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Technology transfer: Renovation of commercial shrimp hatchery in Indonesia

1 November 2006
By Andy Watkins

Renovation of commercial shrimp hatchery in Indonesia

The P.T. Prima Larvae facility in southern Sumatra was updated and converted from a black tiger hatchery to efficiently produce white shrimp postlarvae.

The foundations of modern shrimp farming were laid in the traditional aquaculture systems developed in Asia, and the techniques developed in that region have spread all over the world. Nowadays, aquaculture technology is also being transferred back to Asia.

Recently this was driven by the spread of farming the Western Hemisphere's Pacific white shrimp (*Litopenaeus vannamei).* A complete make-over of a semi-abandoned hatchery for black tiger shrimp (*Penaeus monodon*) in Indonesia applied hatchery methods refined in the West with white shrimp.

Original infrastructure

Successful intensive farming of *L. vannamei* in Indonesia and other parts of Asia requires a consistent supply of high-quality postlarvae. In late 2004, P.T. Prima Larvae contracted the author's company, Hatchery Production Consultants, to reactivate its hatchery facility in Lampung in southern Sumatra.

The original infrastructure consisted of two buildings. The first had 10, 50-cubic-meter concrete tanks for larviculture. Another maturation building contained four 15-cubic-meter round tanks. The system was used to produce *P. monodon* fry in the past, but reduced demand led to the hatchery's closure.

Shrimp nauplii are raised to young postlarvae in concrete V-bottom tanks.

Renovations

Over the last 14 months, the HPC team from Florida, USA, oversaw the transformation of a traditional Asian hatchery into a Western-style operation with an emphasis on incorporating the latest available technology for *L. vannamei* postlarvae production. Construction of new infrastructure (Table 1) lasted from February 2005 to April 2006. In addition, staff lodging quarters and the generator building were also upgraded.

Table 1. Description of new and upgraded infrastructure.

Hatchery Component	Characteristics
Larvae culture building	• 14 – 35-m^3 V-bottom tanks • 3 - 300-m^3 reservoirs • Pumping and filtration room • Air-conditioned algal production room • Probiotic production room • Sterilization room • Larval analysis room • Postlarvae transfer room • Blower room
Outside algal culture building	• 6 – 25-m^3 raceway-type tanks with center dividers
New pump station	• Sand filtration • 5-µ filtration • Ozone injection
Artemia hatching	• 2 – 4-m^3 V-bottom hatching tanks
Maturation building	• Expansion to 8 – 15-m^3 maturation tanks • Recirculation/filtration/chilling water system room • Mass spawning/hatching room • Food preparation room • Reserve brood-holding tanks

Operation

The renovated maturation department is now operated on a recirculation water system with less than 10 percent of the total water volume added daily. This reduced discharge enabled greater control of critical water parameters, decreased contamination risk, and increased productivity.

The overall mating rate was maintained above 10 percent per day. The genetically improved broodstock used in the hatchery were obtained from an established and reputable commercial operation in the Florida Keys, USA. All feeds were obtained from biosecure sources in Europe and the U.S. Starting with pure cultures, algae were grown indoors in caged plastic bags. The outside mass cultures were grown in covered raceways using mechanical paddlewheels for water movement and aeration.

Postlarvae production

Postlarvae were continually produced with survival rates above 60 percent using ozonated, ultraviolet-treated water filtered to 1 µ in combination with an in-house probiotic. By avoiding the costly, traditional dry-out/disinfection down time, it was possible to make efficient use of the nauplii produced from the maturation department.

The new infrastructure facilitated the production of larvae with a two-stage system transferring PL_{2-3} from the V-bottom tanks into the square, flat-bottom postlarvae tanks. Artificial substrates were used to increase the available surface area for benthic feeding.

The team also improved growth rates considerably by using benthic algae and other highly nutritious diets. The end result was consistent production of 8-mm, PL_8 in 15-16 days from nauplii.

(Editor's Note: This article was originally published in the

Algae are grown indoors in caged plastic bags, then moved outside for mass culture.

November/December 2006 print edition of the Global Aquaculture Advocate*.)*

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