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ECONOMICALLY VIABLE APPROACH FOR INDUCED BREEDING OF INDIAN MAJOR CARPS AND AN EXOTIC CARP AT A HATCHERY IN WESTERN RAJASTHAN

Zoology

Anita Jhajhria Lecturer in Zoology Shri Kalyan Govt. College Sikar, Rajasthan

ABSTRACT

A study of Induced breeding was conducted to observe the effect of intramuscular injection of ovaprim on the number of eggs produced, fertilization rate and hatching percentage at a Hatchery in Jodhpur, Rajasthan, during July 1998 to August 2000, on *Labeo rohita* (Rohu), *Cirrhinus mrigala*(Mrigal) and *Cyprinus carpio* (Common carp).Studied fish specimens were spawned successfully following a single dose of injection of ovaprim in the caudal peduncle of the brooders mostly during day time varying from 7.15 am to 3.30 pm . Hatching occurred within 30 to 87 hrs and the hatching rate was 65 to 90% after fertilization. Average number of eggs (lakhs) produced varied from 1.00 to 3.45, and the overall fertilization rate was 50 to 94%..The number of spawn produced (in lakhs) varied from 0.4895 to 2.4393 in the Indian major carps and an exotic carp. The synthetic hormones study was done to find out the way to standardize the fish hatchery sector.

KEYWORDS:

Induced breeding, ovaprim, Labeo rohita, Cirrhinus mrigala and *Cyprinus carpio*

Introduction

Aquaculture is the fastest growing food producing sector and by 2025, one out of every two fish eaten may come from aquaculture. Quality fish seed is a key factor for increase of aquaculture production. Fish seed from natural sources of spawning possess uncertainty in availability, quality, mixing of predatory and weed fish seeds. The technique of induced breeding helped in mass production of quality carp seed under controlled condition and assured timely supply of stocking material for culture farms. Induced breeding is based on the principles of manipulating hormonal or environmental factors for stimulation of reproduction in fishes.

The need for the production of quality fish seed to stock artificial ponds and natural water bodies through artificial propagation has steadily been encouraged, as it is the only practicable means of producing enough quality fish seeds. Scarcity of carp spawn is a major problem for fish farmers in villages to stock their ponds with seed collected from rivers and due to lack of technical knowledge and basic infrastructure facilities, such as hatchery system; induced breeding of carps was rarely adopted by farmers. Induced breeding is a method in which exogenous hormones are injected into the body of mature parent fish for induction of breeding. Marte *et al*. (1987) reported that a drug known as ovaprim has been commonly used as a spawning hormone in fish breeding

Ovaprim is a commercial product used as a spawning aid in fishes and contains a salmon gonadotropin-releasing hormone analog and a dopamine antagonist. Ovaprim has been shown to be effective and safe in numerous ornamental finfish species in the refereed scientific literature. Many years of research investigating hormonal triggers for ovulation and spermiation went into the development of Ovaprim (Peter et al., 1986). The use of sGnRHa resulted in successful stimulation of ovulation in some cyprinids (Hill *et al.,* 2005) and catfishes (Sahoo *et al.,* 2007). The objective of induced ovulation is to produce, on demand, a large supply of high quality eggs. The aims and objectives of this study were to assess artificial spawning in *L. rohita. , C. mrigala and Cyprinus carpio.*

MATERIALS AND METHODS

The experiments were conducted at Fish Hatchery in Jai Narain Vyas University of Jodhpur specimens of *L. rohita,C mrigala and C.carpio* were weghed before and after for investigation, and the loss of weight for brooders was observed. The temperature and injection time in the breeding tank was recorded. The abiotic components of optimum water quality variables was also maintained. These experiments were done to produce fish fry for Stocking in a freshwater body and achieve targets by the following procedures. Selection and handling of broodstocks, good quality and well-matured male and female brood fish were collected because according to Muir and Robert (1985), healthy parental fish are prerequisite for successful artificial propagation. So, the most suitable size of spawners is 4 to 6 kg, because of difficulty of handling of bigger fish and requirement of high doses of expensive hormones.

The brood fish were weighed and dosage of Ovaprim was calculated according to Nandeesha et al. (1991) by the following formula:

Quantity to be injected (ml) = weight of brood fish (kg) x dosage of ovaprim (ml)

The brooders were injected ovaprim with about 0.5 ml/kg,. It was ensured that all the equipments were cleaned and needle of the hypodermic syringe was cleaned by cotton swab, soaked in alcohol before injection. Required amount of Ovaprim were withdrawn from the respective bottle by keeping the needle upward and syringe was squeezed gently to expel any trapped air. At the inner side of the basal part of the pectoral fin, where it was scale less, the syringe needle was inserted gently towards the head at an angle of 45° to the body's longitudinal axis to a depth of about 1.5 cm and fluid was injected slowly. Then, both males and females were released in the fresh aerated breeding tank tank.

Percent fertilization per female was calculated with the following formula

Total No. of egg counted Fertilization = No. of fertilized eggs × 100 Percentage

Hatchability was determined by direct counting of the number of hatchlings of two days old and estimated as follows

Total No. of fertilized egg Hatchability = No. of hatchlings (two days old) × 100

RESULTS

TABLE 1 INDUCED BREEDING OF CARPS DONE IN A HATCHERY OF WESTERN RAJASTHAN

CARP SPECIES	INJECTION TIME	BREEDING EXCERCISES DONE	SPAWNING TIME (HRS)	EGGS PRODUCED (LAKHS)	FERTILIZATION RATE %	HATCHING TIME (HRS)	HATCHING %	SPAWN PRODUCED (LAKHS)
MRIGAL	7.30 AM - 11.10 AM	05	8.15 - 12.30	1.92 - 3.20	70 - 90	32-45	79-88	1.2240-2.4393
ROHU	7.15 AM - 3.30 PM	05	10.10-14.10	1.00-2.72	50-85	30-42	80-89	0.4895-1.9420
COMMON CARP	9.00 AM - 4.30 PM	11	21.35-70	1.15-3.45	58-94	49-87	65-90	0.7453-2.1783

Mean values and ranges of fertilization and hatchlings of Rohu, Mrigal and Common carp following the intramuscular injection of ovaprim or ovatide are given in (Table 1.) Fishewere s given single injection of ovaprim was successfully induced to spawn. Five exercises were conducted on Rohu and Mrigal respectively and eleven dosages of the

synthetic hormone were given to the common carp. Overall fertilization and hatchling percentage age varied from 50 to 94% and 65 to 90. respectively (Table 1). The injection time too varied from 7.15 am to 3.30 pm, the eggs produced varied from1.00 to 3.45 lakhs and the hatching time was recorded from 30 to 87 hrs.

DISCUSSION

In the present study, a single intramuscular injection of synthetic hormone, ovaprim resulted in successful spawning of Rohu, Mrigal and Common carp The results of the current work in the hormonal stimulation are similar to the effectiveness and usefulness by using Ovaprim (Jamroz et al., 2008).

Saud *et al.,(*2013) conducted breeding experiments on *Labeo rohita* using both the synthetic hormone analogues ovatide and ovaprim in Chinese circular Ecohatchery system of agro-climatic condition of Assam. Ovaprim was tested by Nandeesha *et al.* (1990) for its induced breeding efficacy in three species of Indian major carps, viz. catla (*Catla catla*), rohu (*Labeo rohita)* and mrigal (*Cirrhinus mrigala*).T Reddy and Mathur (2000) also reported higher success of ovatide in *L. rohita* and *C. mrigala* as compared to *C. catla*. The trials on induced breeding of Indian major carps (*Catla catla, Labeo rohita, Cirrhina mrigala*) were carried out by Dhawan and Kaur (2004) during 1999-2000 at the Fish Seed Farm of Ludhiana. Only one dose of either Ovaprim or Ovatide Rath *et al.* (2007) conducted experiments on Indian major carps, viz. *Catla catla, Labeo rohita and Cirrhinus mrigala* were induced bred in eco-carp hatcheries with 3 different GnRH based synthetic inducing agents, viz. ovaprim, ovatide, wova - pituitary extract (CPE). More et al. (2010) during 2008- 2009 observed the spawning response of ovaprim compared with pituitary extract in Indian major carps, at fish breeding center at Jaikwadi, Paithan Dist. Aurangabad (M.S) India. Total ten trial doses of ovaprim were used in induced breeding and ten trial doses of Carp Pituitary Extract (CPE) used for induced breeding in Indian major carps i.e *Catla catla, Labeo rohita and Cirrhinus mrigala*. The percentage of fertilization ranged (88.11 - 97.94%) was found with ovaprim treatment. and (53.19 - 85.48%) with pituitary extract treatment. The percentage hatchling ranged (74.70 - 95.92%) with ovaprim treatment and (60 -58.82%) with pituitary extract treatment

So, the present study reveals that Ovaprim use is more economical in commercial carp seed production, as it saves a considerable amount of time and avoids the excessive handling of brood fish. The positive response of carps to ovaprim indicated the higher potency of this drug in inducing the spawning ovaprim gives an equal result of seed production in the hatchery. This small-scale carp hatchery will enable the farmers to operate it with less labor and manage it effectively.

Conclusion

This study will be helpful to the hatchery owners, fish culturists, farm managers, hatchery operators, production specialists, policy makers and extension workers to run a hatchery effectively and efficiently and as well as to improve the breed and stock, improve quality fish fry and increase the fry production rate.

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