

**FECUNDITY AND GONADOSOMATIC INDEX OF *LABEO CALBASU*  
(HAMILTON) FROM A STOCKING POND OF A HATCHERY AT FARIDPUR,  
BANGLADESH**

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**Abstract:** Fecundity, gonadosomatic index (GSI) and ova diameter of the cyprinid fish Kalibaush (*Labeo calbasu*, Ham.) were studied from a closed water hatchery pond, Faridpur district during April 2007 to March 2008. Fecundity of the fish ranged from 37454 to 427030 with an average 230242. The maximum fecundity was from a fish with total length of 51.3 cm and 1785 g in weight and minimum from a fish with a total length of 32.5 cm and 720 g in weight. The number of ova present per gram of body weight was 213.13 and the number of ova present per gram of ovary weight was 1359.17. It was observed that the fish spawned once in a year with one spawning peak in the month of July as indicated by the values of both ova diameter ( $1.3 \pm 0.04$ ) and gonadosomatic index ( $1.68 \pm 0.11$  and  $18.58 \pm 0.06$ ) respectively. The relationship between fecundity and other variables (Total length, body weight and gonad weight) was linear and significant ( $P < 0.01$ ).

**Keywords:** Fecundity, GSI, ova diameter, *Labeo calbasu*, hatchery stocking pond.

**INTRODUCTION**

*Labeo calbasu* (Hamilton, 1822) is an important indigenous freshwater cyprinid fish of Bangladesh. *L. calbasu* locally called Kalibaush, is a very tasty and fast growing fish well suited in farming ponds and lakes. This species has been considered as critically endangered in the red list of IUCN Bangladesh (2000). In considering the above importance the present study was undertaken. Rao and Rao (1972) reported the biology of *L. calbasu* from the river Godawari, India. Pathak and Jhingran (1977) published information on the maturity and fecundity of *L. calbasu* from Madhya Pradesh, India. Vinci and Shugunan (1981) studied the biology of *L. calbasu* from Nagarjunsagar reservoir, India. Therefore, the present research work was undertaken to estimate the fecundity, gonadosomatic index and ova diameter and to find out its relationship with total length, body weight and gonad weight of this carp fish.

**MATERIAL AND METHODS**

The present study was conducted from April 2007 to March 2008 in a stocking pond of a hatchery of Faridpur district. For estimation of fecundity, sixteen mature females of kalibaush (*L. calbasu*) was randomly sampled from the pond. Eye estimation was used in identifying the ripeness of females. Total length and body weight of the collected fishes were measured. The gonad was

taken out very carefully and preserved in a well labeled vial containing 5% formalin for subsequent study. The fecundity of various sizes of kalibaush was estimated by gravimetric method. The fecundity of 16 specimens were computed by counting of ova in all samples of 1.0 g from each ovary following the method of Sevaraj *et al.* (1972).

Gonadosomatic index (GSI) of the male (72) and female (69) fishes were determined separately by using the following formula:  $GSI = \text{Gonad weight} / \text{Body weight} \times 100$ .

In this study at least 200 ova were taken randomly from the mixed sample of eggs from experimental 'fishes ovary' in different months. The diameter (mm) of the eggs at different stages of maturity was measured with the help of a dissecting microscope by using occulometer.

### RESULTS AND DISCUSSION

A total of 141 individuals were examined to determine the gonadosomatic index and ova diameter. In the present investigation the number of eggs produced by the female fish was found to increase with body weight of the fish. During the present study in the males and females, gonadosomatic index (GSI) ranged from  $0.12 \pm 0.02$  to  $1.68 \pm 0.11$  and  $0.37 \pm 0.06$  to  $18.58 \pm 0.06$ , respectively. It showed that there were no eggs from August to November as indicated by the decline of GSI after spawning. Therefore it was noted that the fish spawned once in a year in pond with one gonadal peak in the month of July as indicated by the values of both ova diameter ( $1.3 \pm 0.04$ ) and GSI ( $1.68 \pm 0.11$  and  $18.58 \pm 0.06$ ) respectively (Table 1).

The estimation of ova ranged from 37454 to 427030 eggs. The maximum fecundity was from a fish with a total length of 51.3 cm and 1785 g in weight and the minimum from a fish with a total length of 32.5 cm and 720 g in weight (Table 2). The number of ova present per gram of body weight were 213 and the number of ova present per gram of ovary weight 1359. It was also noted that during the present investigation that the fecundity increases with the increase in gonad weight of the fish.

Some relationships have been shown in Figs. 1, 2, 3 and 4. It was observed that the regression lines of fecundity in relation to other variables (TL, BW and GW) were linear. The 't' test was applied and found to be statistically significant ( $P < 0.01$ ); this indicated that the fecundity supports positive relationship with each variable in this fish.

**Table 1** Monthwise changes in ova diameter and gonadosomatic index of the carp *Labeo calbasu* from a hatchery pond

Year	Month	No. of fish (male) examined	% GSI (male) Mean $\pm$ SD	No. of fish (female) examined	% GSI female Mean $\pm$ SD	Ova diam.(mm) Mean $\pm$ SD
2007	April	7	0.61 $\pm$ 0.02	5	2.33 $\pm$ 0.61	0.43 $\pm$ 0.04
	May	6	0.716 $\pm$ 0.04	6	4.84 $\pm$ 0.08	0.62 $\pm$ 0.05
	June	7	1.42 $\pm$ 0.05	6	11.21 $\pm$ 0.05	0.99 $\pm$ 0.03
	July	6	1.68 $\pm$ 0.11	6	18.58 $\pm$ 0.06	1.3 $\pm$ 0.04
	Aug	6	0.12 $\pm$ 0.02	6	0.37 $\pm$ 0.06	0.00 $\pm$ 0.00
	Sep	6	0.17 $\pm$ 0.05	6	0.84 $\pm$ 0.07	0.00 $\pm$ 0.00
	Oct	5	0.24 $\pm$ 0.04	6	0.93 $\pm$ 0.05	0.00 $\pm$ 0.00
	Nov	6	0.32 $\pm$ 0.15	5	1.06 $\pm$ 0.07	0.00 $\pm$ 0.00
	Dec	5	0.42 $\pm$ 0.04	5	1.09 $\pm$ 0.06	0.12 $\pm$ 0.02
	Jan	6	0.38 $\pm$ 0.04	6	1.29 $\pm$ 0.03	0.19 $\pm$ 0.03
2008	Feb	6	0.52 $\pm$ 0.03	6	1.47 $\pm$ 0.07	0.24 $\pm$ 0.04
	Mar	6	0.53 $\pm$ 0.06	6	1.82 $\pm$ 0.06	0.31 $\pm$ 0.14

**Table 2** Total length, body weight, gonad weight and fecundity of *Labeo calbasu* from a hatchery pond

Length of fish (cm)	Weight of fish (g)	Gonad weight(g)	Fecundity
40.6	1058	155.48	227502
42.8	1098	94.52	164478
32.5	720	69.86	37454
35.7	832	124.64	155423
39.8	935	222.23	281406
48.3	1592	312.12	396826
44.6	1252	192.89	462568
34.9	809	79.25	64114
40.3	928	127.32	215196
47.1	1338	285.87	289524
33.9	775	157.83	228.692
42.3	1022	106.62	268320
33.5	824	165.75	102462
41.1	1115	95.68	87852
43.2	1218	132.92	278450
51.3	1785	389.92	427030

In *L.calbasu* from Indian waters (Rao and Rao 1972, Vinci and Shugunan 1981) have been reported single spawning season from April to June, and all the mature ova released during breeding season. It was also noted that fecundity increased with the increase in gonad weight of the fish. Lashari *et al.* (2007) also observed similar findings in *Cirrhina reba*. In the present investigation the fecundity value were plotted against total length, body weight and gonad weight.

It was observed that the fecundity-gonad weight gives strong relations as compared to fecundity-total length and fecundity-body weight relationship and

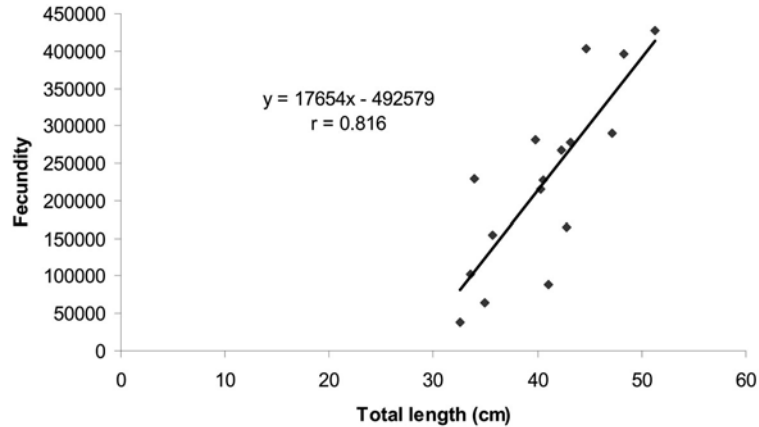


Fig. 1. Regression line between fecundity and total length of *Labeo calbasu*

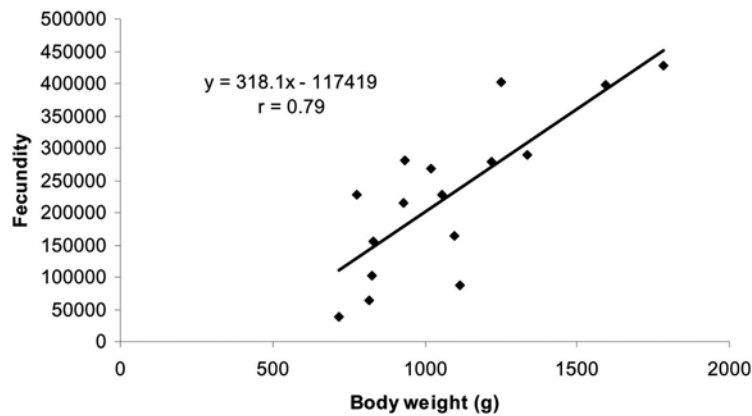


Fig. 2. Regression line between fecundity and body weight of *Labeo calbasu*

was found to be linear and highly significant ( $P < 0.01$ ). Shafi and Quddus (1974) reported similar findings in case of *Puntius stigma*. Banu *et al.* (1992) observed that the fecundity of individual fish of the same length varied considerably and the result of the present study agreed with the above findings. Mastoi *et al.* (2008) studied the fecundity with other reproductive factors (GSI, ova diameter, sex ratio, length, body and gonad weight) of *L. calbasu* from Keenjhar Lake,

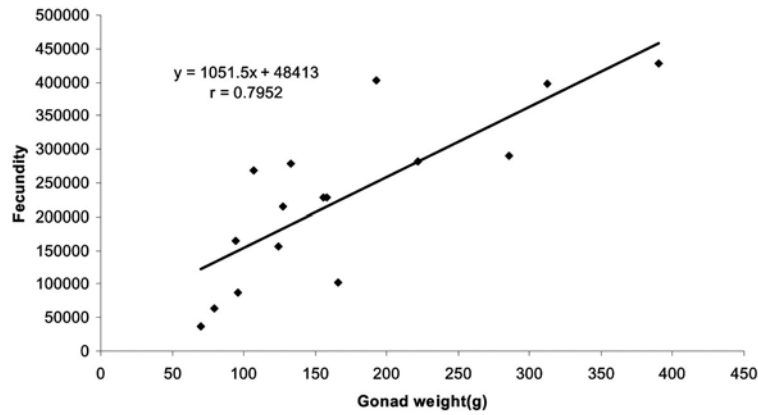


Fig. 3. Regression line between fecundity and gonad weight of *Labeo calbasu*

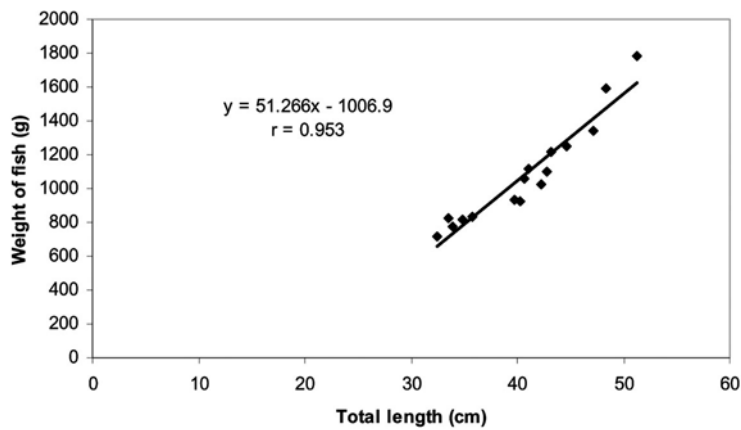


Fig. 4. Regression line between total length and body weight of *Labeo calbasu*

Pakistan and they suggested that all parameters were closely related with each other. The present investigation indicates that the relationship between fecundity and other variables were linear and positively significant. From the above results it can be concluded that fecundity increases with the increases in gonad weight of the fish.

#### LITERATURE CITED

BANU, N. KHAN, S. and ISLAM, L. 1992. Length-weight relationship and fecundity of *Lepidocephalus guntea* (Hamilton, 1822). *Bangladesh J. Zool.* **20**(1): 169-175

- IUCN Bangladesh. 2000. *Red book of threatened fishes of Bangladesh*. IUCN. The World Conservation Union. 116 pp.
- LASHARI, P.K., NAREJO, N.T., LAGHARI, M.Y. and MASTOI, A.M. 2007. Studies on the gonadosomatic index and fecundity of a carp, *Cirrhina reba* (Ham.) from fish ponds of District Jacobabad, Sindh. *Pakistan J. Zool.* **39**(2): 95-98.
- MASTOI, A.M., NAREJO, N.T., LAL, P.K.M. and MASTOI, G.M. 2008. Some aspects of breeding biology of Dahi, *Labeo calbasu* (Ham.) from Keenjhar lake, Sindh, Pakistan. *Sindh Uni. Res. Jour. (Sci.ser.)* **40**(1) 49-54.
- PATHAK, S.C. and JHINGRAN, A.G. 1977. Maturity and fecundity of *Labeo calbasu* (Ham.) of Loni reservoir, Madhya Pradesh, India. *J. Inland. Fish Soc. India* **9**: 72-83.
- RAO, M.G. and RAO, L.H. 1972. On the biology of *Labeo calbasu* (Ham.) from the River Godawari. *J. Inland Fish. Soc. India* **5**: 74-86.
- SEVARAJ, C. RADHAKRISHNAN, S. and PARAMESWARAN, S. 1972. Notes on the breeding season, fecundity and life history of a minor carp *Labeo boggut* (Sykes), Central Inland Fisheries research Institute Barrakpur **4**: 87-97.
- SHAFI, M. and QUDDUS, M.M.A. 1974. The fecundity of the common punti, *Puntius stigma* (Cuvier: Valenciennes) (Cyprinidae: Cypriniformes). *Bangladesh J. Zool.* **2**: 133-145
- VINCI, G.K. and SHUGUNAN, V.V. 1981. Biology of *Labeo calbasu* (Hamilton) from Nagarjunsagar reservoir, Andhra Pradesh, India. *J. Inland. Fish. Soc. India* **2**: 22-39.

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