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# Feed trays: The good, the bad, the ugly

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## Question the long-standing assumptions regarding use, effectiveness

Industries evolve because of change. The shrimp industry is experiencing significant change in numerous areas, including intensification, markets, economics, regulation, genetics, feeds and nutrition. In spite of such changes, it is frequently human nature to continue to use traditional production methods that have worked satisfactorily in the past, although they may not be as effective in optimizing profits under present and future conditions.



Information gleaned from the use of feed trays can be both helpful and misleading. The authors encourage the verification of primary assumptions to reality.

## Shrimp feed trays

The use of feeding trays addresses the need to reduce overfeeding and related feed costs, and improve shrimp pond bottoms, water quality and associated water discharges. It is based on the critical assumptions that all feed leaving the trays is carried off by shrimp, and that all the feed that leaves the trays is consumed and digested by the shrimp.

Feeding shrimp using feed trays involves placing a quantity of feed on a properly designed feed tray, placing the feed and tray in the water at the pond bottom and observing the rate of feed disappearance from the tray over time. The rate of disappearance of the feed is used to determine the amount of feed that should be fed each day.

Rapid feed disappearance suggests that more feed should be fed, and slow feed disappearance suggests that less feed should be given to culture animals. In some cases, all of the feed offered to the shrimp in a pond is placed on trays for feeding. In other cases, a small number of trays are used as a sample measurement, while most of the feed is applied by broadcast feeding.

Feeding trays evolved in Taiwan to feed shrimp in ponds with highly degraded bottoms. In the 1980s, the Peruvian industry adopted the technology to control the application of medicated feeds and estimate mortality. Feed tray use also spread to Brazil and Guatemala. Their use in Guatemala went beyond the monitoring of feed consumption to a tool for monitoring the health of the shrimp.

## The good (strengths)

Feed consumption varies because of the genetic capacity of the shrimp, as well as temperature and other physical conditions in the pond. Additionally, feeding varies daily due to shrimp molting states. When used correctly for 100% of the feed, trays provide much greater control over consumption rates and other benefits.

- Feed-conversion ratios are reduced.
- Per-unit feed costs are reduced.
- Growth is frequently improved.
- Culture conditions are improved.
- Improved water quality supports increased stocking density, greater yield and reduced environmental pollution.
- Information can be provided on size class distribution.
- The presence of predators and competitors can be established.
- Trays can determine uninhabited areas of ponds where animals are not feeding.
- Regular feed tray use causes more frequent observation of the animals, which contributes to more rapid management decisions concerning feed rates, health management and harvesting times.
- Shrimp feeding on dead animals transport the dead ones to trays in the process of searching for fresh feed. This provides a method for observing even minor mortalities.
- It is believed that shrimp contract acute hepatopancreatic necrosis mainly because of contaminated pond bottoms, not the water column. Feed that contacts pond bottoms becomes contaminated and acts as a substrate for bacteria. The consumption of feed that spends more time in a pond increases the chances of disease development. The use of feed trays reduces the contact of feed with the bottom.

## The bad (limitations)

The employees who perform feeding must be competent, properly trained and economically motivated. Using trays without proper supervision can cause huge problems. Additional considerations are outlined below.

- Trays should be on buoys, not tied to fixed posts that result in depressions in pond bottoms. This requires two-person feeding teams and results in substantial cost increases.
- The number of daily feedings per day is limited because of the time required to apply the feed.
- Feed tray designs must be correct, but there is no industry standard.
- The amount of feed that can be placed on a tray at one time is limited.
- The decision to increase or decrease feeding rates is based on human interpretation. It is not an exact science and is thus subject to considerable error.
- The amount of trays and related gear can be considerable, and this equipment requires maintenance.

- Feed that leaves the feed trays by currents or other means besides shrimp can lead to misinterpretation and overfeeding.
- Feed that remains on trays, although the shrimp are hungry, can lead to underfeeding. Shrimp dive and dig for feed dropped near trays, which causes depressions that fill with uneaten feed and detritus that is repulsive to the shrimp. Shrimp also avoid shallow areas with excessive sunlight, low oxygen levels or excessive water flows, so these are undesirable locations for feed trays.
- Feed removed from trays by shrimp that consume only a portion of it can lead to misinterpretation and overfeeding. At temperatures of 33 degrees C and above, shrimp rapidly remove feed from trays, but do not grow faster, according to reports from Thailand.



Feeding with feed trays increases labor and other costs, requiring careful cost-benefit analysis.

## The ugly (pitfalls)

It is a given management responsibility to continually attempt to improve efficiency, productivity and profitability. In spite of this, very few articles in the literature provide detailed analyses of the effects of feed trays on pond profitability. Reducing feed-conversion ratios reduces feed costs, but sensitivity analyses clearly show that profitability is primarily affected by yield, which is made up of animal size, survivability and selling price.

Studies report that using feed trays improves growth rates, which is logically believed to be a result of improved water quality. However, it is quite possible that growth rates may not be optimum because animals are not fed sufficient quantities of feed to maximize their genetic potential for growth. Absent from reports on feed trays is the presence of a positive control in ponds using feed trays, which could demonstrate that shrimp fed from feed trays grow at the maximum potential rate. Without knowing if shrimp are growing at their maximum rate based on their genetics, valid economic conclusions concerning the use of feed trays are not possible.

A review of the limitations clearly shows numerous reasons why the use of feed trays can result in incorrect conclusions concerning optimum feeding rates for maximized growth rate and survival. When broadcast feeding is based on a few sample feed trays in the ponds, there is considerable opportunity

to significantly underfeed or overfeed the shrimp. This is especially true as stocking densities are increased.

## Perspectives

The use of feed trays in shrimp culture has undoubtedly contributed to greater productivity, efficiency and profitability, but conditions are changing. The aquaculture industry must continually challenge existing management protocols to see if assumptions remain accurate under current practices. This article strongly suggests a serious review of the various techniques and assumptions associated with the use of feed trays. Although seldom verified, many producers still assume that all feed leaving feeding trays is carried off, consumed and digested by the shrimp. Only a few reports from Australia have attempted to verify these assumptions by sending divers into ponds to observe the shrimp directly.

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