



INDUCED BREEDING OF INDIAN MAJOR CARPS IN INDIA: AN OVERVIEW

Anita Jhahria

Lecturer in Zoology Shri Kalyan Govt. College Sikar, Rajasthan

ABSTRACT

Fish culture in freshwater ponds was practiced in India as early as 350 B.C., though on a limited scale. Carp culture is common in India. Aquaculture in Rajasthan is a fast developing income generating activity, providing a quality and low cost protein diet to the people. Induced breeding is the most significant advancements in the field of aquaculture to breed in captive condition. For the preparation of carp pituitary extract the glands are removed carefully from freshly killed donor fish. For best result the donor fish should be fully ripe and mature. Nowadays Ovotide, Ovaprim Ovapel and Clomiphene are used. Overall 10 induced breeding exercises were done in rohu and mrigal in a hatchery of Jodhpur which involved ovaprim injection This synthetic hormone has multifold advantages over pituitary extract.

KEYWORDS : Induced breeding, Pituitary extract, Ovaprim, Ovotide, Ovapel and Clomiphene

Introduction

India is the third largest farmed fish producer ranking second globally. The current fish production in India has reached 8.3 million tonnes, which expected to reach 12.5 million tonnes by 2025.

The first successful induced breeding on major carps was done by Dr. Hiralal Choudhri 1957 – *Cirrhinus mrigala*, *C. Reba* & *Labeo rohita*. Induced Breeding is the most significant advancements in the field of aquaculture to induce reproduction in fish. It is a technique to stimulate ripe fish breeders by pituitary hormone or any other synthetic hormone to breed in captive condition by promotion of timely release of sperms and eggs

Indian major carp were induced bred in eco-carp hatchery with different inducing agents, viz. carp pituitary extract, ovaprim, ovotide, ovapel. and other synthetic hormones. The advantages of these synthetic hormones over the classical method of using pituitary extracts in the various Indian Major Carps were worked upon.

Materials and Methods.

The techniques employed involved the use of the various synthetic agents for induced breeding exercises.

Ovaprim is a ready to use product and the solution is stable at ambient temperature. It contains an analogue of 20 µg of Salmon gonadotropin releasing hormone (sGnRH_a) and a dopamine antagonist, domperidone at 10 mg/ml. The dopamine antagonist, domperidone used in ovaprim is also reported to be better than another commonly used antagonist, pimizide. Ovaprim being a ready to use product and one which does not require refrigerated storage, appears to be the most convenient and effective ovulating agent (Piska and Naik, 2007).

Ovaprim has unique advantages over pituitary hormone - ready to use liquid form in 10 ml vial, consistent potency and reliable results, long shelf life, and can be stored at room temperature, formulated to prevent over dosing, male and female can be injected only once simultaneously, reduces handling and post breeding mortality, repeated spawning possible later in the season and high percentage of eggs, fertilization and hatching.

Ovotide is an indigenous, cost-effective and new hormonal formulation for induced breeding of fishes. The new formulation is having the base of a synthetic peptide which is structurally related to the naturally occurring hormone, gonadotropin releasing hormone (GnRH). GnRH is not a steroidal hormone and belongs to the class of organic substances called peptides. It is presented as a low viscosity injectable solution which is not only highly active but also cost-effective compared to other commercially available spawning agents.

Ovopel, developed by the University of Godollo in Hungary, is a preparation containing mammalian GnRH and the water-soluble dopamine receptor antagonist, metoclopramide. The concentration of D-Ala₆, Pro₉NET-mGnRH and metoclopramide are in the form of 18-20 micro gm/pellets and 8-10mg/pellets respectively. The hormone is thus available in pellet form. Each pellet contains superactive gonadotropin releasing hypothalamic hormone analogue with an equal effect which a 3 mg normal acetone-dried dehydrated carp hypophysis gland has.

Clomiphene It is an analogue of the synthetic non-steroidal estrogen chlorotrianisene. It is known to have antiestrogenic effects in teleosts. It triggers the release of gonadotropins. The injections of clomiphene (10 µg/g) induced ovulation within 4 days in gold fish, whereas with same dosage, common carp spawned successfully after 40-64 hours (Piska and Naik, 2007). Environmental factors like temperature, water condition, light, meteorological conditions, etc. are important factors controlling the reproduction of fish.

Table 1. Comparative study on induced breeding by synthetic hormones in various fish species in India by various authors

| Fish species | Dosage of hormone | Hormone | Total fertilized eggs % | Incubation period (Hrs) | Hatching (%) | Reference |
|--------------------------|-------------------|---------|-------------------------|-------------------------|--------------|--------------------|
| <i>Catla Catla</i> | 0.4-06 | Ovaprim | 94.20 | 10-12 | 92.05 | More et al. (2010) |
| <i>Labeo rohita</i> | 0.4-0.6 | Ovaprim | 94.06 | 10-12 | 91.36 | More et al. (2010) |
| <i>Cirrhinus mrigala</i> | 0.4-0.6 | Ovaprim | 92.89 | 10-12 | 88.34 | More et al. (2010) |
| <i>Labeo rohita</i> | 0.2-0.4 | Ovaprim | 71-78% | 18-22 | 80-83 | Saud et al. (2013) |

Results and Discussion

Saud et al., (2013) (Table 1) conducted breeding experiments on *Labeo rohita* using both the synthetic hormone analogues ovotide and ovaprim in Chinese circular Ecohatchery system of agro-climatic condition of Assam. Ovaprim-C was tested by Nandeesh 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*). Reddy and Mathur (2000) also reported higher success of ovotide in *L. rohita* and *C. mrigala* as compared to *C. catla*. The trials on induced breeding of Indian major carps (*Catla catla*, *Labeo rohita*, *Cirrhinus 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 Ovotide 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, ovotide, wova - FH (OOW) and carp pituitary extract (CPE). The

breeding performance of the these agents were compared. Breeding response, mean spawning fecundity, mean spawn recovery rate of OOW ranged between 90 and 100%, 1.30×10^5 and 1.79×10^5 , 0.97×10^5 and 1.34×10^5 respectively, More *et al.* (2010) observed the spawning response of ovaprim compared with pituitary extract in Indian major carps, at fish breeding center at Aurangabad . 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.

of Two Synthetic Hormone Analogues In The Spawning of Indian Major Carp *Labeo rohita* (Hamilton-Buchanan) Under The Agro-Climatic Condition of Assam, India.www.aquafind.com. behavior and induced breeding of an esturine catfish, *Mystus gulio* (Ham.). Bangladesh J Fish. Res. 2006; 10 science 1957;26:381-382.

| MRIGAL (05 Exercises) | | ROHU (05 Exercises) | |
|-----------------------|------------------|-----------------------|-------------|
| EGGS PRODUCED | 1.92-3.20 LACS | EGGS PRODUCED | 1.00-2.72 |
| FERTILIZATION % | 70-90% | FERTILIZATION % | 50-85% |
| HATCHING TIME | 79-88 | HATCHING TIME | 80-89 |
| HATCHING RATE % | 79-88% | HATCHING RATE % | 80-89% |
| NO. OF SPAWN PRODUCED | 1.224-2.439 LACS | NO. OF SPAWN PRODUCED | 0.489-1.942 |

Table 2 shows the results for the experiments done from year from July 1998 to August 2000 .Overall 10 induced breeding exercises were done in rohu and mrigal in a hatchery of Jai Narain Vyas University Jodhpur which involved ovaprim injection. The eggs produced varied from 1.00 Lacs to 3.20 Lacs ,and the fertilization rate was from 50 to 90%.The hatching rate was recorded above 79% in both the species. The spawn produced varied from 0.489 to 2,439 Lacs.

Conclusion

Fish hatchery operators should be trained on better brood fish management, hatchery management and nursery management to produce quality fish seed. More emphasis should be laid on multiple spawning of carps so as to ensure the availability of seed over a longer duration in a year Greater support from government agencies needed for sustainable fish seed Production. The above findings of collected literature suggest the application of synthetic hormones for inducing ovulation and successful breeding and achieving quality egg and larval production for successful carp cultivation in our country.

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