

## Effect of carp PG doses on induced breeding of Shing, *Heteropneustes fossilis* (Bloch)

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### Abstract

Five hormone doses *viz.* 25, 50, 75, 100, and 125 mg of carp PG/kg of body weight of the recipient fish were tested and they were designated as T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, and T<sub>5</sub> respectively. Significantly higher fertilization (98%) and hatching rates (38%) were obtained from T<sub>3</sub> (75 mg of carp PG extract/kg body weight). While T<sub>4</sub> (100 mg of carp PG extract /kg body weight) and T<sub>5</sub> (125 mg of carp PG extract /kg body weight) gave the highest (90%) ovulation rate. In June and July the highest fertilization rate of 96 and 96.4% respectively and hatching rate 42.5 and 48.7% respectively were obtained. In over all consideration carp PG extract at a dose of 75 mg/kg body weight appears to be the suitable dose for induced breeding of *H. fossilis* and June and July are the suitable time for its induced breeding.

**Key words:** Induced breeding, PG, *H. fossilis*

### Introduction

Of the endemic catfishes, shing is a popular and highly priced fish in Bangladesh. It is considered to be a highly nourishing, palatable and tasty fish. These fishes are well-adapted to adverse ecological conditions in swamps, marshes and derelict waters which are mostly shallow and characterized by heavy silt load with decaying vegetation and organic matter coupled with poor nutrient release.

During the past few years, the natural population of this catfishes has been rapidly decreasing due to various man-made and natural causes. Moreover, natural breeding grounds of this fish are also under threat due to drying up of the low lying areas and indiscriminate use of fertilizers and pesticides. If appropriate measures are not taken immediately there is every possibility the existence of this important endemic catfish species will be threatened. There is no other alternative but to develop induced breeding technique of this species to overcome the catastrophe. Pal and Khan (1969), Khan (1972a and b), Thakur *et al.* (1974 and 1977) and Saha *et al.* (1998) provided some basic information on the induced breeding of *H. fossilis*. with a view to achieve success in mass production of *H. fossilis* seeds, the present investigation was undertaken to find out appropriate dose of carp pituitary hormone (PG) for successful induced breeding of the species and to find out its peak breeding season.

## Materials and methods

Male and female brood fishes were collected from the local fish market from December'96 to March'97 and were stocked in earthen ponds at a density of 20,000 fish/ha. The fishes were fed twice a day with a supplemental feed formulated from locally available ingredients containing fish meal (40%), mustard oil cake (20%), rice bran (20%), wheat bran (15%), molasses (4%) and Vit. Premix (1%) at the rate of 5-6% body weight in the morning (09:00 AM) and afternoon (16:00 PM). Only fully mature fishes were selected for induced breeding and brought to the hatchery in batches. Fishes were injected with five different doses of carp pituitary gland extract *viz.* 25, 50, 75, 100 and 125 mg/kg body weight and the treatments were designated as T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> respectively. In all the treatment groups 10 mature females were injected with a single dose of carp PG extract. After a latency period of 8-10 h, the eggs were stripped out and fertilized with milt from macerated testes of a single male. In each trial the eggs stripped from a female were divided into three sub-samples of about 200 eggs per sub-sample. The eggs were then incubated in plastic sib (20 cm diameter) with nylon meshed bottom, placed in shallow cement cisterns, having continuous water flow (0.5 l/minute).

The numbers of live eggs in each batch were estimated 2-3 h after fertilization. Hatching was considered to be successful if the sac emerged from the egg envelope. Hatching, mortality and deformity were also recorded regularly. Water temperature during the breeding and incubation period was recorded by a Celsius thermometer. Data on ovulation, fertilization and hatching were also recorded to evaluate the effects of different doses of carp PG on breeding success of *H. fossilis*.

Pertinent data were subjected to necessary Arcsin and Logarithm transformation and analyses by one way analysis of variance (ANOVA). The data on fertility, hatchability, deformity were further tested to assess significant difference between treatment groups using Duncan's New Multiple Range Test (DNMRT). Necessary statistical analysis were performed after Zar (1996)

## Results and discussion

Induced breeding trials of *H. fossilis* with five doses of carp pituitary gland (PG) extract showed significantly higher ( $P < 0.05$ ) ovulation at T<sub>4</sub> and T<sub>5</sub> containing carp PG extract of 100 and 125 mg/kg body weight respectively. Where as significantly lower ( $P < 0.05$ ) ovulation rate was observed at T<sub>3</sub> having carp PG extract of 75 mg/kg body weight, PG (Table 1). However, the fishes did not ovulation with 25 and 50 mg of carp PG extract/kg body weight (Table 1). This agrees with the findings of Jhingran (1991), and Munshi and Hughes (1992) who recommended carp PG extract dose at 150-200 mg/kg body weight for economic breeding of *H. fossilis*. The effect of hormone dose on fertilization and hatching rate of eggs was significant. T<sub>3</sub> gave the highest ( $P < 0.05$ ) fertilization and hatching rate followed by T<sub>4</sub> and T<sub>5</sub> (Table 1). The results agree with the findings of Pal and Khan (1969), Khan (1972a and b) and Saha (1998). However, in case

of *Clarias batrachus*, the fertilization and hatching rate of eggs were reported by Naser *et al.* (1990) to be 51 to 96% and 42 to 81%, by Das *et al.* (1992) to be 40 to 90% and 25 to 75%, by Ahmed and Kabir (1985) to be 55 to 95% and 20 to 70% respectively. While Rahmatulla *et al.* (1983) reported the percentage of fertilization of eggs of the same species to vary from 50 to 90%.

Month to month variation in the rate of ovulation, fertilization, hatching deformity and mortality of eggs was significant ( $P < 0.05$ ) of *H. fossilis* (Table 2). Ovulation rate was the highest in May (87%) which declined in June (81%) but exhibited a pronounced pick in July (84.8%) and then decreased in August (80%) (Table 2).

**Table 1.** Effect of different doses of carp PG extract on ovulation, fertilization and hatching rates

Treatments	Dose of carp PG extract (mg/kg body weight)	No. of female induced	Ovulation response	Ovulation (%)	Fertilization (%)	Hatching (%)
T <sub>1</sub>	25	10	Not ovulated	-	-	-
T <sub>2</sub>	50	10	Not ovulated	-	-	-
T <sub>3</sub>	75	10	Ovulated	80 <sup>b</sup>	98.0 <sup>a</sup>	38.0 <sup>a</sup>
T <sub>4</sub>	100	10	Ovulated	90 <sup>a</sup>	96.5 <sup>b</sup>	37.2 <sup>b</sup>
T <sub>5</sub>	125	10	Ovulated	90 <sup>a</sup>	92.3 <sup>c</sup>	28.1 <sup>c</sup>

**Table 2.** Monthly variation in the percentage of ovulation, fertilization, hatching, deformity and mortality of eggs of *H. fossilis* as recorded during the experimental months

Parameters	Month			
	May	June	July	August
Dose of carp PG extract (mg/kg body weight)	75-100	75-100	75-125	75-125
Number of fish induced	15	22	33	25
Weight (gm) of the experimental females	35-70	40-90	40-110	40-140
Ovulation (%)	86.6 <sup>a</sup>	81.0 <sup>c</sup>	84.8 <sup>b</sup>	80.0 <sup>d</sup>
Fertilization (%)	94.6 <sup>b</sup>	96.0 <sup>a</sup>	96.4 <sup>a</sup>	93.3 <sup>c</sup>
Hatching (%)	37.8 <sup>c</sup>	42.5 <sup>b</sup>	48.7 <sup>a</sup>	38.2 <sup>d</sup>
Deformity (%)	28.5 <sup>a</sup>	21.5 <sup>c</sup>	18.6 <sup>d</sup>	26.8 <sup>b</sup>
% of mortality (up to 5 <sup>th</sup> day)	33.3 <sup>c</sup>	42.5 <sup>a</sup>	36.8 <sup>b</sup>	31.9 <sup>d</sup>

The highest fertilization percentage (96%) was obtained in July and June while the lowest (93%) in August. The highest hatching rate (48.7%) was recorded in July while the lowest (37.8%) in May (Table 2). The results of the present experiments indicated that June and July are the peak season for induced breeding of *H. fossilis*. Similar findings on induced breeding of *H. fossilis* was obtained by Bhatt (1968), Jhingran (1991), Kuddus *et al.* (1997) and Saha (1998) and in the induced breeding of *C. batrachus* by Das

*et al.* (1992). The highest (28.5%) and the lowest (18.6%) deformity was recorded in May and July respectively. However, the highest deformity as recorded in May was found to decrease gradually till July (19%) and again increasing in August (27%). Significantly higher (42.5%) mortality was found in June followed July (36.8%), May (33.3%) and August (31.9%).

Result of the present study indicate that carp pituitary gland extract (PG) at a dose of 75 mg/kg body weight gave the highest percentage of fertilization and hatching while the same hormone extract at the doses of 100 and 125 mg/kg body gave the highest percentage of ovulation. In over all consideration Carp PG extract at the rate of 75 mg/kg body weight appears to be the suitable dose for its induced breeding of *H. fossilis* and the present findings may serve as a basis for the induced breeding of similar cat fishes in Bangladesh.

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