Private Hatchery Owners' Perspectives on Hatchery Management in Bangladesh

A.S. Sarder[1], M.R. Azam[2] and M.A. Hossain[3]

1 Arabpur fish farm, Puratan Kashba, Airport Road, Jessore, Bangladesh
2 MSc Student, Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna, Bangladesh
3 Research Associate, Bangladesh Aquaculture Research and Dissemination Service (BARDS), Puratan Kashba, Airport Road, Jessore, Bangladesh

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Abstract
The paper is presented in a view to expose the overall management techniques that should be performed in a carp hatchery, such as pituitary gland collection and preservation, brood management, reconditioning of broods before induced breeding, pituitary extract preparation, hatching jar preparation, breeding techniques, multiple breeding of the same brood fish and post breeding management of broods. It also reflects on the genetic consideration for induced breeding to avoid inbreeding.

Introduction
Carp culture is an ancient practice in China and the emigrants from China introduced it into several southwest Asian countries. Indigenous system of Indian carp culture is seen to have existed in eastern parts of Indian subcontinent in the eleventh century AD (Pillay, 1990). Carp culture began in Bangladesh since 1926 (Nazmul, 2000). A king named Raja Gogendra Nath Roy, observed the collection of fingerling in the river of Hugli of Calcutta. The people started aquaculture and to mitigate the increasing demand of fingerlings, the establishment of hatchery became essential.

Collection and preservation of pituitary gland

The pituitary is collected by chopping off the root of the cranium, and exposing the brain. Then the brain is removed and the gland is collected with the help of forceps. All these should be done with a gentle hand. These glands may be preserved either in absolute alcohol or acetone. For the first time, in case of alcohol the old alcohol should be replaced after 24 hours of preservation and in case of acetone the old acetone should be replaced after 12 hours. These glands may retain their efficiency for up to two years.

Brood collection and management

Preferably 2-3 years old mature males and females should be collected from the natural sources (rivers, lakes, and reservoirs) as broodstock. Broodstock from culture ponds may also be of the same age. For the exotic species the culture ponds are the only source of broodstock.

Collected broodstock should be transferred into the brood stocking pond with aerator or with the facilities for water exchange in the month of October to December. The formulation of good brood diets is based on nutritional value: protein (28-30%), carbohydrates, lipid, and vitamins and improvements in feed presentation. Pond management schedules are to be followed strictly, involving weed clearance, removal of predatory and weed fishes, pond fertilization and application of supplementary feed, fish health care and monitoring of pond environment etc. Maximizing fecundity and milt yield from female and male respectively and to determine the multiple maturity and spawning (Kumar, 1992).

Netting of broodstock from the brood stock ponds and conditioning in the tank

In the breeding season the broodstock are netted from the pond for induced breeding. During netting it should be observed that either the broods are ready for spawning or not by examining the pectoral fin and/or the anus. Mature males ooze a milky fluid (milt), if the abdomen is slightly pressed near the vent. They are also characterized by the roughness of their pectoral fins. Mature females have a soft bulging abdomen with slightly swollen and reddish vent. The ready females and males are transferred to the rectangular tank for conditioning and during transferring of broodstock stress should be minimized. In the tank the broodstock should be kept for the time required. Then the weights are recorded.

Preparation of pituitary extract and injection to the fish body
After the selection of the broodstock, the injectable dosages of pituitary extract is calculated in term of milligram of pituitary gland per Kg body weight of the recipient fish. Then weighed gland is ground with a cell homogenizer in distilled water and centrifuged and the supernatant is separated. Females are given two injections at an interval of 6 hours while males are given only one injection at the time of the first injection of the females. The respected dose must be used. The dosage varies with the temperature, potency of the pituitary gland, gonadal maturity of the recipient and the prevailing climatic conditions (Jhingran and Pullin, 1988).

Hatching jar preparation
Before subjected the eggs in the hatching jar, it should be washed with disinfectant and rinsed several times with fresh water. It is also essential to dry the hatching jar properly. All the equipment that will be used must be disinfected and dried to reduce the microbial danger.

Breeding procedure
Six hours after the second dose, breeding takes place. Observing movements of the fishes the eggs and milt are to be collected from both female and male respectively by stripping the abdomen of the fishes with a gentle hand. The fish should be anesthetized by using MS222 (0.5g/50 ml water). The milt from the males should be diluted with normal physiological saline solution and mixed with the eggs, shaking for 5 minutes and then washed with fresh water, then put into the pre-prepared hatching jar with a continuous water flow to keep the eggs moving.

Hatching time is temperature dependent. Usually hatching takes place about 15-18 hours at the temperature range of 26-31^{0}C (Kumar, 1992). At lower temperature the hatching time is consequently longer. It takes 12-15 hours for the developing egg to hatch out in Bangladeshi conditions. Three days after hatching the fry are transferred to a cemented tank. Then the spawn are sold. While the eggs are in the hatching jar continuous supervision is essential for the estimation of hatching percentage, water temperature, dissolved oxygen and change the hatching jar after 12-14 hours of hatching.

Rearing of fry
Fry from the hatching jar are usually transferred to the tank by siphoning. The yolk sac is absorbed within 2-4 days after hatching and the fry are then fed with boiled yolk. It is suitable if possible to feed with natural feed (phytoplankton, zooplankton

or zoobenthos). The newly hatched fry are acclimatized before release in the earthen ponds. For fry nursing special types of ponds are used, having low depth, small size and the pond should be pre-prepared. In these ponds fry are reared for three to four months (Kumar, 1992).

Post breeding management of Broods

It should always be borne in mind that spent carps are potential breeders for the next breeding season, so proper care should be taken to save them. For this, antibiotic and disinfectant treatment should be given.

Multiple breeding

Indian major carps generally breed once a year but recent years it has been possible to breed them twice in a year. They are induced to breed in the early part of the season, well cared and fed for the rest of the season, then they are again induced to breed in the late part of the season (Jhingran and Pullin, 1988).

Some specialization of induced breeding in case of exotic species

Exotic species are preferred to culture for their fast growth, short culture period, high production and availability of fingerlings in hatchery. For this, special information for the induced breeding of exotic species cultured in Bangladesh are given. A catheter is found to be quite helpful especially in case of silver carp and grass carp to identify their maturity. By inserting the catheter in the genital opening of a female spawner, some eggs are taken out and examined at the pond site in a petridish. Uniform size eggs of pale blue color in silver carp and brown or copper color in grass carp indicates proper maturation stage (Jhingran and Pullin, 1988). Silver carp and grass carp normally do not release eggs. In case of silver carp males, the quantity of milt is insufficient and hence extra males should also be injected to ensure maximum fertilization of stripped eggs (Kumar, 1992). For the brood management of Black carp, required calcium and high protein percentage is applied in their supplementary food. It takes five years or more for this species to mature.

Genetic considerations

At present, hatcheries produce slow growing spawn caused by inbreeding effects. A simple crossbreeding technique can be followed to avoid carp inbreeding in hatcheries by mating two unrelated strains/stocks of the same species either collected from two different river systems or from two different locations. Crossbreeding can

be combined with selection in this program to produce fish with no inbreeding generation after generation (Tave, 1999).

Recommendations

- For choosing stock it should be borne in mind that the stock should have fast growth, good body conformation, disease resistance, high fecundity etc. to suit the hatchery owners and customers.
- Appropriate dosages for hormone injections of carp species should be followed for good quality seed production.
- It should be made sure that the hatchery owner have to have adequate facilities to keep stocks separate from each other, in sufficient numbers to avoid inbreeding and the means, either in his farm or through cooperation with other farmers, to undertake a sustained program of evaluation of stock performance.
- To develop breeding techniques and share knowledge of hatchery owners, workshops should be conducted yearly by FRI, DOF and Universities.
- Facilities and literature on latest technologies in potential areas should be made available to develop theoretical and practical knowledge of hatchery owners and technicians.
- To create skilled personnel, training programmes should be organized both in the country or abroad.
- Improved induced breeding method should be demonstrated for sustainable breeding.

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