CMFRI

Course Manual

Winter School on

Recent Advances in Breeding and Larviculture of Marine Finfish and Shellfish

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BROODSTOCK DEVELOPMENT OF COBIA

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Introduction

The cobia (*Rachycentron canadum*) is distributed worldwide in warm marine waters. They are found throughout the water column and are caught in both coastal and continental shelf waters, although they are typically considered to be an offshore species. Wild caught cobia do not support a major commercial fishery and generally considered as incidental catch. Sexual maturity is reported in males at 1-2 years and in females 2-3 years, with females growing both larger and faster with maximum sizes upto 60 kg.

Fast growth rate, adaptability for captive breeding, lowest cost of production, good meat quality and high market demand especially for *sashimi* industry are some of the attributes that makes cobia an excellent species for aquaculture. Under culture conditions, cobia can reach 3-4 kg in body weight in one year and 8-10 kg in two years. The species has protracted spawning season and it can spawn in captivity. The fecundity is very high. Aquaculture research with cobia was first reported in 1975 with the collection of wild caught cobia eggs off the coast of North Carolina. Larval development was described and after the termination of 131 day rearing trial it was concluded that cobia had good aquaculture potential because of its rapid growth and good flesh quality. Additional research on cobia was conducted in the late 1980s and early 1990s in the USA and Taiwan Province of China. Research continued and in 1997, the technology to raise large quantities of cobia fry had been developed and Taiwan Province of China was producing juvenile fish for grow out mostly in nearshore cage systems. Cobia production is also reported in the Bahamas, Belize, the Dominican Republic, Mexoico, the Philippines, Puerto Rico, the USA and Vietnam.

Broodstock management

The capacity to produce a large and dependable quality of cobia seeds is the key for establishing reliable and sustainable cobia aquaculture. One of the bottlenecks in the development of commercial aquaculture and a prerequisite for our ability to provided bio-secure and quality certified fry and later on implement genetic improvement programs is the control of reproductive processes of fish in captivity. Broodstock management usually includes collection, selection and domestication of breeders as well as control of maturation and spawning and egg collection. Wherever available, cobia broodstock can be purchased from the wild during the spawning season, then transferring them to culture systems for rather short time, and either obtaining spontaneous natural spawn or hormone induced spawning.

Cobia being a very active fish which grows to large size, broodstock development is mostly practised in sea cages. This will ensure good water exchange and provide a healthy environment for the broodstock fish. Marine sea cages with a volume of about 50 cubic meter can be employed. Brood fishes can be stocked at a density of about 2kg/ cubic meter. Trash fish (sardines, scads etc) are fed once in a day at the rate of 5% of biomass or till saturation. The trash fish has to be supplemented by vitamins and HUFA (fish oil, squid liver oil). Broodstock nutrition is very important and there is positive correlation of HUFA in the broodstock diets and in the eggs and larvae. Cobia attains maturity when the fish is about two years old . It has a protracted spawning season. It spawns under captivity naturally as well as by induction. It has high fecundity – ranges from 0.05 to 0.25 million eggs per kg. The eggs are pelagic with single oil globule. Metamorphosis from 9-11 dph. The egg diameter is 1.4mm. Hatching after 26 hours at 27º C. Larvae are very sensitive to environmental conditions. Larval mouth opens at 2-3 dph (temperature dependent). Oil drop completion at 7 dph. Broodstock nutrition plays a key role in the quality and viability of the larvae. Best temperature for maturation is around 27 º C and the best salinity range is 30-34ppt.

Bigger fishes of around 10 kg weight have to be selected for broodstock and the fishes selected should have normal shape without any deformity and with healthy behaviour. The other criteria for broodstock include (1) bright colour (ii)best size 10-15 kg, (iii) anus should be easily recognizable. Separation of males and females from the broodstock cage is required for conditioning the fish for breeding. It is required for controlling breeding and for planning the seed production. The best time for separating is one month before the breeding induction. Conditioning the breeders ensures best maturation and the egg and larval quality. Cannulation can be done to assess the maturity condition of the female. The maturation characteristics of female include egg size above 0.7mm, non-stick, brown colour, and round shape. In the case of mature males, by gently pressing the belly, the milt comes out. Breeders are characterized by big belly, chasing behaviour and red and swollen anus. The selected breeders are brought from the cages and transferred to cement tanks. Usually two males and one female is introduced to one spawning tank. Natural spawnings also will be obtained if breeders are selected properly. Induction of spawning can be done by injecting LHRHa 20 microgram per kg for females and 10 micrograms per kg for males. Spawning occurs within 12-24 hours after the injection. Egg collection can be done manually from the tank by employing 500 micron net.

Optimization of captive broodstock management protocols still remain a challenge to establish reliable biosecure hatcheries with genetic diversity and consistent production of high quality eggs and larvae.