

INVE Aquaculture offers solutions for hatchery production of Cobia
Fish Farming International, December 2005.

Cobia is an important species for the development of fish farming along the Atlantic coast of Central and South America. The enormous growth potential when stocked into cages has been well documented (>5kg in 1 year), and this coupled with the excellent flesh quality makes it a prime candidate to occupy several markets within the US and abroad. Forecasts project that the industry is set to develop rapidly and, in fact, several projects are already off the ground in Puerto Rico, Bahamas, Mexico, Belize, and Brazil. Initial harvest volumes could approach 10,000tons by 2008 for this region alone, demanding a hatchery production of nearly 2million fish.



Cobia juveniles are produced in a number of ways ranging from extensive pond rearing to semi-intensive tank culture to closed recirculation larval rearing. Husbandry technique often varies by location, climate, and level of investment for the hatchery. The greatest control of environment and nutritional parameters for larval rearing is achieved by the intensive production hatchery as in the case of other industrial cultured marine fish like flatfish, cod and European seabass/bream. Excellent success can be had in producing cobia with conventional methods using rotifers and Artemia. However, quality and consistency of practices are paramount to successful production of larvae using this technique.

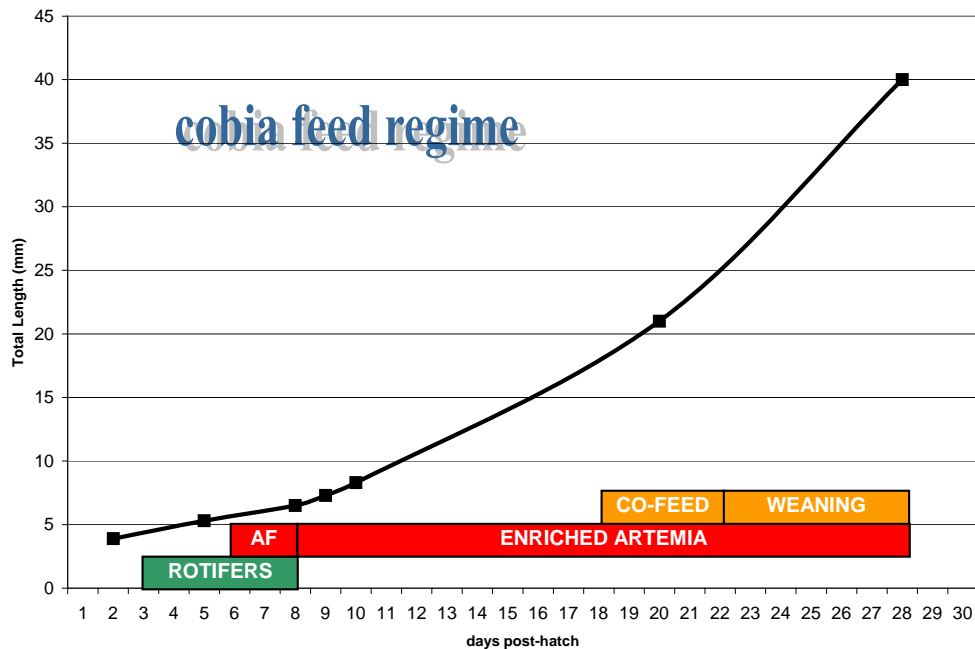
Nutritional advances, starting with better understanding of broodstock maturation and contributing factors of fry quality, all the way through to state-of-the-art technology for weaning diet formulation and production, will significantly contribute to improved larval survival and performance. Included in this process and of paramount importance is the sustainable production of quality live feeds that can bring balanced nutrition to larvae through the bioencapsulation process. Over the past 20 years, INVE has gained vast experience to build a strong reputation in marine larval rearing. As specialists in larval nutrition, INVE offers solutions for cobia rearing aimed at optimizing production and efficiency in the hatchery.

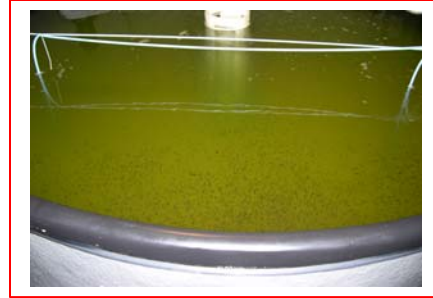
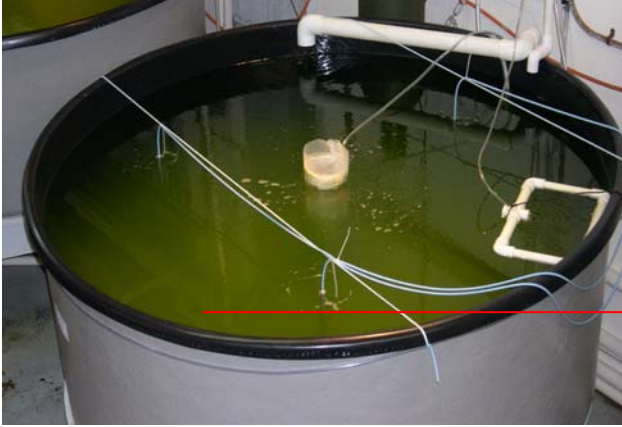
Broodstock nutrition is recognized as a crucial factor in determining the viability and quality of eggs and subsequent larvae. Typically with cobia, wild broodstock are captured, acclimated to hatchery conditions, and maintained on a fresh fish diet before spawning. The same broodstock population is retained within the hatchery for many years and spawning cycles. Even if repeatedly fed to satiation, a fresh fish diet is often limiting in protein (due to high moisture level) and lacking in other key nutritional components (i.e. vitamins, minerals) to support sustained spawning activity and proper recovery while in captivity. In response to this crucial need, INVE Aquaculture has

developed a number of specific broodstock diets to enrich parent fish and ensure fecundity and vitality.

INVE Aquaculture Nutrition's **Fish Breed-M** is a high quality concentrate for making moist broodstock feed in the hatchery. By mixing it with water, Fish Breed-M can be made into stable moist paste or moist sausages due to the inclusion of several marine meals and selected binders. The well-balanced end formula results in a complete package of highly digestible protein, high inclusion levels of fatty acids (with optimal DHA/EPA ratio), inclusion of natural pigments, increased levels of vitamin and minerals levels especially B1, B2, vitamin E, and vitamin C. With this solution, efficiency is improved in the hatchery by eliminating the need for onsite design and construction of broodstock diets. Fish Breed-M offers flexibility to decrease or even eliminate the use of fresh fish in the moist broodstock feed depending on the preference of the customer.

Larval rearing of cobia vary from location to location, and given their broad geographic distribution, protocols can be quite vast by nature of the environment and tradition of practices. More recently, INVE Aquaculture Nutrition participated in critical research aimed at developing a larval feed regime and specific culture conditions for intensive production of cobia. Carried out in the US at the Virginia Seafood Agricultural Research and Extension Center (Virginia Tech, USA), results from this work demonstrated that cobia could be reared to a weaned juvenile in 28 days with consistent survival of 22-28% using a conventional feed regime.





Rotifers (3-8 dph)

As soon as yolk sac reabsorbs, rotifers need to be fed to fry and for cobia this occurs at day 3 (at 28C). However, unlike other marine fish larvae, cobia will not feed on rotifers any sooner than this period. As such, the window of opportunity for first feeding is shortened and given their very high specific growth rate, it is important to commence feeding with rotifers that are rich in proteins, HUFA's and other essential components.

INVE Aquaculture offers **Culture Selco Plus** and **Protein Selco Plus** for high density culture and enrichment of rotifers. These products combine nutritional and practical benefits to fortify rotifers with essential marine DHA, phospholipids, vitamin C, immunostimulants and marine algae in order to reduce enrichment variability and provide consistent, high quality rotifers to larvae.

AF Artemia nauplii (day 6-8)

Beginning as early as 6dph, it was found that cobia larvae ingest and effectively digest the small-sized **AF Artemia** nauplii. AF Artemia is specially selected and processed by INVE for it's small size and high HUFA profile. They typically have a length of 430micron (width =162micron) - compared to typical Artemia of 630/185 microns – and can contain upto 20mg/g DW of n-3 HUFA as an Instar 1 nauplii. Using this solution, a significant boost in both protein and HUFA nutrition can be attained while achieving an early transition from rotifer to enriched Artemia feeding.

Enriched Artemia (day 9-28)

Cobia go through a relatively early metamorphosis that spans from approximately day 10-18. In addition to the more typical morphological and physiological transformations, abrupt changes in behavior can be seen during this period and the hydrodynamics of the culture system need to be adjusted in order to re-establish feeding behavior. The use of enriched Artemia is essential to carry larvae through this critical period as attempts to wean onto inert feeds during metamorphosis has resulted in low survival in the past.

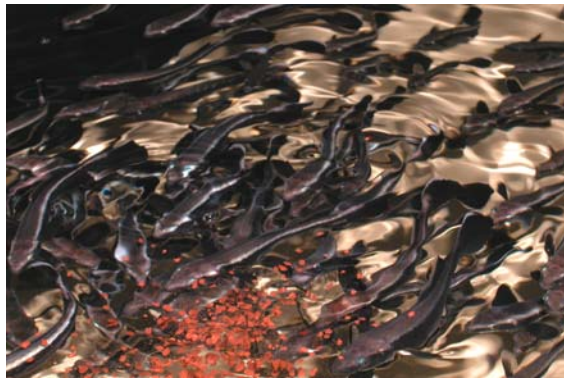
As a digestible feed, enriched Artemia offers the ability to provide the proteins, fats, and vitamins that are needed to sustain high growth rates and stress reduction. **DC DHA Selco** brings high inclusion rates of HUFA and properly balanced ratios of DHA, EPA, and ARA to the larvae through the Artemia bioencapsulation process. Further quality

enhancement can be achieved by hatching and enriching Artemia with conditioners like **Sanocare Hatch Controller** and “Disinfection Continuous” (DC) Selcos in order to greatly reduce the risk of disease outbreak do to *Vibrio sp.*

Co-feed and weaning (day 18-28)

Cobia will wean quickly to inert diets in just a few days. However, it is important to control the weaning process by integrating a co-feed phase to ensure a more uniform transition of all larvae. By weaning too fast, only those fish that “get with” the program will transition, then quickly outgrow non-weaned cohorts and lead to increased cannibalism. Co-feeding habituates larvae to compound diets while providing primary nutrition through enriched Artemia.

Attractability, palatability, digestibility, water stability, particle uniformity, and buoyancy characteristics are all crucial factors in determining the suitability of a diet for weaning. The **NRD** formulation aims at increasing the digestibility and metabolizable energy of larval diets while maintaining the integrity of the previously mentioned characteristics. It is carefully fractioned into narrow size ranges (200-300, 300-500, 400-600, and 500-800 microns) to ensure optimal uptake during the critical co-feeding phase for better homogeneity of fish population. **NRD G** continues the transition to nursery with micro granulates of 0.8mm and 1.2mm, and **IDL CW** finishes the nursery stage with 1.5 and 2.0mm pellets. **IDL CW** is specifically engineered to prepare the fish for cage transfer by offering a formulation that enhances the health status of juveniles through key nutritional co-factors to immune development. Once established onto a formulated diet, cobia grows rapidly and can reach 3 grams in less than 2months from hatch if temperature is maintained at 28 degrees.



In addition to the product line, INVE Aquaculture Nutrition maintains close contact and offers technical support to live feed production staff in hatcheries to ensure culture and enrichment standards set forth by the company, and to ensure that the latest production methodologies are passed on to the industry. It is also a mission of INVE to support aquaculture development for new production species in regions lacking experience in industrial fish production so that we may create a sound foundation for growth together with emerging industry.

For more information, please contact your local INVE Service Center or visit us at www.inve.com.