Fish larvae fed mixture of live feed had significantly highest growth performances in terms of DWG, SGR and final mean weight ($P > 0.05$) followed by fish fed *Artemia* (Table 1).

Table 1. Growth and survival of larvae reared in TR1, TR2, TR3 and TR4 (mean \pm Standard deviation (n =4); different superscripts in the same raw indicate significant differences at $P < 0.05$)

Responses	Feeding treatment			
	<i>Artemia</i> (TR1)	Bread worms (TR2)	Copepods (TR3)	Combination (TR4)
Final mean weight (mg)	4.04 ± 1.16^b	0.95 ± 0.17^c	1.71 ± 0.46^c	9.22 ± 2.05^a
DWG (mg day ⁻¹)	0.125 ± 0.042^b	0.014 ± 0.008^c	0.047 ± 0.010^c	0.310 ± 0.07^a
SGR (%)	7.04 ± 1.36^b	1.96 ± 1.11^d	4.00 ± 0.96^c	10.05 ± 1.23^a
Survival (%)	75 ± 15^a	47 ± 8^b	42 ± 8^b	75 ± 5^a

Survival rate is significantly higher in *Artemia* and live feed mixture in compared to other two treatments. Size of the prey and predator, nutritional quality, density, physical attractiveness and mode of presentation of food basically decide the feed intake of fish. Generally fish larvae are able to consume prey having same size of their mouth but small prey is more preferable. Live feed mixture contains all live feeds all over the experimental period providing a wide spectrum of live feeds according to their size. Mouth gape of fish larvae undergoes ontogenic development and presence of different size live feeds provide many chances to select their prey preferably. That could be the reason for the better growth performances of larvae fed mixture of live feeds. Low growth performances of *Artemia* compared to mixture of live feeds may probably be due to large size of *Artemia* (0.5 ± 0.06 mm in size) which might not be suitable at the commencement of larval feeding. Although, the bread worms are rich in protein, they are relatively smaller in size. Hence, bread worms could be only suitable at the onset of larval feeding. Copepods are comparatively larger than other live feeds and probably reduced the feed intake leading to the low growth and survival. Even though the mixture of live feeds performs better growth and survival, fish might perform better if different size live feeds provide at different stages of larval ontogenic developments. Therefore larval rearing methods have to be improved further for commercial farming of the species. Provision of mixture of *Artemia*, copepods and bread worm has been resulted better growth and survival of larvae compared to single live feed. Therefore live feed mixture is the most suitable feed for fighter fish larval rearing among tested other live feed and it would be more economical than the currently existing practice of offering 100% *Artemia*.

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