Innovation & Investment

First commercial inland farm in Florida uses zero discharge in low-salinity

1 October 2001

By David Z. McMahon , Bart Baca, Ph.D. and Tzachi M. Samocha, Ph.D.

System can reduce nutrient loading in adjacent waters

Aerial view of 1-ha production ponds and ancillary facilities at OceanBoy Farms, an inland shrimp farm in south central Florida, USA.

OceanBoy Farms (OBF) is developing an inland, freshwater, shrimp production system that includes a 1,500-square-meter, greenhouse-enclosed nursery with HDPE-lined raceways and outdoor ponds operated with limited or zero water discharge. Production protocols include nursery, grow-out,

processing, and marketing aspects of the Pacific white shrimp (*Litopenaeus vannamei)*. The first phase includes twelve 1-ha shrimp grow-out ponds, two 1-ha ponds for polyculture of fish and shrimp, two 0.5-ha ponds for finfish, one 2-ha pond for water treatment, a 2 million-liter tank field reservoir, and a state-of-the-art, value-added processing plant.

Site selection

OBF was developed on 75 ha (185 acres) just outside the town of LaBelle, in south-central Florida, USA, an agricultural community that has welcomed the new project with open arms and provided nearly every needed service for the project, from employees to insurance, concrete to pipes. According to Chief of Operations Robin Pearl: “We are located in a small, friendly town where we help each other, and we are within 2.5 hours of more than 7 million potential customers. What more could we ask for?”

Labor

The county suffers from the largest unemployment in Florida, due to citrus and sugar crop reductions. A hard-working migrant work force is readily available and services needed to support large agri-projects are only a phone call away.

Water quality

Paddlewheel aerators are used in OceanBoy Farms’ production ponds.

One of the primary components is availability of water with the proper quality. LaBelle and the surrounding communities are located above several different water tables with the proper water hardness and salinity necessary for inland culture of *L. vannamei*. The area’s remoteness provides for added control in establishing the biosecurity protocols needed.

Expanding horizons

Several pilot projects in the United States for the culture of *L. vannamei* in zero discharge recirculation and zero exchange inland fresh/brackish water systems are currently marching forward. Areas where shrimp culture would have once been considered impossible or even ridiculous are now proving to be

practical candidates for shrimp culture. Areas such as the deserts of Arizona and Israel, the clay ponds of Alabama and Mississippi, raceways on the Atlantic coast and lined ponds halfway between the Gulf of Mexico and the Atlantic Ocean in South Florida. It is no longer unusual to find shrimp farms ~ 8 to 320 km (~ 5-200 miles) from the nearest ocean.

New opportunities, problems

With this move inland, new opportunities and new problems have arisen. Land costs near or on the coast of Florida made shrimp production financially impractical when compared to other regions. The environmental requirements in such densely populated regions made permitting and mitigation less than appealing, and exotic culture permitting next to impossible. Land may cost as much as U.S. $2.5 million per hectare (~ $1 million per acre) on the coast, but drop to ($1,500 per acre) ~ 48 km (30 miles) inland. Exotic species once banned from production in coastal areas are less of an issue inland. Additionally, locating an aquaculture facility within an agricultural community rather than an urban center can enhance financing opportunities, and provide a readily available and reliable work force. Agricultural communities can provide happy neighbors that may be hard to find on a crowded oceanfront or bay front property.

Protocols for success

OBF was built as a profit center to demonstrate the protocols needed for the profitable operation of an inland marine shrimp farm.

Biosecurity

OBF is well located to be free from ocean-borne

On-site indoor nursery provides a facility for receiving and pregrowing larvae before stocking.

pathogens, with appropriate water quality, and within a few hours of one of the state's premier SPF hatcheries, Shrimp Improvement Systems on Plantation Key.

OBF implements many standard biosecurity rules, including required check-in hand washing, shoe baths, and chlorine baths for the limited number of service vehicles that are permitted on-site. No seafood of any sort may be brought onto the farm, and visitors who have been to another farm within 30 days, must wear special disposable jump suits and footwear. All PLs are PCR tested twice for WSSV and other pathogens by the Aquatic Animal Health Laboratory at the Harbor Branch Oceanographic Institution), first when stocked into the nursery phase and then when they are transferred into the growout ponds. Daily procedures include water quality tests and inspection of shrimp samples. Signed health certificates accompany all aquatic animals received at the farm.

Zero water exchange

Regular monitoring of water quality and juvenile health must be carried out before stocking the growout phase.

Third among the major protocols at OBF is the development of a zero exchange water management system. Trials are now evaluating recommended diets and stocking densities.

As shown elsewhere, including Belize Aquaculture, Inc., feeds with reduced protein and proper C/N balances are proving to be key. Additional substrate construction and deployment are also being tested, as well as water circulation models best suited to our system.

Preliminary results

Acclimation and nursery phase protocols have been established. Shrimp growth and survival in ponds are all currently within acceptable parameters, and overall production and profit should exceed projections. Other studies are also evaluating the economic viability of shrimp and tilapia.

OBF has taken the first steps to make a zero discharge, inland, shrimp production system in Florida a reality. These systems can reduce nutrient loading of adjacent waters. Heterotrophic culture systems have the potential to reduce protein requirements and move from marine to vegetable protein sources, benefiting the farmer and the environment.

(Editor's Note: This article was originally published in the October 2001 print edition of the Global Aquaculture Advocate*.)*

Authors

DAVID Z. MCMAHON

Nova Southeastern University Oceanographic Center
8000 North Ocean Drive
Dania, Florida 33004 USA

oceanboy98@yahoo.com (mailto:oceanboy98@yahoo.com)

BART BACA, PH.D.

Nova Southeastern University Oceanographic Center
8000 North Ocean Drive
Dania, Florida 33004 USA

oceanboy98@yahoo.com (mailto:oceanboy98@yahoo.com)

TZACHI M. SAMOCHA, PH.D.

Texas Agricultural Experiment Station
Shrimp Mariculture Research Facility
Corpus Christi, Texas, USA