NOAA - National Aquaculture Program

Demonstrating Technological and Economic Feasibility of Cobia (*Rachycentron canadum*) Aquaculture from Hatchery to Market

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PROJECT UPDATE SEPTEMBER - DECEMBER 2006

Hatchery:

Broodstock cobia (*Rachycentron canadum*) have been conditioned to naturally spawn at the University of Miami Experimental Hatchery (UMEH). Millions of eggs and larvae were produced for larval rearing trials using probiotics and a simplified live feeds regime.

Research on probiotics use in live feeds continues. Several larval rearing trials were conducted with various degrees of success.

Thousands of fingerlings were produced as "by-product" of the larval rearing research trials. Some were shipped to Puerto Rico to

stocking Snapperfarm's Aquapod submerged cage. Others are being used at the hatchery for nutritional, stocking densities and disease studies and a growout trial in a pond. These trails are ongoing.

We continue to collaborate with the industry and institutions for the development of marine fish culture in the U.S. Several shipments of cobia eggs and yolk-sac larvae were made to private companies and universities (e.g. Great Bay Aquaculture from New Hampshire and Virginia Tech from Virginia). Both GBA and VT conducted successful larval rearing runs using eggs and larvae from cobia broodstock from UMEH.

Diseases and nutrition are two areas identified as of major importance for the successful development of the cobia aquaculture industry in the US. Besides the ciliate protozoan parasites *Amyloodinium*, *Cryptocaryon* and *Brooklinella*, a bacterial disease caused by *Photobacterium sp* has been identified as a major potential threat for cobia during the fingerling, juvenile and adult stages. We continue to work in cooperation with UM veterinarians ad outside labs to perfect methods to identify, monitor and control disease outbreaks during both the hatchery and the growout stages.

Continued development and improvement of juvenile shipping methodologies

Continued investigation into optimization of feeds formulation necessary for optimal growth and minimal dietary protein and lipid levels

Background and preliminary investigations incorporating probiotics and microbial management into live feeds culture and marine finfish larval rearing

We are currently conducting an experimental polyculture growout trial of cobia and conch in a saltwater pond at the UMEH. Cobia and conch juveniles were stocked in September of 2006; harvest is scheduled for April 2007. Results are highly promising, with both cobia and conch growing very well with no mortalities observed to date.

Growout:

Snapperfarm has currently 3 submerged cages deployed and stocked with cobia for growout on its site off Culebra Island in Puerto Rico: two SeaStations and one Aquapod. This feat is per se a great accomplishment and an enormous success.

The testing of the first Aquapod cage system by Snapperfram in Puerto Rico is ongoing with highly satisfactory results.

It appears that the rigid geodesic design of the Aquapod system has solved one of the biggest problems faced by open ocean aquaculture operators in the tropics; losses due to predator (shark) attacks.

As one of the primary objectives of this proposal (improved harvesting technology) Snapperfarm has successfully adapted a harvesting system for the first cobia harvests from an Aquapod. We are testing pneumatic stunners and bleeding to improve product quality and make the process more humane.

The main focus this year both at the hatchery and at the growout facility is on health and nutrition. A new bacterial disease has been identified affecting cobia juveniles (*Photobacterium sp*). We are currently considering testing vaccines on the smallest crop (75-100 grams juveniles) or in the next stocking early in the spring.

Nutrition trials are being carried out both at the hatchery and in the offshore cages. In the hatchery, we are comparing two different diets aiming at lowering protein levels and reducing fish meal use in aquafeeds for cobia. In the growout cages, three different diets are being tested (one per cage), all with different protein/energy ratios and levels of fishmeal substitution.

Snapperfarm is still working on the permits to expand its operations to 8 cages.

Environmental monitoring continues using a simplified method to detect nutrient buildup before it actually constitutes a problem. So far, results show that there are no significant or cumulative environmental footprint neither at the bottom nor at the water column of the site where the cages are deployed. Similar results were also obtained in the Bahamas. A manuscript describing these findings is being submitted for publication in a peer review journal (Marine Ecology Progress Series)

List of publications related to the NOAA funded projects between 2004 and 2006:

Benetti, D., L. Brand, J. Collins, R. Orhun, A. Benetti, B. O'Hanlon, A. Danylchuk, D. Alston, J. Rivera, and A. Cabarcas. 2006. Can offshore aquaculture of carnivorous fish be sustainable? Case Studies from the Caribbean. World Aquaculture 37(1): 44-47.

Benetti, D.D., M.R. Orhun, I. Zink, F. G. Cavalin, B. Sardenberg, K. Palmer, B. Denlinger, D. Bacoat and B. O'Hanlon. In press. Aquaculture of cobia (Rachycentron canadum) in the Americas and the Caribbean. Book Chapter In: I.-C. Liao (ed), Cobia Aquaculture: 20 p.

Benetti, D.D., M. Nakada, S. Shotton, C. Poortenaar, P. Tracy, W. Hutchinson 2005. Aquaculture of three species of yellowtail jacks (Carangidae, *Seriola spp*). In: Aquaculture in the 21st Century, A. Kelly and J. Silverstein, eds. American Fisheries Society Symposium 46: 491-515

Benetti, D.D., M. Nakada and M.R. Orhun. Aquaculture of Yellowtail Hamachi, *Seriola quinqueradiata*. Aquaculture Compendium, CABI Ed. Available at the internet at http://www.cabicompendium.org/ac/datasheet.asp?CCODE=SEROQU and as CD.

Benetti, D.D. and M.R. Orhun. Cobia (*Rachycentron canadum*). FAO/FIRI - Inland Water Resources and Aquaculture Service (FIRI) 2004-06 Fact Sheet. Food and Agriculture Organization (FAO), Rome, Italy. (in press)

Alston, D.E., A. Cabarcas-Nuñez, C. E. Helsley, C. Bridger and D. Benetti. 2006. Standardized environmental monitoring of open ocean cage sites: Basic considerations. World Aquaculture 37(2): 24-26

Zink, I. C., F.G. Cavalin, D. Bacoat, B. Denlinger, K. Palmer, B. Sardenburg, R. Kirkpatrick, R. Orhun, D. Benetti. 2006. U.S. trials compare commercial diets fed to juvenile cobia. Global Aquaculture Advocate 9(2): 53-54.

Zink, I. C., F.G. Cavalin, D. Bacoat, B. Denlinger, K. Palmer, B. Sardenberg, R. Kirkpatrick, R. Orhun, D. Benetti. 2006. U.S. trials compare commercial diets fed to juvenile cobia. Global Aquaculture Advocate 9 (2):53-54.

Davis, M., S. Cox, J. Corsaut, T. Wadley, B. O'Hanlon, J. Rivera, D. Benetti, M. Pardee and L. Creswell. 2005. Collection of Spiny Lobster Pueruli in Puerto Rico: An Integrated Approach. Proceedings of the 58th Gulf and Caribbean Fisheries Institute, San Andres, Colombia. In Press.

Rotman, F.J., D.D. Benetti, E. DeMicco and M.R. Orhun. 2005. Experimental larval rearing of the marine Sciaenidae spotted seatrout (*Cynoscion nebulosus*) using probiotics as microbial control agent. J. Aquac. Trop. 20(2): 175-184

Benetti, D.D. 2004. Offshore cages survive hurricanes. Global Aquaculture Alliance Technical Magazine Vol. 7(5): 52-53

Eleven abstracts submitted for oral presentations at the World Aquaculture Society Conference in Florence, Italy, in May 2006, Aquaculture America Conference in Las Vegas, Nevada, USA., in February 2006 and in San Antonio, Texas, in February of 2007.

The success of the research work conducted in association with these grant proposals has caught the attention of the national and international media. What follows are some of the highlights: In 2006, we were twice interviewed by NPR and were featured in several newspaper and magazine articles. Recently, ABC National News interviewed us at the UMEH and Snapperfarm and will run a piece in World News and Nightline sometime in December 2006. A crew from Outdoor Living Network (Outdoor Channel) visited Snapperfarm for interviewing and filming the farm. The show (World Wide Sport Fishing) is planned to air in February or March 2007. A photo of Snapperfarm also made the cut (as a solution to the problem) for a large 40 page global fisheries article that will run in National Geographic magazine in April 2007.