

## HATCHERY OPERATION OF THAI KOI (*ANABAS TESTUDINEUS*) IN A FRESHWATER FISH FARM IN BANGLADESH

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### ABSTRACT

Hatchery Operation of Thai koi (*Anabas testudineus*) was investigated to understand the quality seed production technique and cost-profit of the hatchery. The study was conducted in April, 2012 in Talukdar Fish Farm, Mymensingh, Bangladesh. Hatchery operation mainly divided into – breeding unit and culture unit. Water quality parameters in brood stock pond and breeding tank was optimum. Seed production through induced breeding is the main feature of the hatchery. Single dose of Pituitary Gland (PG) extract was used. PG was injected at the rate of 6-8 mg/kg body weight of the female broods and 2-3 mg/kg body weight was injected to the male broods. Sex ratio was maintained as 1:1. Inbreeding problem was strictly avoided. Females spawned approximately 7-8 hours after injection and fertilized eggs hatched within 24-36 hours. Total cost of the hatchery was 1200000 BDT and net profit was 660000 BDT. The source of profit runs as hatchery 70% and culture 30%. The study may be useful for the proper management of Thai koi hatchery in Bangladesh.

**KEYWORDS:** Cost-profit, Hatchery operation, Induced breeding, Thai koi, Water quality,

### INTRODUCTION

In Bangladesh there are 266 freshwater fish species and 15 exotic species (Department of Fisheries, 2012). Thai koi (*A. testudineus*) is an exotic species in Bangladesh. The fish is called climbing perch since it can wander across land to find new habitats. The Freshwater Station of BFRI has developed the induced breeding technique of exotic Thai koi- a strain of koi (Kohinoor and Zaher, 2006). Presently, Thai koi is getting more popularity than our native strain as the growth rate of Thai koi is much higher. This fish attains 80-100 g size within 3-4 months. It was first brought in Bangladesh in 2000 by Talukdar Fish Farm in Rupganj. In 2002, private entrepreneur's imported first growing koi strain seed from Thailand. Optimum result was obtained in induced breeding of Thai koi by Nurul Haque, Brahmaputra Fish Seed Complex, Shamvuganj, Mymensingh (Waheduzzaman *et al.*, 2010). So far, in Bangladesh there is little information on the hatchery operation of Thai koi. The objective of the study was to know the seed production technique of Thai koi through induced breeding and cost-profit analysis of the farm.

### MATERIAL AND METHOD

#### Research area

The research work was conducted in a fish farm named Talukdar Fish Farm situated at Shambhuganj, Mymensingh, Bangladesh. The culture technique of this farm is scientific. Mostly they are prominent for breeding and culturing Thai koi. The geographical location of the study area is shown in Figure 1.

#### Brood fish collection

Brood fish were selected from two different ponds for avoiding inbreeding. One is from Narsingdi and another from farm's pond. For this research, the male fish were used ranging from 50.0 to 60.0 gm in weight. On the other hand, female fish were larger in size and weight ranging from 100.0 to 120.0 gm in weight. Broods were collected from the brood rearing ponds with a cast net at 5:00 pm on the day of breeding trails.

#### Conditioning

The ready females and males are transferred to the different rectangular tank for conditioning, No feed was provided during the period of conditioning.

#### Water quality monitoring

Various water quality parameters such as temperature (<sup>0</sup>C), dissolved oxygen (ppm), pH were recorded by using Celsius thermometer, HACH pH taste kit, HANNA DO meter respectively.

#### Hormone (PG extract) preparation

Kuddus (brand name) PG extract was weighed by balance and then ground by mortar and pestle manually with very small amount of water.



Figure 1 Map showing the geographical location (filled arrow) of the research area

### Breeding of Thai koi

The PG extract was injected into the muscular basal part of the pectoral fin. Needle was inserted at an angle of 45° with the body. After injection, both the males and females were shifted to breeding tank filled with 30 cm of water (10ft / 8ft) at 1:1 ratio. Artificial aeration was provided continuously. The adults were removed from spawning tanks after fertilizing eggs and water depth increased to 50 cm.

### Data analysis

Data was collected carefully recorded and analyzed by using Microsoft Office 2007 version.

## RESULT AND DISCUSSION

### Brood selection and induced breeding

For successful hatchery operation, brood selection is important one. If it is not done properly, it must create problem into production rate. Suitable criteria for identification of male and female fish of Thai koi are shown in Table 1.

Table 1. Criteria for identification of male and female broods of Thai koi

Criteria	Male	Female
Size	Small (average wt. 30-35 g)	Large (average wt. 80-100 g)
Abdomen	Normal	Bulging and soft
Body shape	Slender	Robust
Pectoral fin	Inner side rough	Inner side smooth
Gentle pressure on abdomen	Whitish milt come out through the genital pore	Eggs come out through the genital pore

During the study both male and female fish received single dose of PG. The hatchery obtained best result by using 6-8 mg/kg body weight of female broods and 2-3 mg/kg body weight of male broods in respect of fertilization and hatching. After 7-8 hours of injection ovulation occurred. The fertilized eggs hatched within 24-36 hours and yolk sac absorbed within 3-4 days.

Fish pituitary gland (PG) extract and Human Chorionic Gonadotropic (HCG) hormone are usually used for artificial induced breeding of endemic and exotic carps (Sarder, 2007). Present finding is same as Waheduzzaman *et al.* (2010) because the studied hatchery follows the same PG doses as it was successful in their study experiment. But it is reported that PG dose 12 mg/kg for female and 6 mg/kg for male also give the best result in respect of fertilization and hatching rate (Mahmood, 2003; Kohinoor and Zaher, 2006; Saha *et al.*, 2009). The optimum dose of PG for female is 3-4 mg/kg and for male it is 2 mg/kg and the ovulation occurs within 9-12 hours (Sarder, 2007).

### Water quality

Water quality parameters were recorded daily during the study period. Range of different water quality parameter of brood stock pond and breeding tank is shown in Table 2.

**Table 2. Water quality parameters during breeding period**

Parameters	Range	
	Brood stock pond	Breeding tank
Temperature (°C)	28.0-30.0	28.0-30.0
DO (ppm)	4.5-6.0	5.0-6.5
pH	7.5-8.0	7.3-8.2

The maintenance of a healthy aquatic environment and production of food organism is greatly influenced by environmental parameters (Hossain *et al.*, 2012). Suitable water quality is the most important factor for keeping healthy koi in brood stock and grow-out ponds. The metabolism of the pond ecosystem as well as fish life is affected by temperature (Vaishali *et al.*, 2012). The fishes from family Anabantidae grow well in temperature of water between 25-30°C (Muhammad, 2008). Moitra *et al.* (1979) recommended an optimum ambient temperature of 28.6±1°C for breeding under laboratory conditions. The water quality parameters such as water temperature, dissolved oxygen (DO) and pH ranges 26.0–29.5°C, 6.5–8.4 mg/L, and 6.9–8.4 respectively (Hossain *et al.*, 2012). The water quality parameters such as temperature were ranged from 27.5 to 29.9°C; pH from 7.8 to 8.7; and DO for 5.1 to 6.2 mg/L (Karim *et al.*, 2009). The DO in water influences the metabolism of the fish (Vaishali *et al.*, 2012; Shivayogimath *et al.*, 2012). DO level for climbing perch culture has been reported between 4 to 6.8 mg/L (Muhammad, 2008) and 5.5 to 6.2 mg/L (Alam *et al.*, 2010). The pH of water for the climbing perch culture has been reported between 6.5-6.9 (Muhammad, 2008); meanwhile, the normal pH for aquaculture was 6.5-9 (Rosli *et al.*, 2010). In the present study all the studied parameters were found to be within the acceptable level for Thai koi breeding and culture management.

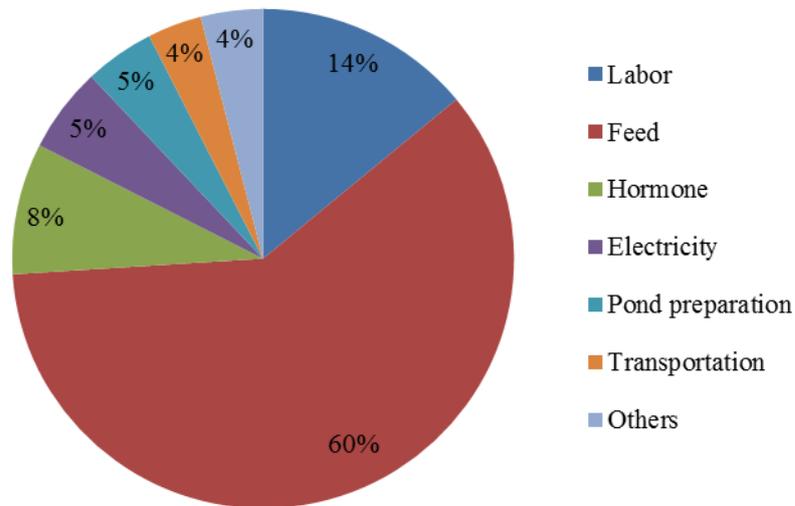
### Cost – Profit analysis

Although the hatchery got a good production but they need to invest a large amount of money to manage hatchery operation scientifically. During the study period in the year 2012 the cost of the hatchery in different sectors was recorded. Total cost and profit of the farm is presented in Table 3.

**Table 3. Cost-profit analysis of the farm**

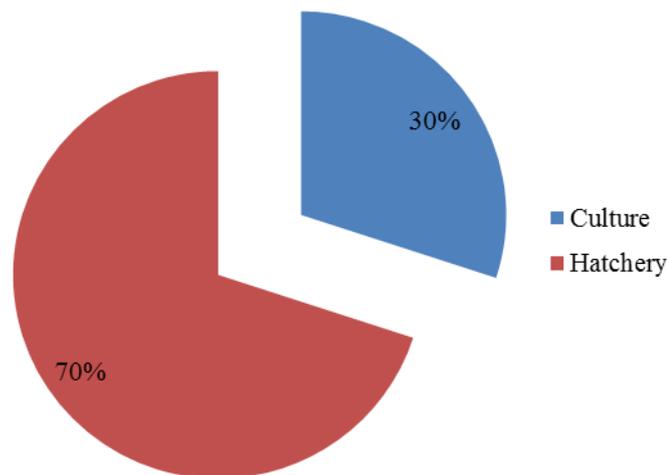
Expenditure (BDT)		Income (BDT)	
Labor	168000	Gross income	1860000
Feed	720000		
Hormone	102000		
Electricity	66000		
Pond preparation	54000		
Transportation	42000		
Others	48000		
<b>Total</b>	<b>1200000</b>	Net profit	<b>660000</b>

Highest cost required to feed the broods, culture and nursing of Thai koi. Lowest cost was required to transport broods, fry, feeds etc. Other sectors of investment were as labor, hormone, electricity, pond preparation and others. Total investment (%) in different sectors in 2012 is compared in Fig. 2.



**Figure 2. Cost (%) of the farm**

The hatchery profits yield from two sectors viz., hatchery and culture. Total net profit of the farm was 660000 BDT. A total of 462000 BDT (70%) of the net profit comes from the hatchery sectors by selling quality seeds of *A. testudineus*. The culture sector yields 198000 BDT which is 30% of the net profit. There is huge difference between the net profits of hatchery and culture sector because the farm is focusing on producing and marketing of quality seeds. The source of profit in 2012 runs as follows:



**Figure 3. Profit (%) of the farm**

### CONCLUSION

In spite of being exotic species, Thai koi (*A. testudineus*) is now a prominent freshwater species of Bangladesh. It is becoming popular rapidly to the fish farmers of Bangladesh. Production of quality fry is hence very much important for the culture of Thai koi. Avoiding inbreeding, brood fish management, water quality management, PG extract quality, PG extract dose, science-based hatchery operation, trained labor etc. are keys to supply fish seed having premium quality. More emphasis should be given to develop the technique of overall operational system of the hatchery and popularize it all over the country to increase aquaculture production.

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