Effect of Certain Feeds on Growth and survival of *Ompok pabo* (Hamilton-Buchanan) Hatchlings in Captive Condition

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**Abstract**– An experiment was conducted in the laboratory of Department of Zoology, Goalpara College, Goalpara, Assam (India) from August/2008 to September/2009 to investigate the effects of certain feeds on growth and survival of *Ompok pabo* hatchlings during nursery rearing. Four different feeds were tested to four batches of hatchling simultaneously which are assigned as T-1: Rice polish & mustard oil cake (1:1), T-2: Boiled chicken egg and filtered zooplankton, T-3: Chopped earth worms only and T-4: Earth worms and dry fish powder. A feeding frequency of 3 times /day was adopted for all the feeds. The highest gain in weight and length of the hatchlings were 0.581 ± 0.035 g and 4.7 ± 0.2 cm respectively in treatment T-3, fed with chopped earth worms only. The hatchlings showed much interest toward the chopped earth worms feed. Highest specific growth rate (SGR) was found to be 13.67 ± 0.05% shown by the hatchlings fed with chopped earthworms. Similarly, higher survival rate (62.5 ± 1.8%) was observed in the hatchlings fed with chopped earthworms. Water quality parameters of all the nursery tanks were found within the suitable range of fish culture. Finely chopped earth worm was found to be the best food for hatchlings rearing of *Ompok pabo*.

**Index Terms**– feeds, growth, survival rate, *Ompok pabo*, hatchlings

I. INTRODUCTION

*Ompok pabo* (Hamilton-Buchanan) commonly known as ‘pabo’ is an Indian freshwater cat fish with good market demands particularly in North-Eastern part of India. It is a delicious, tasty, nutritious catfish having relatively few bones. *Ompok pabo* dwells and breeds in the rivers and reservoirs (Mukherjee et al., 2002). In spite of all these characters, it has not received much attention in aquaculture mainly due to non-availability of information regarding feeding, breeding and culture technique of this important fish species. Over the last few decades, its wild population has undergone a steady decline mainly due to over exploitation, loss of habitat, disease, pollution, siltation, poisoning, dynamite and other destructive fishing.

*Ompok pabo*’s fry are very rare in nature because of many adverse changes in their natural breeding and growing habitats (Hossain et al., 2006). *Ompok pabo* has already been declared as an endangered species (Datta et al., 2003; NBFGR, 2010). So the seed production in captivity will be the only alternative for obtaining optimum quantity of seed for the purpose through induced breeding operation.

The main objective of any hatchery system is to produce maximum number of high quality fish seeds, fry and fingerlings from the available brood stock (Marimuthu and Hanifa, 2007). For propagation of a fish species, knowledge of feeding habit is very essential as it plays a vital role in the growth pattern. Studies of food and feeding habit of fishes have manifold importance in fishery biology (Islam et al., 2004). Food is the main source of energy and plays an important role in determining the population levels, rate of growth and condition of fishes (Begum et al., 2008). Though the proper growth of fish depends mainly upon the quantity and quality of food having all the essential nutrients, there is a limit of maximum growth for fish even if optimum amount of balanced nutrients is provided (Ghosh et al., 2005).

The sustainable culture operation of any fish species requires proper domestication, fry feeding and rearing and culture technique of the species concerned (Sarowar et al., 2010). Growth of an organism can be defined as a change in its size (length and weight) over a period of time. The growth rate in fishes is highly variable and depends upon many environmental factors. Quality of food and its availability is one of the important factor influences growth rate of fishes (Khanna, 1996). The growth of larvae is also influenced by the quality of feed and their acceptability (Sahoo et al., 2010). They revealed that the acceptability of feed depends on the feed type and their particle size, which influence the growth and survival rate during their rearing. In aquaculture, feed is the single most important item since nearly 60% cost is associated with fish feed (Hossain et al., 2011). Food and feeding helps to select such species of fishes for culture which will utilize all the available potential food of the water bodies without any competition with one another but will live in association with other fishes (Begum et al., 2008). Feeding frequency has direct impact on the growth performance and survival of fry and larvae of *Clarias macrocephalus* (Mollah and Tan, 1982). However, the knowledge of the food items of the fish is very important and essential for the stock enhancement through the seedlings release and it will become a guideline for determining the environmental capacity which is useful for the prevention of fish starvation and improvement of their growth after the release (Yamagishi et al., 2005).

*Ompok pabo* is a carnivorous fish; which mostly feeds on small fishes, aquatic insect, insect larvae etc. Apart from these,
earthworm is also a favorite food for this catfish. As per the existing literature on food and feeding habits of \textit{Ompok} genus, it has been found that they are mostly piscivorous or carnivorous in nature (Booth and Alquezar, 2002; Mahmood, 2006). Considering the above realities, the present work was carried out with an aim to find a suitable feed for optimal growth and survival during rearing of \textit{Ompok pabo} hatchlings.

II. MATERIALS AND METHODS

The present experiment was carried out in the laboratory of Department of Zoology, Goalpara College, Goalpara; Assam. The experiment was conducted from August/2008 to September/2009 during breeding season in four earthen tubs. The tubs were rectangular in shape having the diameter of 100 cm with 50 cm depth. Prior to stocking of hatchlings, each of the tubs was cleaned and prepared with all facilities necessary to run the experiment efficiently. In order to facilitate renewal and removal of water concomitantly, an inlet and an outlet was provided with each of the tubs. Each tub was provided with a gentle shower throughout the experimental period. The outlets were covered by nylon net to stop hatchling escape. Pebbles and some aquatic plants such as \textit{Hydriella verticillata}, \textit{Eichhornia crassipes}, \textit{Pistia} etc were given to the rearing tubs for providing natural microhabitat to them. Hatchlings of pabo (\textit{Ompok pabo}) catfish were produced by artificial breeding following the methodology of Bhowmik \textit{et al}. (2000); Mukherjee \textit{et al}. (2002) and Sarkar \textit{et al}. (2005). Earth worms are cultured near the laboratory followed after the methodology of Nagavallema et al. (2004).

In order to study the effect of different feeds on larval growth, a completely randomized design (CRD) with four treatments was followed (Mahmood, 2006; Rahman \textit{et al}. 2008).

Four different feeds were tested. The feeds were assigned to different treatments as:
1. T-1: Rice polish & mustard oil cake (1:1)
2. T-2: Boiled chicken egg and filtered zooplankton
3. T-3: Chopped earth worms only and
4. T-4: Earth worms and dry fish powder.

Ten randomly selected individuals from each treatment were sampled weekly. Five days old larvae were used in the experiment. The physico chemical parameters of tub water were analyzed weekly following the standard method (APHA, 1989). The parameters such as Specific Growth Rate (SGR), Length gain (LG) and Weight gain (WG) were calculated by following the methodology of Brown (1957). This statistical analysis was performed with the help of computer software SPSS programme. SGR (%/day) was calculated using the formula:

$$\text{Log}_{10}\frac{W_{2} - Log_{10}W_{1}}{T_{2} - T_{1}} \times 100$$

Where, $W_{1} =$ The initial life body weight (g) at time $T_{1}$ (day) \\
$W_{2} =$ The final life body weight (g) at time $T_{2}$ (day) \\
Length gain (cm) = Mean final length – mean initial length \\
Weight gain (g) = Mean final length – mean initial length \\
Percentage survival (%) was calculated using the formula=

$$\frac{\text{No of hatchlings alive}}{\text{Total no. of hatchlings stocked}} \times 100$$

III. RESULTS AND DISCUSSION

A. Effect of different feeds on larval growth:

It has been found that \textit{Ompok pabo} is a highly carnivorous fish and an opportunistic cannibal. Similar behavior was also observed during the rearing of \textit{Channa striatus} larvae (Mollah \textit{et al}. 2009). During the experimental period, the hatchlings were found to be very aggressive toward the administered food except the formulated feed. Growth in terms of length and weight of hatchlings at weekly intervals is summarized in table 1. Three replications of treatment I, II, III and IV were stocked with 20 hatchlings each. Similar treatment structure was also taken in case of \textit{Channa striatus} with 40 fry each (Sarowar \textit{et al}., 2010). The initial average weight and length of the hatchlings were $0.013 \pm 0.001$g and $0.8 \pm 0.2$ cm, respectively for all treatments. The final average weight of the fry of treatment I (fed with rice polish & mustard oil cake), II (fed with Boiled chicken egg and filtered zooplankton), III (fed with Chopped earth worms only) and IV (fed with earth worms and dry fish powder) were $0.492 \pm 0.055$ g, $0.512 \pm 0.063$ g, $0.598 \pm 0.065$ g and $0.537 \pm 0.058$ g; while the final average length were $5.0 \pm 0.2$ cm, $5.2 \pm 0.2$ cm, $5.5 \pm 0.3$ cm and $5.3 \pm 0.2$ cm, respectively. The supplied feed was completely finished within few minutes of administration. This illustrates their voracious predatory nature. Similar investigation was also made by Hossain \textit{et al}. (2006) on \textit{Clarias batrachus} larva fed with \textit{Moina} (D-1), chopped \textit{Tubifex} (D-2) and both \textit{Moina} and chopped \textit{Tubifex} (D-3) at 4 hour interval for first 6 days and at 6 hour interval for another 6 days.

The highest gain in weights of the fry were $0.581 \pm 0.035$ g in treatment T-3 (fed with Chopped earth worms only) which is significantly (P>0.05) higher than those of the other three treatments followed by $0.520 \pm 0.033$ g in treatment T-4 (fed with earth worms and dry fish powder), $0.496 \pm 0.031$ g in treatment T-2 (fed with boiled chicken egg and filtered zooplankton) and $0.472 \pm 0.037$ g in treatment T-1 (fed with rice polish & mustard oil cake). Similarly, the highest length gain was found to be $4.7 \pm 0.2$ cm in treatment T-3 which is significantly (P>0.05) higher than the rest of the treatments. The highest percent weight gain (91.64%) and percent length gain (54.30%) was also observed in the fry fed with chopped earthworm only (Table 1). After completion of the experiment, the highest specific growth rate was found to be $13.67 \pm 0.05$% shown by the hatchlings fed with chopped earthworms (Fig. 1) which was significantly (P>0.05) higher compared to those in treatment T-1, T-2 and T-4. According to Mondal \textit{et al}. (2007), growth rate of fish increases with increase in the level of dietary protein till the optimum level is reached. However, the hatchlings fed with formulated feed showed very little interest toward the feed unlike the hatchlings reared with the rest two foods. This might be the reason for the poor growth performance and survival of the hatchlings fed with formulated diet. The fasting hatchlings often showed cannibalistic nature and fed on their siblings. Boonyaratpalin \textit{et al}. (1985) described cannibalistic predation of snakeheads under confined condition during the state of starvation which coincides with that of the present result. A feeding frequency of 3 times/day was adopted during the present experiment to avoid water deterioration and easy managements. Feeding frequency has direct impact on the growth performance
and survival of fry and larvae of *Clarias macrocephalus* (Mollah and Tan, 1982). They found that a feeding frequency of 3 times/day was best for rearing the fry and larvae of *Clarias macrocephalus*.

**B. Water quality parameters**

Water temperature, dissolved oxygen and pH during the fry rearing period in the rearing tubs were found within the desirable range according to Boyd (1979) and Rahman et al. (1982). There was no indication of the adverse effect of water quality parameter on the existence, growth and survival of *Ompok pabda* fry and fingerlings. The levels of physico-chemical parameters recorded from the experimental tubs of four treatments are summarized in Table 2. Higher water temperature (31.0 °C) was measured in T-3 and lowest (30.5 °C) in T-1. However, no significant (P > 0.05) differences were recognized among the treatments. Rahman et al. (2008) observed almost similar types of temperature variation in nursery rearing of *Ompok pabda* fingerlings. Water pH was significantly (P < 0.05) highest in T-4 and lowest in T-3. However, the range was found to be suitable for fish growth. The mean dissolved oxygen (DO) concentrations were significantly (P < 0.05) higher in T-2 (10.12 mg l⁻¹) than rest of the three treatments. Higher level of DO might be due to continuous flow of water during the rearing period. Mean free CO₂ value was found between the ranges of 2.2 and 4.4 mg l⁻¹, but no significant (P > 0.05) differences were observed amongst the four treatments. Similar highest FCO₂ value was recorded by Mondal et al. (2007) during rearing of *Labeo rohita* fingerlings. Mean total alkalinity differences among the four treatments were not statistically significant (P > 0.05). Mean total hardness was significantly (P < 0.05) highest in T-2 and lowest in T-3. Mean chloride level was found significantly (P < 0.05) higher in T-4, while it was lowest in T-2. However, the value of total alkalinity, hardness and chloride were within the suitable ranges for fish production and survival (Boyd, 1979).

**C. Survivality of the hatchlings**

The survival rates were found to be 51.4 ± 1.2%, 56.7 ± 1.5%, 62.5 ± 1.8% and 58.2 ± 1.3%, respectively in T-1, T-2, T-3 and T-4 (Fig 2). Significantly (P<0.05) higher survival rate was observed in the hatchlings fed with chopped earthworms than rest of the three treatments. Stocking density is known to be one of the important parameters in fish culture, since it directly effects growth and survival, and hence production (Backiel and Leeren, 1978). Haylor (1992) observed that the growth rate of African catfish (*Clarias gariepinus*) larvae was significantly influenced by the density at which they were stocked. However, in the present study the stocking density was found to be suitable without any affect.

The trash fish of *Rasbara* sp., *Puntius* sp., hatchlings of Indian Major Carps are found to be best food for the *Ompok pabda*. A number of researchers have recommended live *tubificid* worms as the best food for rearing of larvae and fry of several fishes (Mollah and Nurullah, 1988; Gheyas, 1998 and Akter et al., 2001). Live-food has been the most useful feed for rearing of fry of *Coregonus lavaretus* (Mahmoudzadeh, 2009). According to Hecht and Appelbaum (1987), the juveniles of *Clarias gariepinus* preferred live feed rather than formulated feed. In the present study, *tubificid* worm is replaced by live earth worm due to its high protein content comparing to that of *tubificid* worm. The percentage composition of protein in earth worm is 67.68% (Kumar et al., 2007); while in live *tubificid* worm it is 32.13% (Sarowar et al., 2010). In *Ompok pabda*, formulated feed with the addition of piscimix helps to combat mortality, enhances survival rates and allows larger growth (Mukherjee et al., 2002). In *Clarias batrachus*, the artificial feed was prepared with a mixture of molluscan meat (70%), egg (20%), soybean cake (10%) and vitamin B premix (500mg / kg feed) and then applied in the form of dough balls (Mahapatra, 2004).

**Table 1:** Growth performance and of *Ompok pabda* hatchlings after 4 weeks of rearing; mean ± SD with range in parentheses

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T-1</td>
</tr>
<tr>
<td>Initial length (cm)</td>
<td>0.8 ± 0.2</td>
</tr>
<tr>
<td>(0.6-1.0)</td>
<td>0.6-1.0</td>
</tr>
<tr>
<td>Final length (cm)</td>
<td>5.0 ± 0.2</td>
</tr>
<tr>
<td>(4.7-5.2)</td>
<td>(4.8-5.4)</td>
</tr>
<tr>
<td>Initial weight (g)</td>
<td>0.013 ± 0.001</td>
</tr>
<tr>
<td>(0.012-0.015)</td>
<td>(0.012-0.015)</td>
</tr>
<tr>
<td>Final weight (g)</td>
<td>0.492 ± 0.055</td>
</tr>
<tr>
<td>(0.438-0.547)</td>
<td>(0.454-0.572)</td>
</tr>
<tr>
<td>Weight gain (g)</td>
<td>0.472 ± 0.037</td>
</tr>
<tr>
<td>(0.463-0.509)</td>
<td>(0.486-0.527)</td>
</tr>
<tr>
<td>Length gain (cm)</td>
<td>4.2 ± 0.3</td>
</tr>
<tr>
<td>(4.0-4.4)</td>
<td>(4.2-4.6)</td>
</tr>
</tbody>
</table>

**Table 2:** Mean values (± SD) of water quality parameters of weekly samples over the four weeks experiment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T-1</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>30.5 ± 0.53</td>
</tr>
<tr>
<td>(0.6-1.0)</td>
<td>0.61</td>
</tr>
<tr>
<td>pH</td>
<td>8.1 ± 0.1</td>
</tr>
<tr>
<td>Dissolved oxygen (mg l⁻¹)</td>
<td>9.76 ± 0.84</td>
</tr>
<tr>
<td>Free CO₂ (mg l⁻¹)</td>
<td>2.2 ± 0.44</td>
</tr>
<tr>
<td>Alkalinity (mg l⁻¹)</td>
<td>90 ± 8.0</td>
</tr>
<tr>
<td>Hardness (mg l⁻¹)</td>
<td>57 ± 4.8</td>
</tr>
<tr>
<td>Chloride (mg l⁻¹)</td>
<td>8.77 ± 1.24</td>
</tr>
</tbody>
</table>

Haylor, G. S (1992) Controlled hatchery production of

EFERENCES

[25]

[23]

Bangladesh J. Fish., 11(2), pp. 9-14.


REFERENCES


IV. CONCLUSION

From the above experiment, it can be concluded that the hatchlings fed with chopped earthworms have showed significantly highest growth (% SGR) and survival rate among the four treatments. Therefore, finely chopped earthworm is the best food for Ompok pabo hatchlings up to a stockable size. The findings of this experiment can help the farmers a lot in rearing and culture of this endangered species in captive condition.

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Fig 2: Comparison of survival rate (%) of hatchlings during 28 days experimental periods.

Fig 1: Comparison of specific growth rate (SGR %) of hatchlings during 28 days experimental periods.


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