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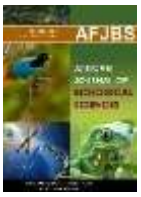

An Investigation into The Feeding Habits and Dietary Preferences of *Heteropneustes fossilis* the Air-Breathing cat fish

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Abstract: The goal of the current study was to evaluate the suitability of several diets for *Heteroneustes fossilis* in a laboratory setting. *Heteropneustes fossilis* were collected from Sarua Lake located at Gorakhpur for this study and kept for two days in a big rectangular aquarium for acclimatization. Thirty fish were used in the feeding study, which lasted 30 days. The fish were kept in cement aquaria of 54×36×36 cm3, each holding 30 L of water, and their minimum and maximum lengths were 92.7 and 101.2 ± 2.3 mm and their weights were 3.2 and 5.7 ± 0.45 gm respectively. Three separate feeding trials were conducted: one for tubifex, one for commercial pellet feed, and one for a mixed diet consisting of food prepared with dried fish flour, dried prawn flour, wheat flour, and mustard oil cake, along with a vitamin B complex. The fish were given food twice a day until they were satisfied. In comparison to other diets, the fish fed a mixed diet along with tubifex diet had considerably better outcomes in terms of length. Throughout the trial periods, water quality measurements were tracked and through this study we found that *Heteropneustes fossilis* fish benefit from a mixed diet without tubifex diet.

Keyword: *Heteroneustes fossilis*, Tubifex, mixed diet, commercial pellet feed

Introduction: The Asian stinging catfish, *Heteroneustes fossilisis*, is a valuable and commercially important native fish species. It has a high market value and is widely accepted among consumers (Rahman et al.,2013),. The species has a high iron content (226 mg 100 g-1) and relatively high calcium content compared to other freshwater fishes (Saha and Guha, 1939). This fish for sick and convalescent patients due to its excellent nutritional content (Kohli and Goswami ,1989). This lean fish is ideal for those who avoid animal fat (Rahman et al.,1982). *Heteroneustes fossilisis*, a native species, is under peril due to poor water management, overexploitation, illicit fishing, and ecological changes in its habitat (Chakraborty, 2010). It's important to focus on the culture of native species because of their nutritional, economic, and biological value. Previously, seed scarcity was a major issue for cultivating this species, but the situation has since improved. Many hatcheries have been developed across the country, generating enough fingerlings to sustain aquaculture operations. A baseline assessment identified 59 hatcheries producing *Heteroneustes fossilisis* in Jessore. The survey also identified some major problems in *Heteroneustes fossilis* is hatchery such as brood source, sudden change of larval feed and catching method. Generally, the hatchery owner use tubifex as larval feed whereas, the farmer use commercial feed during culture due to higher rate of tubifex. The larval growth remains good at hatchery due to use of live feed but due to sudden change of food types in culture pond, the constant growing rate of the larvae is hampered and farmers do not get satisfactory growth. So, it is essential to understand better feed compared to tubifex. Data on growth and survival can help understand how animal food and commercial diets affect first-feeding fish. In this study, we used growth and survival dates to assess the impact of animal food and commercial diets on the initial feeding of shinghi (*H. fossilis*). Previously, seed scarcity was a major issue for culturing this species. However, the situation has improved with the establishment of numerous hatcheries across the country producing enough fingerlings for

aquaculture. The hatchery owner typically uses tubifex as larval feed, while farmers use commercial feed due to its higher rate of tubifex. It's important to learn which feed is better than tubifex. Accurate understanding of food and feeding is crucial to aquaculture practices in order to maximize the yield of cultivated fish. The findings of an inquiry on the diet and feeding behaviours of air-breathing fish in their natural habitat are presented in this paper.

Materials and Methods: To investigate the food and feeding habits of *Heteropneustes fossilis* 30 samples were examined, collected from Sarua Lake, District Gorakhpur during March to July 2024. The fishes were collected by different nets upon collection of the fish; the data on various parameters like weight and length of the body were noticed on battery operated scale in grams and mm respectively. It took place in a 54 × 36 × 36 cm3 tank at St. Andrew's College in Gorakhpur, Uttar Pradesh, India. The fish were conditioned in a big aquarium in a wet fish laboratory for two days before the experiment began.

Before stocking fish, tanks were cleaned, dried, and equipped with necessary amenities for efficient experimentation. Each tank was equipped with a submerged filter and air diffuser. The submerged filter kept the water pure. Approximately 3/4 of the water was changed once a week. Siphoning was used to interchange water and eliminate wastes and uneaten feed on a daily basis. Dirt adhered to the aquarium walls and shelter pipe was cleaned once a week. Continuous aeration was maintained for raising throughout the experiment. During the experiment, water temperature, dissolved oxygen (DO), and pH levels in the fish rearing system were constantly evaluated.

A digital DO meter was used to test the dissolved oxygen (DO) in the water, a portable PH meter was used to assess the pH, and a Celsius thermometer was used to measure the

temperature. Every parameter was the same, and there was no discernible difference between the various treatments (Table 1)

Table 1 : Water quality parameter (mean± SD) of different treatment

Parameters		Treatments	
	Tubifex	Comm. pellet feed	Mixed diet
DO (mg/L)	5.8±0.4	5.48±0.53	6.1±0.48
pH	8.6±0.8	8.1±0.7	8.3±0.16
Temperature (0C)	29.6±0.46	29.1±0.67	29.3±0.47

Shinghi (*Heteropneustes fossilis*) were supplied in aquariums (54 × 36 ×36 cm3) with 30 L of water at a stocking density of 10 per aquarium. Their initial minimum and maximum lengths were 92.7 and 101.2 ± 2.3 mm,, respectively, and their initial weights were 3.2 and 5.7 ± 0.45 gm. The Shinghi were given three different kinds of feed during the study period: commercial feed, mixed diet, and Tubifex. Each treatment was repeated three times, and the fish were raised for thirty days.

At their satiation level, they were fed twice a day at 10.30 am and 5.30 pm. Using a plastic tubing, the uneaten feeds and excrement in the tank were emptied before adding new feed for the subsequent feeding.

For the duration of both trials, fish growth was recorded every seven days. The fishes' growth was assess during the following measures. Using a scoop net, five fish were randomly selected from each aquarium for sampling, and each fish's length and weight were recorded afterward. An

electric balance and a measuring scale were used to determine the weight and length. Weight gain of the larvae was calculated by the following formula (Sandifer and Smith, 1974),

Weight gain= Mean final weight (g) - Mean initial weight (g)

The arithmetic mean ± standard deviation (SD) is used to report data.

Result: Three different sorts of feed combinations were utilized to determine what fish food was. Following a four-week feeding trial, it was observed that *H. fossilis* could be fed a mixed diet without experiencing appreciable changes in growth metrics as compared to those fed a tubifex diet, measured length 100.03±2.40 mm and weight 7.01±1.88 g, fed commercial diet, the fish measured 97.96±2.68 mm in length and 6.12±1.11 gm in weight and those fed mixed diet, the fish measured 100.44±2.58 cm in length and 7.26±1.61 gm in weight (Figure 1, 2), provide a comparison of the three treatments with regard to weight gain and specific growth. During the feeding study period, no deaths were reported. The outcome also revealed that the fish that were fed with commercial food only there growth and weight gain were less than tubifex food and mixed food while the mixed food revealed higher growth and weight gain than other two foods.

Three feed combinations were tested to determine fish food. After a four-week feeding trial, *H. fossilis* showed no significant growth differences when fed a mixed diet versus tubifex alone. The mixed diet resulted in a length of 100.44±2.58 mm and 7.26±1.61 gm in weight, similar to the tubifex diet's length 100.03±2.40 mm and weight 7.01±1.88 g, (Figure 1, 2). Throughout the feeding trial, no deaths were recorded. The study indicated that fish fed exclusively with commercial feed had low development.

Figure 1. Cumulative growth of *H. fossilis* larva in terms of length during the study period (data are expressed as mean ± SE.

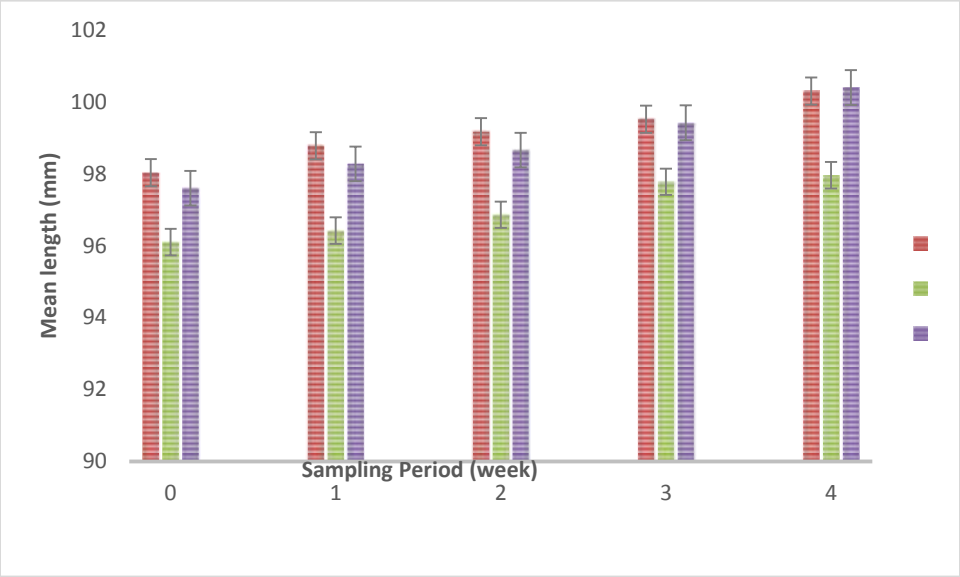
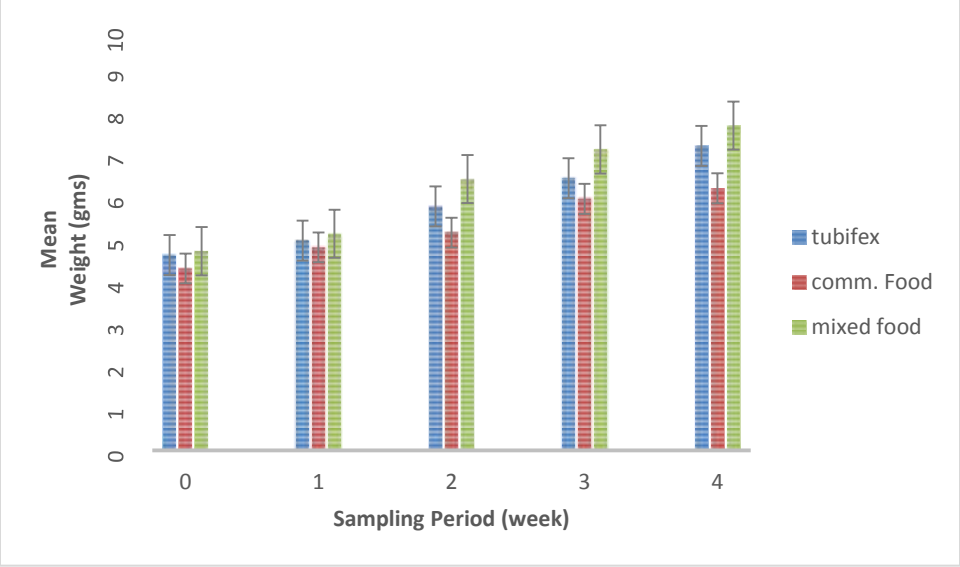


Figure 2. Cumulative growth of *H.* fossilis larvae in terms of weight during the study (data are expressed as mean ± SE



Discussion: The water quality parameters for growing *Heteropneustes fossilis* fish did not significantly alter during the experiment. Each tank was equipped with a submerged filter and air diffuser. The writers (Boyd, 1982; Jhingram and Pullin, 1985; Rahman et al., 1982) agree that the water temperature, pH, dissolve oxygen, and ammonia levels were within acceptable limits. Temperature has a significant impact on the physical, chemical, and biological properties of water bodies. Water chemistry is heavily influenced by its pH level.

Sudden fluctuations lead to the mortality of many aquatic organisms. While low pH, lowers ammonia toxicity (Whitfield, 1974), it can also mobilise metals like iron and aluminium, resulting in lower yields in aquaculture ponds (Simpson et al., 1983). According to Alasbaster and Lioyd (1980), low pH can lower natural productivity by limiting nutrient availability. The pH of the water in this investigation was within a productive range. Dissolved oxygen level of 7.0 mg/L is optimal for fish culture, while a range of 3.0-5.0 mg/L is unproductive (Banergea,1967). Fish cultivation requires dissolved oxygen levels between 4.5-9.9 mg/L (George ,1961),. The optimal DO range for fish culture is between 7.2 and 12.5 mg/L (Ali et al.,1982). The DO levels in this study ranged from 6.9 to 8.9 mg/l. Water quality parameters, including temperature, pH, and DO, were optimal for *Heteroneustes fossilis* in all treatments.

Catfish are typically grown semi-intensively in India, with additional feed consisting of rice bran and oil cake. The growing interest in intensive fish culture highlights the need for cost-effective diets. Evaluating locally available, low-cost feeds for nutrient content and digestibility is crucial for effectively incorporating them into fish diets. The proximate composition of feedstuffs used in the present study is similar to the values reported in earlier publications (Jafri et.al.1992; NRC, 1993).

Figures 1 and 2 show that fish fed a varied diet performed best in terms of growth. In a experiment with *Clarias gariepinus* juveniles, a mixed diet was more effective for fish growth than tubifex feed (Hecht and Appelbaum, 1987). Non-living feeds (fish meal and wheat flour) were unsuitable for *Heteropneustes fossilis* larvae (Haque and Barua ,1989). However, live food (tubificid worms) resulted in the best development and survival.

The current investigation found that combination feeding performed better than commercial or tubifex feeding alone. *Heteropneustes fossilis* fish are primarily carnivorous, meaning they prefer animal feed. Fish fed a tubifex diet are expected to grow at the greatest growth rate. However, this study yields unique and intriguing results. Variations in food can boost taste and demand, leading to increased growth.

Conclusion: This study aimed to examine the eating habits of *Heteropneustes fossilis*. Diet modification significantly affected fish growth throughout a 30-day trial period. Tubifex fed food resulted in consistently higher growth compared to commercial diet. Tubifex is pricey and unavailable in the local market. The current study aimed to compare diets. The mixed diet resulted in similar fish growth as the tubifex diet. This mixed diet can provide as an alternative feed in *H. fossilis* cultivation.

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Conflicts of Interest:

The authors declare that there is no conflict of interest regarding the publication of the present paper.

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