1994

The basics of cage and pen culture

Aquaculture Department, Southeast Asian Fisheries Development Center

Southeast Asian Fisheries Development Center, Aquaculture Department (1994). The basics of cage and pen culture. Aqua Farm News, 12(1), 11-12.

http://hdl.handle.net/10862/2496

The basics of cage and pen culture

Cage and pen culture nearshore has these advantages: simple technology, low investment compared to pond culture, and suitability in almost any body of water. There are many commercially important species that can be cultured in pens and cages: salmonids, groupers, carps, tilapias, sea bass, catfish, snakehead, and milkfish. A recent trend is the culture of shrimp, crab, and lobster in cages, and sea cucumber in pens.

Site selection

Consider three factors: water quality, depth and current. Water temperature, pH, salinity and dissolved oxygen should meet the specific requirements of the fish species to be cultured. Water depth should allow a minimum distance of 1 meter between the cage and bottom sediment. This makes for better water flow through the unit and minimizes contact between the stock and the bacteria in the bottom sediments. (Settled cages are set up in calm, relatively clear waters.) For pens, water depth should be at least 3 meters and the bottom not very muddy. Too much organic matter lowers water quality. Current speeds of more than 40 cm/sec should be avoided; 10-20 cm/sec is desirable to maintain good water quality and to prevent fishes from spending too much energy swimming.

Nets, floats, frames, and anchors

Flexible nylon or polyethylene nets are common materials for cages and pens. They are cheap, and can be treated with anti-fouling chemicals. Plastic construction materials and galvanized or plastic-coated steel are used for rigid cages and pens. The net mesh should be as large as possible to encourage a good flow of water without letting out the stock. Large mesh allows high oxygen content and reduces fouling.

Floats and pontoons may be made of empty oil drums, plastic containers, styrofoam or especially designed air- or foam-filled plastic floats. More resistant materials are preferred, as crustaceans and molluscs can bore into softer material.

Frames must be strong, corrosion-resistant, and easily replaced. Aluminum, wooden beams, bamboo poles, galvanized pipes, steel and flexible rubber hoses are examples. As cages have become bigger, non-slip walkways with guard rails and that can ride waves have been designed.

Strong anchors are necessary to hold the cage in position, particularly in rough seas. (See separate story, this issue.)

Choice of culture method

Cages and pens may be classified as extensive, semi-intensive or intensive. Extensive and semi-intensive methods are suitable for fishes that feed on plankton and detritus and do not require much protein. In intensive culture,

☞

Environmental considerations for sea farms

- Sea farms must be sited in locations with good water exchange -- fast-flushing bays or the open sea -- and not over stagnant deep waters.
- Loss of uneaten feeds must be minimized by paying attention to stock numbers and feed requirements, and avoiding heavy reliance on automatic feeders. Dust should be removed by sieving the feed to reduce waste. Moist or wet feeds should not be used.
- Dead fish and predators caught in anti-predator nets should be regularly removed and disposed onshore. Undersized and dead molluscs and other fouling organisms, too.

feeds represent 40-60% of total operating costs. The market and other factors must be able to justify the high cost of feeds involved.

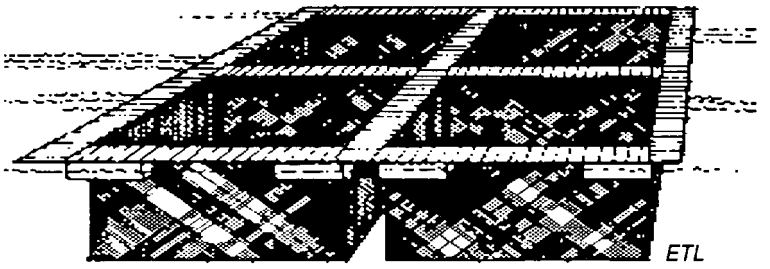
Variations of the theme

More and more systems are now completely integrated. Units for staff accommodation, power generation, automatic or computerized feeding, feed storage, and fish grading and transport equipment are built together. In a vacuum pump system, fish are sucked into a hose and into a sorter that removes the water and size grades the fish. This minimizes damage during transfer of fish to cages or boats.

Some farms use a computer program in stock management. The program simulates biomass changes during the growth cycle and records stocks and feeds.

Source: F Buranudeen. *The basics of cage and pen culture.* **INFOFISH International** 2/89.

Cage culture of sea bass in Malaysia



Cages are generally rectangular and are made of polyethylene nets. Their sizes vary: 3 x 3 x 2 m, 4 x 4 x 3 m. The estimated cost of one platform (4 cages of size 3 x 3 x 2 m) is MYR 2000-2500.

Sea bass 5-8 cm long are stocked in cages at densities of 15-25 fingerlings per m^3. After several weeks, densities are reduced to 10-23 per m^3. Although there is a large government hatchery and some local seed suppliers, the bulk of sea bass stock is imported from neighboring countries, especially Thailand.

Sea bass are fed "trash fish" once a day. As they grow, sea bass are periodically graded to prevent cannibalism.

Sea bass attain marketable size (500-600 grams) in about 6-8 months. Survival is 60-80%. They are marketed live in local restaurants or exported to Singapore. The ex-farm selling price is around M $ 9-10 per kilogram.

Problems

Foremost among the problems are feed and seed. "Trash fish" is the main source of feed for the cage culture industry; supply is limited and the quantity and price subject to seasonal variations. Although a number of prepared feeds have been introduced by both the government and the private sector, their use has not quite caught on, mainly because of high cost and doubts about their efficiency.

Most of the seed supply is from Thailand and the longer transport time means stress. Transport costs add to the price of the fry. The government encourages and provides training in hatcheries. Many have already set up their own sea bass hatcheries after attending the government courses.

Another problem is overcrowding of fish cages in a particular area. Water flow is hindered, resulting in accumulation of feces and uneaten food. Excessive stocking and feeding by some overzealous but misguided culturists further worsens the problem. Overcrowding and poor water quality stress the fish and they suc-

☞ p. 15