www.trjfas.org
ISSN 1303-2712
Turkish Journal of Fisheries and Aquatic Sciences 11: 469-472 (2011) DOI: 10.4194/1303-2712-v11_3_12

SHORT PAPER

Induced Spawning and Larval Rearing of *Cyprinus carpio* on Three Different Feeds

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Received 21 July 2010
Accepted 11 March 2011

Abstract

A total 48 *Cyprinus carpio* breeders (W = 963±9.5 g; L= 33.60±2.6 cm) were divided into two groups as control (n=24) and experimental (n=24). Control group spawned naturally while experimental group were subjected to induce spawning using ova prim. Results showed positive correlation in breeder's body weight, gonado somatic index (GSI) and fecundity. Significantly high (P<0.01) fecundity and % hatch is observed in induced spawning as compared to control (open water). In an other experiment 84,000 *C. carpio* larvae after alluvial stage were grown on 100% body weight spread in two feeds on powdered egg yolk, beef extract, liver extract and live food for 35 days. Stocking density was kept 7,000 larvae per tank in triplicate for each feed. Growth was observed as beef liver extract > beef extract > open water > egg yolk. Maximum survival (57%) was noted in liver extract feed and minimum (25%) in pond water.

Keywords: Alluvial stage, beef extract, egg yolk, *C. carpio*, fecundity, survival.

Üç Farklı Yemlemede *Cyprinus carpio*'nun Üreme ve Larval Yetiştiriciliği

Özet

48 adet *Cyprinus carpio* (W = 963±9,5 g; L= 33,60±2,6 cm), kontrol (n=24) ve deneme grubu (n=24) olmak üzere iki gruba ayrılmıştır. Kontrol grubu doğal olarak yumurtlarken, deneme grubunun hormon kullanılarak yumurtlaması sağlanmıştır. Sonuçlar, anaç balığın vücut ağırlığında, gonadosomatik indeksinde (GSI) ve yumurta verimliliğinde pozitif korelasyon olduğunu göstermiştir. Kontrolle kıyaslandığında dışarıdan etki ile yumurtlaması sağlanan balıklarda yumurta verimliliğinin (P<0,01) ve yumurtadan çıkma yüzdesinin önemli derecede yüksek olduğu görülmüştür. Bir başka denemede 84.000 *C. Carpio* larvası alüvyal aşamadan sonra 35 gün boyunca toz haline getirilmiş yumurta sarısı, sığır eti ekstraktı ve karaciğer ekstraktı ile canlı yemden oluşan iki çeşit yemleme ile vücut ağırlığının %100'ü oranında büyümüştür. Stok yoğunluğu üç tekrarlı olarak her yemleme için tank başına 7.000 larvada tutulmuştur. Büyümenin, sığır karaciğeri ekstraktı>sığır eti ekstraktı>açık su>yumurta sarısı şeklinde olduğu gözlenmiştir. En yüksek yaşama oranı %57 ile karaciğer ekstraktı ile beslenen grupta olurken, en düşük yaşama oranı %25 ile birikinti suda olduğu kaydedilmiştir.

Anahtar Kelimeler: Alüvyal aşama, sığır eti ekstraktı, yumurta sarısı, *C. carpio*, yumurta verimi, yaşama oranı.

Introduction

Common carp is a popular fresh water fish of high market value in Asia for dry and damaged soils. It has been farmed commercially in cages and ponds in bio-saline waters all over the world (Sharma *et al*., 2010). The fish can grow fast and attain market size of 600-800 g in about 6-8 months. The fry used for culture is usually obtained from the wild which means the supply is very erratic and inconsistent. Large-scale commercial production of common carp is hampered by shortages of fry due to its pond breeding habit. To ensure consistent and adequate supply of fry, efforts have been made to produce them under controlled conditions by using ova prim. Present study was designed to compare the fecundity of *C. carpio* in pond water and at controlled hatchery conditions by induced spawning. An effort was also done to rear fish larvae on live food in pond and artificial feed in lab to find out the best feeding technique for better production and survival.

Materials and Methods

A total 48 *C. carpio* breeders (W=963±9.5 g; L=33.60±2.6 cm) of both sexes selected on random basis were fed on 7% of wet body weight. After acclimatization breeders divided randomly in two

groups, control (n=24) and experimental (n=24). In each group 8 breeders (5 male and 3 females) were stocked in triplicate. Experimental were subjected to induce spawning using ova prim @ 0.2 mg/kg to male and 0.5 mg/kg to female (Nandeesha *et al*., 1990). Control was released in earthen ponds for natural spawning using kaka bans. Eggs (control and experimental) were examined after spawning under microscope. The eggs were washed repeatedly with carbamide solution to remove tissue debris. For counting, the eggs were whirled in one liter water and at least five sub samples of 1/30 were counted (Rothbrad, 1981). Dry fertilization was executed with fresh milt through stripping while control breeds spontaneously in ponds on kaka bans. After fertilization eggs were shifted into circular spawning tanks with water discharged of 22-25 L/min. Control eggs fertilized in pond naturally at appropriate temperature. For first feeding and rearing, 84,000 larvae were selected on random basis. Stocking density was kept 7000 larvae/tank (2407 L) in triplicate for each feeding trial of live food, powdered egg yolk, liver and beef extract on 100% of body weight spread over two feeds for 35 days. Growth and survival were determined weekly while temperature, pH and DO measured on daily basis. Data was analyzed by ANOVA, and correlation using SPSS 13.

Results and Discussion

In present study sexually mature female (Figure 1) and male were selected on the basis of plumpness of abdomen, redness of the vent and presence of milt. Temperature varied from 22-24±2.18°C, pH 7.3±0.088 to 8.8±1.3 and DO 5.94±0.26 to 8±1.2 mg/L for control and induced spawning. Body weight, ovary weight and GSI were almost equal in both experimental and control group as shown in Figures 2a, 2b and Figure 3 a with non significant difference.

Body weight and ovary weight ranged from

Figure 1. Showing various stages of ceincronization technique of induced spawning in C. *carpio*

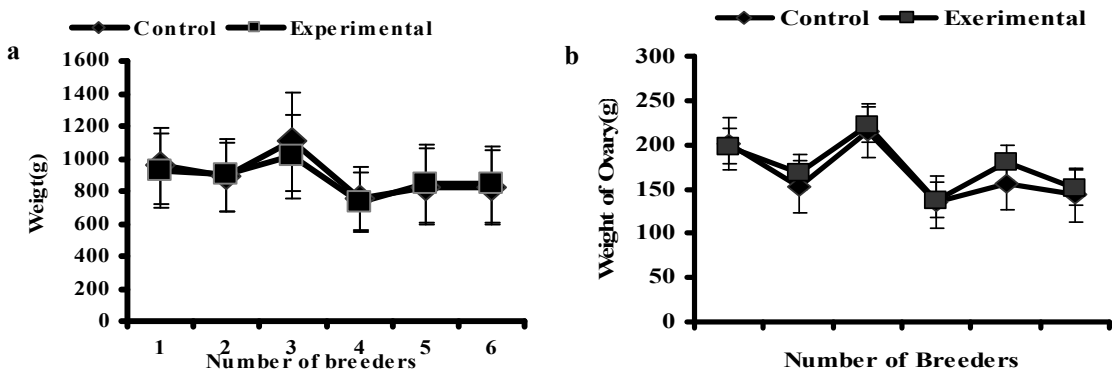

Figure 2. Showing comparison in Weight (a) and ovarian weight (b) of control (n=24) and experimental (n=24) *C. carpio* breeders.

736.4±180 to 1103.4±231g and 135.4±36 to 222.6±54 (df = 6, 35; F = 6.19; P<0.05) respectively in both groups. Same trend was observed in GSI (17.22±4.6 to 21.9±4.3). However, a clear decline in fecundity of control (30010±719 to 47785±817) was observed as compared to experimental (43955±1412 to 71005±645) as shown in Figure 3b (df = 6, 35; F = 13.57; P<0.01).

The main reason behind this low fecundity is in open water *C. carpio* laid eggs in intervals due to variation in levels of egg maturity (Giri *et al*., 2002).

Temperature fluctuation also affects the fecundity if temperature slightly fluctuates from optimum even fully mature breeder's seize spawning and predator stress reduces the level of fecundity (Olubiyi *et al*., 2005). Similar trend was noticed in hatching success. Although breeders were almost of the same size yet in induced spawning 54.6±12% hatch was observed as compared to 33.8±11.2 of control as shown in Figure 4a.

In fry rearing experiment growth significantly (P<0.01) increased in order liver extract >beef extract >egg yolk > live food as shown in Figure 4b and 5a. Maximum mortality 75.1±4.3 observed in control as compared to artificial feeding i.e. 42.8±1.2 (liver extract) <44.8±1.34 (egg yolk) <48.7±1.22 (beef extract) (Figure 5 b).

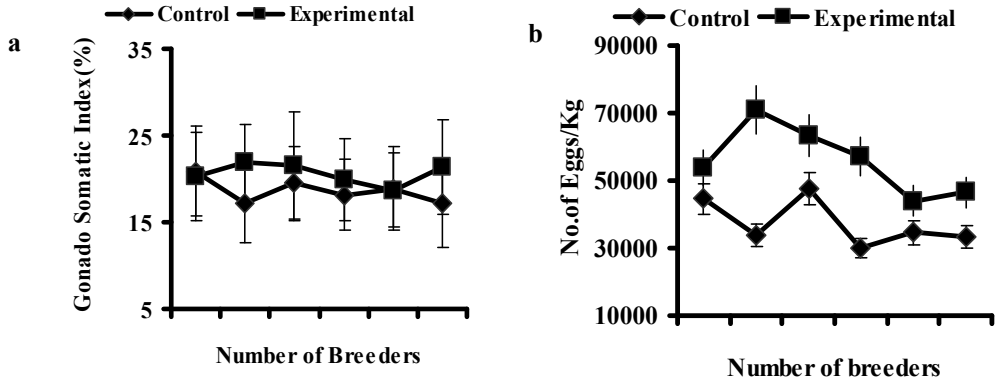

Figure 3. Showing comparison in GSI (a) and Fecundity (b) of control (n=24) and experimental (n=24) *C. carpio* breeders.

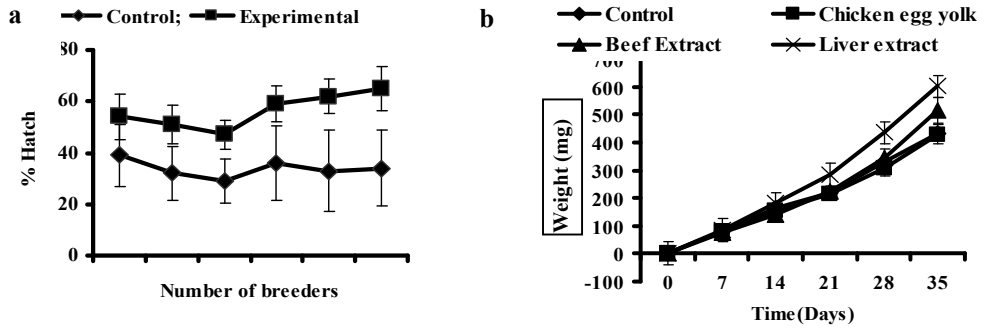

Figure 4. Showing comparison in % hatch (a) of control (n=24) and experimental (n=24) *C. carpio* breeders, (b) showed response of various feeds on survival and growth of larvae (n=84000).

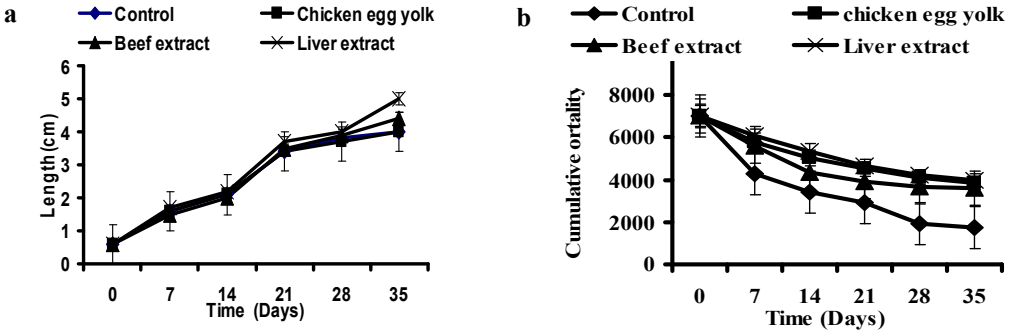

Figure 5. showing response of various feeds on Length (a) and mortality (b) of larvae after 35 days (n=84000).

Conclusion

Breeding potential of same size *C. carpio* is 20% more in induced spawning as compared to control. Maximum growth and survival is observed on artificial feed as compared to live feed due to consistent feed supply.

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