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Impact of high-performance substrate technology on intensive commercial shrimp farm

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Mexican shrimp farm reduced its required daily water exchange 70 percent

Industrias Pecis, S.A. de C.V., with headquarters in Merida, Yucatan, Mexico, operates a 45-ha intensive shrimp farm near the town of Sisal, on the northwest coast of the Yucatan Peninsula. In addition to the growout farm, which is currently being expanded from 30, 1.5-ha unlined ponds, Pecis also

Production ponds using AquaMats® substrates made gains in yield and profitability.

operates two large hatcheries and a packing plant.

The company has been producing *L. vannamei* shrimp since 1997. The farm has not had any major disease problem, and has been able to consistently improve its yields by incorporating the latest developments in biosecure, sustainable shrimp-farming technology.

Improving production technology

Through a disciplined process of investigation, evaluation, and use of new technology, Pecis has steadily increased production and profitability. Examples of this process are the development of a line of disease-free, domesticated broodstock and postlarvae; and a multiphase production system that includes the use of intensive nursery raceways and nursery ponds, probiotics, and improved feeds. After improving all phases of its operations, Pecis began work with AquaMats® substrate technology, and achieved further gains in production.

Substrate technology

A year of data evidences the importance of the substrate technology implemented in 20 percent of the ponds to date. Essentially, the substrate provides a very high amount of a surface area that is readily colonized by bacteria and benthic algae, which together behave as a huge biofilter in absorbing metabolic waste.

At the same time, the microfauna (copepods, rotifers, etc.) associated with the colonized surfaces provide an important alternative, natural food supply. The substrates also offer increased grazing area for shrimp, and refuge during molting, and can aid in the dispersion of the population.

By exploiting the biofiltration capabilities of substrate technology, Pecis has reduced its required daily water exchange 70 percent, from an average of 11 percent to 3 percent exchange.

Profitability

Financial analysis of the most recent grow-out cycle (ponds stocked in August 2000) shows that production costs averaged U.S. $3.57 per kilogram of shrimp in ponds equipped with substrates and $3.68 per kilogram of shrimp in ponds without substrates. These figures include the costs of postlarvae, feed, fertilizers, probiotics, direct labor, aeration, pumping, maintenance, harvest, processing, and insurance. Fig. 1 shows the reduced water exchange used in ponds with substrates versus ponds without substrates.

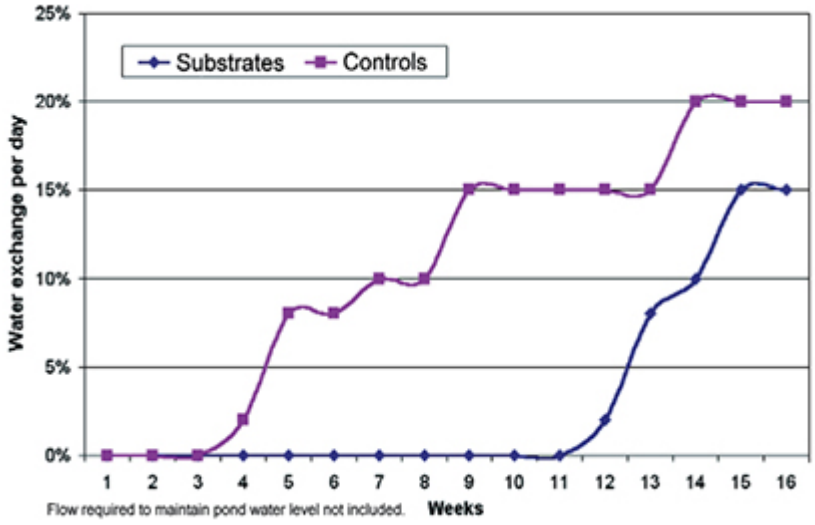

Fig. 1: Typical water exchange protocol.

Yields were significantly increased using substrate technology, with an average 12.2 metric tons (MT) per hectare per cycle yield in ponds with substrates, compared to 8.2 MT per hectare per cycle in those without. The combination of a 3 percent reduction in operating costs and 48 percent higher yield in ponds with

substrates resulted in an overall increase of 52 percent in net profit. Although the investment for installing substrate technology was significant (about U.S. $11,300 per hectare), it was recovered in less than one grow-out cycle (return on investment = 450 percent per year).

Conclusion

At Industrias Pecis' intensive shrimp farm near Merida, Mexico, substrate technology has allowed a reduction in water exchange from 11 percent to 3 percent. It also improved profitability by increasing yields by 48 percent and reducing operating costs by 3 percent.

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