

Feeds:

As farms evolve from low to high stocking densities, the quality of feed becomes very important. Most extensive farms (low stocking densities) don't feed at all; shrimp feed on naturally occurring food organisms in the pond. Other extensive farms use small amounts of feed and fertilizer to stimulate the natural food chain. On semi-intensive farms, with many more shrimp scouring the bottom of the ponds, most of the feed is consumed by the shrimp and less is available to serve as a stimulant to the natural food web. Therefore, the quality of the feed is more important because the shrimp get most of their nutrition from it. On intensive farms, shrimp depend on commercial diets for most of their nutrients, so intensive farms require the very best feeds.

Ideally, shrimp in semi-intensive and intensive farms should be fed four or five times a day, with at least three hours between feedings. High-quality feeds offer several advantages over lower quality feeds: better feed conversion, faster growth, lower mortalities and improved water quality. In 1997, feed mills around the world produced approximately one million metric tons of shrimp feed. All things considered, including the abysmal state of shrimp farming statistics, that figure probably increased to 1.5 million tons by 2000.

Feeds can represent over 50% of the production costs on intensive shrimp farms, and shrimp feed makes a mighty contribution to the sludge on the bottom of the pond. Consequently, shrimp farmers believe better feeds and feeding strategies could save them a lot of money. The shrimp's habit of slowly nibbling feed particles causes substantial nutrient losses even if the pellets are of good quality. Increasing the water stability of the feed beyond a couple of hours does not help, because leaching of the nutrients will continue, even from pellets showing excellent physical stability. Within an hour, shrimp feed can lose more than 20% of its crude protein, about 50% of its carbohydrates

and 85 to 95% of its vitamin content. As much as 77% of the nitrogen and 86% of the phosphorus compounds in shrimp feed are wasted. The waste either accumulates on the pond bottom, or is discharged into the environment.

Instead of increasing pellet stability beyond a couple of hours, feeds should include attractants so they are consumed within 20 or 30

minutes.

Because the Asian shrimp feed market is highly competitive, most feed manufacturers produce feeds with excessive nutrient levels to assure that their products are well received in the marketplace. Consequently, shrimp feeds tend to contain a considerable volume of fishmeal, usually 30 to 35% of the total. In those countries that produce shrimp extensively—Indonesia, India, Philippines, Vietnam and Bangladesh—farmers utilize feeds with lower protein and fishmeal levels.

Farmers in the Western Hemisphere depend almost entirely on dry, commercial feeds, while 50% of those in the Eastern Hemisphere utilize farm-made feeds and natural foods, such as trash fish, seafood by-products and various mollusks and crustaceans, a practice which can encourage the spread of disease and adds to the organic load in the pond.