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Larval Rearing of the Spotted Snake head *Channa punctatus* Fed with Different Feeding Regimes

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Abstract: A rearing experiment was conducted to the larvae of spotted Snake head *Channa punctatus* fed with five different feeding regimes consisted of plankton soup, chicken intestine paste, fish paste, plankton with fish paste and plankton with chicken intestine paste for 28 days. During the experimental period the fishes were fed to satiation twice a day. Significantly higher survival rate (86.6%), the better weight gain (6606%) and SGR (6.522%) were observed in the larvae fed on plankton plus chicken intestine paste when compared to other feeding regimes. The larvae fed with solid food alone showed a high mortality during the first 7 days. In conclusion, the present study a combined diet consisting of live zooplankton (Copepod, Cladoceran, Daphnia, *Moina* sp.) and chicken intestine paste improved growth of larvae whereas larvae fed on solid diet alone poor growth performance was recorded.

Key words: Spotted Snake head, *Channa punctatus*, larval rearing

Introduction

Success of hatchery management in a true sense involves fish breeding, eggs hatching and rearing of young ones and among these rearing of larvae is very delicate as the larvae are very tender and easily succumb to adverse changes in physico-chemical conditions of water and easily become prey to predators in natural water bodies. Moreover the quality of food provided during the weaning of larvae is a critical step in larviculture (Devresse *et al*., 1991). The spotted Snake head *Channa puncrtatus* is one among the highly priced freshwater air breathing fish species in India. Captive seed production and larval rearing of this species have been accomplished experimentally, but are not presently done on a large scale (Marimuthu *et al*., 2001; Marimuthu, 2002). In places like India, captive reproduction and Snake head culture are essential since wild seeds are scarce. Reliable, cultured seed production may soon become necessary even in places like India where environmental degradation has reduced wild stocks (CAMP, 1997). Additionally wild fry are only seasonally available while captive reproduction and larval rearing could supply seeds throughout the year. The larval stage is the most critical stage in the production cycle for many commercial important fish species. Further, the quality of offspring is influenced by a combined effect both of endogenous properties of spawners or internal factors and of external factors (Kamler, 1992). Under natural conditions, the effect of external factors plays a dominant role. The situation with fish culture under captive conditions is somewhat different; larval performance at the initiation of feeding is mainly affected by husbandry practices such as density

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(Gatlin *et al.*, 1986; Diana and Fast, 1989) and food (May, 1970; Houde, 1973; Jhingran, 1991) and also digestion of the food. Few reports are available for the candidate species with respect to their reproduction and breeding strategy (Dehadrai *et al.*, 1973, Parameshwaran and Murugesan, 1976a,b; Marimuthu *et al.*, 2001; Marimuthu, 2002), little is known about their food preference and needs in early life stages. Successful larval rearing of Snake head depends on a complete understanding of diet requirements at the first feeding and diet requirement as fish grow. The aim of the present experiment was to evaluate the effects of live food and the solid diet and in combination of these two diets on survival and growth of spotted Snake head *C. punctatus*.

Materials and Methods

Snake head larvae of (4.62 + 0.08 mm; 1.25 mg) were obtained by induced spawning of broodstock (using 0.4 mL ovaprim/kg.bw) at the CARE Aquafarm. Feeding trials were conducted in 15 L capacity round plastic troughs for 28 days. Larvae were stocked at 40/trough in 15 aquaria. The five feeding regimes viz., 1. Plankton soup, 2. Chicken intestine paste, 3. Fish paste, 4. Plankton with fish paste and 5. Plankton with chicken intestine paste were used. Triplicate troughs of each 15 L capacity were allotted to each diet. Chicken intestine was collected from the local broiler shop, cleaned, boiled and ground by a mixer and stored in refrigerator at -20°C. For fish paste, tilapia fishes were collected from the fish market, all scales and fins were removed, cooked and sieved in small mesh and stored in refrigerator at -20°C. Mixed zooplankton sample consists of Copepod, Cladoceran, Daphnia, *Moina* sp. were collected from the culture ponds of CARE just before feeding the larvae using plankton net. The larvae were fed *ad libitum* twice a day at 10 and 16 h. Water in each trough was changed daily before the first feed ration was given. Sediment and dead larvae were siphoned from the trough daily. The densities of the plankton were maintained at 5-10 individual mL^{-1} for the feeding regimes 1, 4 and 5 throughout the experimental period. Temperature, pH and dissolved oxygen were monitored weekly once. Ten larvae were randomly sampled from each feeding, individually weighed and returned to the aquaria for determination of growth rate at weekly. At the end of 28th day the larvae were counted and their total length and live weight were measured and data were tabulated. The Specific Growth Rates (SGR) was calculated with the formula: SGR = 100 (lnW2-lnW1)/t, where W1 and W2 are the initial and final weights of the larvae and t is the time in days. The influence of different diets on growth (Final mean weight, SGR, weight gain) were evaluated by analysis of variance and means were compared using Duncan multiple comparisons using SPSS package ver.11.

Results and Discussion

Dissolved oxygen and pH values ranged with in the optimal level (DO: 6.1 mg L^{-1}; pH 7.5-8.2 and water temperature 29±1°C) and there were no significant difference among the experimental groups. The growth performance of the larvae of *C. punctatus* is presented in Table 1. The final mean weight of fish fed plankton with chicken intestine paste had a significantly ($p<0.05$) higher weight (83.8±3.2 mg) and poor growth (69.6±1.5 mg) recorded in larvae fed with plankton with fish paste and (72.8±4.0 mg) in fish paste alone.

The highest SGR was (6.522±0.13%/day) obtained in plankton with chicken intestine paste fed groups, whereas the lowest SGR (6.276±0.07%/day) and (6.299±0.053%/day) were recorded in larvae fed with fish paste alone and plankton with fish paste respectively. The best weight gain (6604±240%) was observed in fish fed plankton with chicken intestine paste whereas lowest weight gain (5628±386%) was obtained in plankton with fish paste. Statistical analysis with regard to SGR and weight gain indicated a significant difference ($p<0.05$) in the SGR between the diet types plankton with chicken intestine, fish paste and plankton alone fed and plankton with fish paste fed groups. However

Table 1: Growth performance of *Channa punctatus* fed with different diets

Diet types	Initial weight (mg)	Final weight (mg)	SGR (%)	Weight gain (%)	Survival rate (%)
Plankton soup	1.25±0.06^{a}	76.3±3.5^{bc}	6.376±0.056^{bc}	6004±280^{bc}	74.16±6^{c}
Chicken intestine paste	1.25±0.06^{a}	79.8±4.0^{ab}	6.445±0.082^{ab}	6284±320^{ab}	36.6±1.44^{d}
Fish paste	1.25±0.06^{a}	72.6±3.0^{c}	6.299±0.053^{c}	5708±240^{c}	34.16±1.44^{d}
Plankton with fish paste	1.25±0.06^{a}	69.6±1.5^{c}	6.276±0.07^{c}	5628±386^{c}	82.50±2.5^{b}
Plankton with Chicken intestine paste	1.25±0.06^{a}	83.8±3.2^{a}	6.522±0.13^{a}	6604±240^{a}	86.6±1.44^{a}

Values with mean in the same column with same superscripts are not different

no significant difference was noticed in the plankton with chicken intestine and chicken intestine fed groups. The survival rate (86.6±1.44%) was significantly higher for fish fed plankton with chicken intestine than in the rest of the diets. The poor survival rate was observed in fish fed on chicken intestine alone (34.16±1.44%) and fish paste alone (36.6±1.44%).

The larvae of *C. punctatus* fed with solid food alone showed a high mortality during the first 7 days. This poor survival of Snake head larvae might be related to poor developed digestive enzyme system as suggested by Dabrowski (1982). Further Dabrowski (1982) reported that many fish larvae do not have enzymes for digesting non-living diets and hence enzymes present in their live prey carry out initial digestion in fish larvae. It is evident from the present results that live zooplankton are the primary requisite for rearing of *C. punctatus* larvae. Furthermore, the present study showed that plankton with chicken intestine paste is an excellent feed for successful rearing of *C. punctatus*. Fermin and Bolivar (1991) reported that *Moina macrocopa* was an excellent zooplankton feed for successful rearing of *Clarias macrocephalus* larvae. In contrast, Knud-Hansen *et al*. (1990) obtained almost 100% mortality after 7 days in *C. batrachus* larvae fed on mixed cladocerans consisting mainly of *Daphnia* sp. and *Moina* sp. when compared to fish reared on *Artemia* and rotifer with nearly 100 and 25% survival, respectively and suggested that the size of the cladocerans as initial feed was too large for *C. batrachus* larvae to ingest. In the present study a combined diet consisting of live zooplankton (Copepod, Cladoceran, Daphnia, *Moina* sp.) and chicken intestine paste improved growth of Snake head larvae. Szlaminska and Przybyl (1986) made similar observations in common carp, *Cyprinus carpio,* larvae fed on mixed diet consisting of zooplankton and dry food for 7 days. Survival of fish, given only solid diets was inferior to those given only live zooplankton alone and combined with solid diets. Based on the present results it is possible to suggest that the live zooplankton or in combination with solid diet could be offered to larvae of *C. punctatus* for better survival. A combination of live zooplankton and solid diet however improve the growth and the survival of the fish.

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