

Southeast Asian Fisheries Development Center

Aquaculture Department

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Aqua Farm News

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Farming systems

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Farming systems

Farming systems for catfish include ponds, cages, raceways, and tanks.

Pond culture

The suitability of land for the catfish *Ictalurus punctatus* should be seriously studied. Soil of high clay content is considered the best. The size of the pond depends on the grower's willingness to meet construction costs and the type and extent of his intended operations. Ponds should be rectangular in shape, twice as long as wide. The shallow end should be 0.75-1 meter deep, sloping to 1.5-2 meter deep.

Prior to stocking, grow-out ponds are prepared for the production of natural food. Fish pests are destroyed with 0.5-2.0 ppm rotenone several weeks before stocking. Rotenone may remain toxic for two weeks in warm water and longer in cold water. Pond bottom should be dried and smoothed. After filling with water, fertilize the ponds, especially new ponds, with 16-20-4 or 16-20-0 fertilizer at the rate of 50 kg per hectare.

The channel catfish *Ictalurus punctatus* is the most widely cultured species in North America. In the Philippines on the other hand, farming the fast-growing Thai catfish *C. batrachus* has become popular.

Source: *World Aquaculture* 22 (2), June 1991.

Selection of fingerlings

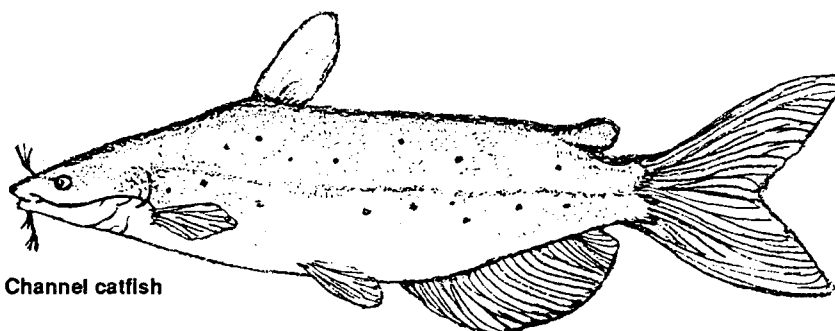
Fingerlings should be of uniform size and in good health. If fingerlings are purchased, it is a good idea to buy from reputable producers.

Most growers prefer to stock 15 cm fingerlings. Fish should weigh half a kilogram in 210 days, or by October or November. Larger fingerlings of about 20 cm long are preferred by some growers who can pay the higher price. Fingerling under 10 cm should not be used.

Stocking

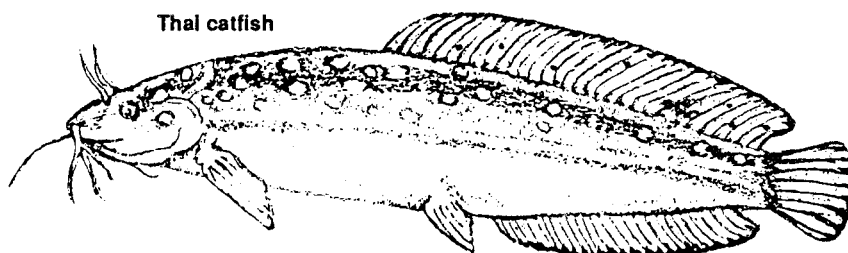
It is better to stock ponds during the warmer months. In cold countries, winter months are least preferable for stocking because the activity of catfish is at a minimum and they may not start to feed right away. Getting fingerlings to feed immediately after stocking is critical.

Stocking rate varies with the size of fish desired and the culture practice. The holding capacity of ponds is limited by the available oxygen and competition by plants and animals. Fingerlings are stocked at 1875-2500 per hectare in ponds that depend on rain and runoff. Higher stocking densities (3750-5000) are possible if a pump is used for water exchange.



Channel catfish

C Sorensen



Thai catfish

C Sorensen

Feeding

The amount of feed consumed by fish varies with temperature and other conditions. Catfish consumes the most feed and grows best at 27 to 29°C. Fish should not be fed more than the amount consumed in 10-15 min. Overfeeding causes more trouble than any other practice. Catfish are fed at the rate of 3% of the fish weight at each feeding. Some growers feed every day, others omit feeding one day each week.

Catfish requires a high protein diet (35-40%). The feed includes an attractant to ensure that the fish will eat it. One of the better known basic formulas consists of the following:

Soybean oil meal	35%
Peanut cake	35%
Fish meal	15%
Distillers' dry solubles	15%

These various components are blended and then pelleted, about 4-10 mm in diameter. Catfish will eat either a sinking or a floating feed.

Water quality

Water quality has much to do with the well-being of the fish. Insufficient oxygen affects production. Oxygen deficiencies most often occur just before sunrise. Overfeeding contrib-

utes to oxygen deficiency and to plankton blooms in stagnant ponds.

Techniques to cope with oxygen depletion include draining the water and adding fresh water, spraying water into the air to absorb oxygen, and placing aerators in ponds.

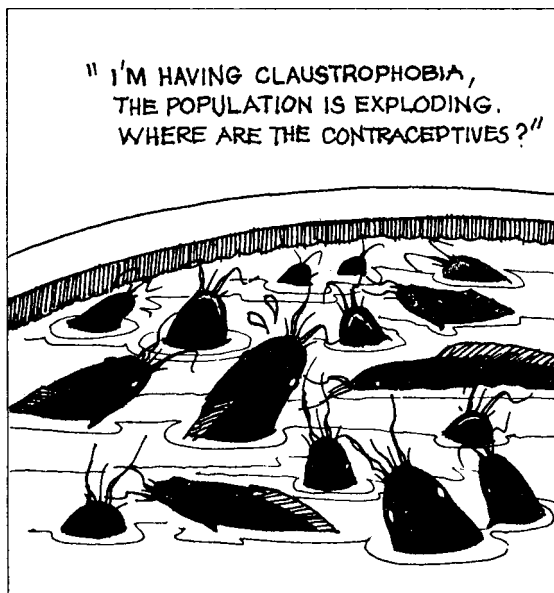
Other water quality variables such as ammonia and sulfide must remain well within tolerable limits.

Harvest

The pond is drained when complete harvest is desired. Ponds are constructed with a harvest or catch basin to facilitate draining of the water. The fish are removed with scoop nets and placed in transport tanks.

The draining method is applicable in small ponds. One major disadvantage is that water is wasted. Before another fish crop can be grown, the pond must be filled. Concentrating catfish into a small area increases the danger of oxygen depletion, especially during warm summer days. Several hours, or even days, may be required to drain a pond. The advantage of complete draining is that the pond bottom can be dried and smoothed for the growing season. Draining is most efficient for total harvest.

Seining permits the harvest of entire ponds without water drawdown. This method may be used to harvest large ponds up to 40 hectares or more and requires a greater investment on equipment. In North America, power equipment is used, thus reducing manual labor. Not all fish are captured, as 15-20% could escape.



Cage culture

Design of cages

Cages should be constructed of materials that are sturdy, relatively lightweight, rust and corrosion resistant, and slow to decay in water. Floating materials include expanded polyurethane foam, expanded polystyrene and styrofoam. These are dissolved by oil or gasoline and, therefore, should be coated with fiberglass if there is a possibility of contact with liquid or

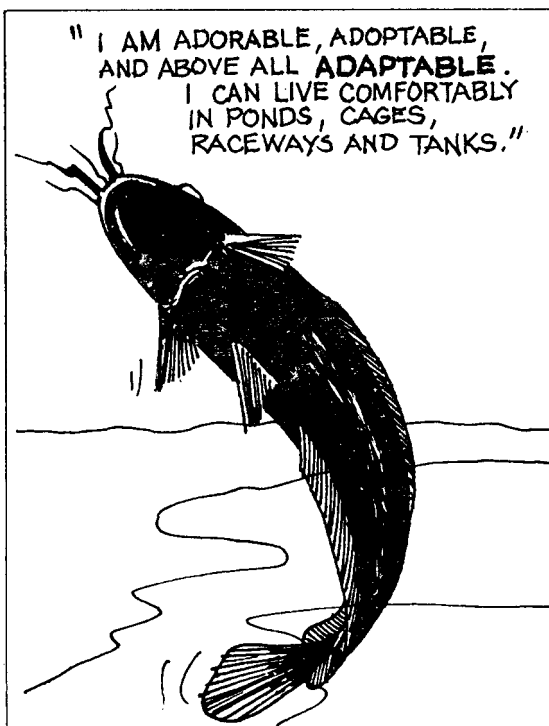
petroleum products. Some commercial cages are constructed for easy disassembly.

Cages for the catfish *Ictalurus punctatus* are constructed in various sizes and materials. Most cages are designed to a capacity of 1 metric ton. Cage dimensions of 1 x 1 x 1 meter have been used. Larger cages of 6-7 tons capacity are better than smaller cages.

Cages are constructed of wooden, plastic or metal frames and lined with aluminum, nylon, or polypropylene net. Some cages are constructed of galvanized welded wire with a 1 x 2 cm mesh. A 16-gauge wire is common. Treating zinc-coated wire with tar or asphalt can prevent zinc poisoning and decay. Mesh sizes of other materials vary from 0.3-1 cm. The top of cages may be covered with wood or fine net.

Cage design should facilitate easy entry of technicians but prevent theft and unwanted disturbance to the fish. Cages may be connected by a floating platform or bars. Floating platforms are preferred by some farmers, and these are built to support one or two men, thus facilitating feeding and observation.

Water movement causes feeds to drift out of cages. Feed rings may be made of wood or file screen to prevent loss of feeds.



Rate of stocking

The limiting factor in stocking fish is the amount of dissolved oxygen in the water. A stocking rate designed to produce 680-900 kg of food fish is suggested. Frequently, 150 to 200 catfish 13-18 cm long are stocked per cage in early spring or in fall.

Feeding

Catfish depend almost entirely on feeds supplied by the farmer. The supplemental feed normally available to catfish in ponds and streams is not available in cages. A nutritionally complete floating feed is preferred.

Feeding rate varies. For newly stocked fish, 3.5% of fish weight per day will suffice. This can be gradually reduced to 2.5% or less depending on how much the fish actually consume.

Fish in cages grow more rapidly if fed twice daily than if fed once each day, but the difference in weight gain is not sufficient to justify feeding twice daily. Late afternoon is the best time to feed. Feed should be placed inside the cages. Catfish should be fed no more than they will consume in 30 minutes. Catfish may not consume feed shortly after a major weather change.

Culture in raceways

True raceways are relatively small, about 500-2500 m². The water exchange is twice each hour. The amount of fish produced is much greater than in a pond of similar size. The water in true raceways flows much more rapidly and is exchanged more often (turns over twice per hour) than in semi-raceways. Semi-raceways are usually larger and do not produce as much fish per acre as true raceways.

Growing the catfish *Ictalurus punctatus* in raceways is still experimental and should be tried with caution.

Stocking rate

The stocking rate is based on the size of fish desired at marketing and the flow of water.

A common rate is based on 8 kg of fish per ton of water. For example, a raceway with 112 tons can be stocked with 2000 fingerlings. With proper feeding, 900 kg of fish can be produced in 180 to 210 days. Another rate of stocking is 125 000- 150 000 per ha. Most individual raceways are less than 400 m²; the number of fingerlings to stock must be calculated accordingly.

The stocking rate in semi-raceways is considerably less than in raceways. Some raceways or semi-raceways with water flows of 600 liters per min can be stocked with 3500 to 5000 fingerlings 15 cm long.

Feeding

Catfish grown in raceways require a complete feed (pellets) more nutritious than that used in ponds. The density of fish population in raceways is much greater and the water does not contain zooplankton.

A floating feed is preferred. Feeding rate is usually 4-5% of fish weight for 60 days after stocking. This rate is gradually reduced to 3%.



About 1/3 of the daily amount may be given in the early morning and 2/3 in late afternoon. No more than 450 grams of feed may be used per 3 tons of water.

Culture in tank

Tank culture of the catfish *Ictalurus punctatus* is new but farmers who have used tanks have been pleased with the results. A round tank 6 meters in diameter and 0.6 meter deep is equivalent to a half-hectare pond.

Rate of stocking

Fingerlings stocked are usually 15-20 cm long. Stocking rate may range from 180 to 530 fingerlings per ton of water. The best stocking rate depends on waterflow and aeration rates. As stocking rates are increased, production increases — if growth rates and survival are kept high. When all factors are considered, the best stocking rate may be 180-350 fish per ton when a size of 600-800 grams each is desired.

Feeding

Floating feed is often used. The feed should be nutritionally complete and should contain more vitamins than the feed for pond systems. Fish in tanks are often fed by hand two to three times daily. Rate of feeding is gauged by the amount of feed consumed. A daily level of around 3% of fish weight is used. Overfeeding should be avoided to minimize waste. Some producers have found that production is increased significantly when the tanks are protected from bright light either by covering the tanks or locating them inside a building.

Source: Training notes of the Network of Aquaculture Centres in Asia and SEAFDEC/AQD. 1981-87.

Support sustainable aquaculture
