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Tilapia culture in Ecuador

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By Mario Velasco, Ph.D. and Gorki Freire, MBA

Resilient industry coexists with shrimp

Most tilapia production in Ecuador is carried out in polyculture with Pacific white shrimp. Pond management is totally geared toward the tilapia, so the shrimp feed on natural pond productivity.

In 1998, Ecuador was the largest shrimp-producing country in the Western Hemisphere and had record shrimp production. Then white spot syndrome virus (WSSV) hit and devastated production in 1999.

At that time, Ecuador already had a small, export-oriented tilapia culture industry that was started in the early 1990s. By 1995, a few companies had achieved considerable volumes of the fish in the Taura River region, where Taura syndrome virus (TSV) had affected shrimp production.

After the record production of shrimp in 1998, some tilapia-farming companies were on the verge of switching back to the more profitable shrimp-farming business. However, when WSSV struck the following year, tilapia culture found favor again.

Tilapia farming was perceived as a good way to pay bills and keep the companies viable while adapting to the presence of WSSV in the country. Moreover, farmers found that shrimp stocked with tilapia did not suffer as badly in terms of mortality as shrimp stocked in monoculture ponds. This resulted in rapid expansion of tilapia culture in shrimp farms.

Rapid expansion

The expansion of tilapia culture in Ecuador is illustrated by export figures. The United States is the main market for fresh tilapia fillet exports from Costa Rica, Ecuador and Honduras. Costa Rica was the main tilapia exporter in Latin America until 1999.

In 1998, Ecuador exported about 646 metric tons (MT) of fresh fillets, while Costa Rica exported 2,206 MT. Ecuador's tilapia fillet exports almost tripled in 1999, and production just kept growing. By 2000, Ecuador was the top fresh tilapia fillet exporter in the region – its 3,250 MT surpassed Costa Rica's 2,684 and Honduras' 1,038 MT figures.

Ecuador maintained this top ranking until 2007, when it reached an export figure of 11,900 MT. Ecuador product now accounts for about 48 percent of the total volume of fresh tilapia fillets imported to the U.S.

The capacity of the Ecuadorian aquaculture industry to rapidly adapt to the alternative species is worth noting. The 900 ha dedicated to tilapia culture in 1998 grew to about 4,000 hectares (ha) in production by 2006, and this number has been relatively stable since then. Tilapia culture expanded in 8-ha ponds originally constructed for semiextensive culture of shrimp.

Thus, most of the culture was – and still is – conducted in brackish water with salinities ranging from 0 psu during the January-April hot and rainy season with temperatures of 6 to 30 degrees-C up to 30 psu during the May-December cold and dry season, which has temperatures of 22 to 27 degrees-C.

Integration, polyculture

Tilapia in Ecuador is mainly produced by a handful of vertically integrated companies that export over 90 percent of the product. About half of the companies manufacture their own feeds. Most of the culture is carried out in polyculture with Pacific white shrimp (*Litopenaeus vannamei),* which makes a very interesting production model. This practice makes the production systems more efficient and contributes to financial sustainability.

Although both animals have their optimum salinity ranges in terms of growth potential, they are euryhaline and adapt well to a range of salinities. A red hybrid tilapia is used at farms with higher salinities, and other varieties were tested for salinity tolerance, including the Chitralada variety developed in Thailand that seems to be gaining wide acceptance.

Pond management is totally geared toward the tilapia and not the shrimp. After the shrimp are stocked in the ponds at densities of 4 to 9 postlarvae per square meter, no further care is provided. The shrimp feed on natural pond productivity and at harvest reach sizes of 20 grams and greater with 60 to 70 percent survival.

Multiphase production

To support rising production, one of the first things that had to be done was to increase fry production at the existing hatcheries. The numbers of broodstock ponds and larval tanks at the hatcheries were increased. Construction of new hatcheries followed. Genetic-selection programs to improve desired traits were implemented by some companies.

At hatcheries, fry production is targeted toward achieving a mean weight of 0.4 to 0.5 grams in 21 to 28 days, depending on water temperature. Usually, feeds with 45-50 percent protein are used at high feeding frequencies of over 24 times/day. Survival at this stage is usually 75 to 85 percent.

Fry are then transferred to nearby ponds and grown for 60 days to a mean size of 20 g at a stocking density of about 30 fry per square meter. Feed with 40 to 45 percent protein is fed 8 to 12 times/day. Survival at this stage is 70 to 80 percent.

The juveniles are then distributed to other ponds within the same farm or to other farms for a pregrowout phase to a mean size of 200 g. Stocking density is about 6 juveniles per square meter, and the growth period is 120 days. Feed of 30 to 35 percent protein is used at a frequency of 3 to 6 times per day. Survival at this stage is 75 to 85 percent.

The 200-g fish are transferred to larger ponds for final grow-out to a mean size of 800 g. Stocking density is 1.0 to 1.4 fish per square meter during the growth period of 170 to 200 days. Feed with 28 to 32 percent protein is given 2 to 3 times/day. Survival in the final phase is typically 75 to 85 percent. Average water-exchange rates can reach 20 percent per day, and feeding rates may reach 80 kg/ha/day.

Average tilapia production is 7 MT per ha. However, some farms with higher technical expertise and resources may reach production of 18 MT per ha and obtain growth rates of 4 grams per day using greater water exchange. Human resources at farms vary 5-10 persons/ha depending on how farm operations are carried out.

Regarding health management, the major problems at tilapia farms relate to the control of *Flavobacterium*, *Flexibacter* and *Saprolegnia* in the hatcheries; Amyloodinium infestation in saline water ponds and *Streptococcus* and *Aeromonas* bacterial outbreaks in pre-grow-out and final grow-out phases. Biosecurity measures and implementation of novel management methods to break the life cycle of the pathogenic organisms greatly helped to ameliorate these problems.

At harvest time, fish are hauled live to the processing plants. Some plants in Ecuador process up to 45 MT of whole tilapia fillets daily. The exportation of frozen fillets to Europe has currently been initiated.

Perspectives: production, marketing

This year, tilapia production in Ecuador significantly declined compared to 2007 levels, and fresh fillet exports declined by 30 percent during the first six months of 2008. Higher production and particularly feed costs discouraged tilapia culture and encouraged a reversal to shrimp monoculture. In fact, shrimp production this year will probably create a new volume record for Ecuador. Honduras is picking up the volume of tilapia not produced by Ecuador.

Tilapia consumption in the United States is steady, and further market increases are probable, but at a slower rate than in previous years. China became a new major fresh tilapia fillet provider to the U.S. market in 2008, and it remains to be seen if this is a temporary development due to current market circumstances or a long-term marketing strategy. Nevertheless, Ecuador, Honduras and Costa Rica have the ability to respond quickly to market demands with high-quality, wholesome tilapia that meets the demands of consumers.

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Authors

MARIO VELASCO, PH.D.
Maricultura Negocios y Tecnología, S.L.
Cond. Lincoln Park #808
8 Carr. #833
Guaynabo, Puerto Rico 00969-3368 USA
director@marnetec.com (mailto:director@marnetec.com)

GORKI FREIRE, MBA
Kalusa Farm
Guayaquil, Ecuador