

Aquaculture Technical Series

Channel Catfish Production



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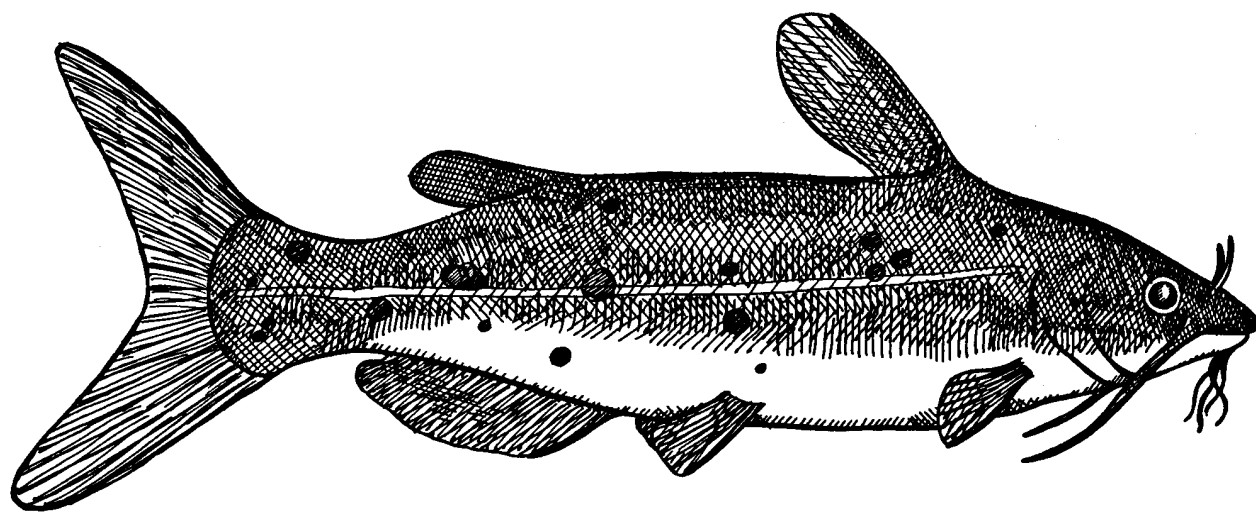
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Channel Catfish Production

Channel catfish farming is the fastest growing segment of the aquaculture industry in the United States. Expansion of this industry over the past two decades has been phenomenal, and catfish is now the most widely cultured food fish in this country.

The earliest commercial attempts to raise channel catfish were in Arkansas from about 1955 to 1965. A rapid increase in acreage but relatively inefficient production practices characterized the initial phase of development. In 1960, the country had an estimated 164 acres of commercial catfish ponds. A 1963 survey estimated 2,370 acres in commercial production and by 1969 there were an estimated 40,000 acres. Commercial culture of food-sized catfish began in Mississippi in 1965. By 1973, the state had more than 4,000 acres producing food fish, primarily in the northwest region known as the Delta.

In the late 1960s and early 1970s, the primary market for channel catfish was sale to live-haulers. Industry expansion was affected by sporadic and seasonal supplies of fish and an absence of dependable markets. By the mid-1970s, many Delta farmers had adapted production methods that enabled them to supply markets with food-sized catfish year-round. Yields increased from about 1,500 pounds per acre to about 4,000 pounds per acre. An estimated 19.7 million pounds of catfish were processed in 1973.

Over the next three years, there was an annual decline in both production and acreage. Several factors caused this shake-out period. Primarily, markets had not developed to support the increased production and production costs had increased due to the oil embargo. Many states had dramatic declines in acreage. By this time, Mississippi had emerged as the primary producer of channel catfish because processing in the state had grown with the industry, providing a dependable, year-round market for producers.

Over the next five years, the industry grew moderately and by 1981, 60.1 million pounds of catfish were processed. This was a threefold increase over 1976. Catfish sales rose steadily through the 1980s. Consumer acceptance grew and the image of catfish as a food item improved. Markets have expanded nationally and this trend is expected to continue.

In 1992, 457 million pounds of catfish were processed. This represents a 2,400 percent increase between 1975 and 1991. The industry is marketing successfully and is educating the consumer about the

desirable qualities of channel catfish.

There is considerable optimism and enthusiasm about the future of the catfish industry. However, several factors could have an impact on future growth. It appears that markets have grown faster than production and processors are having a difficult time supplying the market. National markets demand consistent quality and quantity. If the industry cannot adequately supply this demand, retailers may seek other fish products to satisfy the growing consumer demand.

Other possible limitations to industry growth are financial. The high investment costs of catfish production, high interest rates and the availability of lending capital may restrict growth. As with other animal production enterprises, the rise and fall of commodity prices can directly affect operating costs. Feed costs, which depend on the price of soybean meal, are a major variable operating expense in catfish farming.

Environmental concerns are becoming more important. Current culture practices depend upon adequate supplies of ground water or other reliable water supplies. Ground water quality has become a national issue and states are beginning to regulate ground water uses.

In the short-run, prospects for continued growth look good for the catfish industry. Potential producers should be aware of possible problems and seek professional help for information and guidance.

LIFE HISTORY

The channel catfish (*Ictalurus punctatus*) is the primary species of catfish cultured in the United States. Channel catfish are native to the Mississippi River drainage. Their range has expanded through introductions to most regions of North America. In the wild, channel catfish are most active at night. During the day, they usually live in dark holes and deep pools. Catfish depend more on their senses of taste and touch than eyesight to locate food. They have whisker-like sensory organs called barbels covered with external taste buds. Catfish eat both plant and animal material.

Channel catfish spawn in late spring or early summer. Males select and prepare the nesting sites, which are usually in natural cavities such as hollow logs, bank undercuts and beaver or muskrat holes.

Females enter the nest, spawn and then leave. The male provides all parental care. He hovers over the egg mass, fanning them with his fins and occasionally compressing the eggs with his abdomen. Besides protecting the eggs, this activity helps circulate water in and around the egg mass. Eggs hatch in about seven days at appropriate water temperatures. After hatching, the yolk sac fry remain in the nest for about another seven days until the sac is absorbed. The male continues to guard the newly hatched fry until they leave the nest.

SITE SELECTION AND DEVELOPMENT

Water and land are the two most important natural resources to consider when developing a catfish farm. These resources have a significant effect on site-development costs, year-to-year operations and profitability.

Quality and quantity of available water are primary considerations for a production facility. A ground water source is preferred. Using surface waters such as rivers and streams can introduce unwanted fishes, parasites or diseases into production ponds. Also, most surface waters vary seasonally in quality and quantity.

Watershed ponds are the least desirable production system. They must be managed differently from ponds filled by ground water because most depend solely on rainfall as the water source.

All potential water sources should be checked for quality-mineral content, pH and possible contaminants. The quantity of water available also should be determined. Some ground water sources do not have enough volume to adequately supply production ponds.

For example, a 5-acre production pond with an average depth of 4 feet has 20 acre-feet of water. One acre-foot of water equals 325,851 gallons. A well yielding 50 gallons per minute (gpm) requires 2,172.3 hours or 90.5 days of continuous pumping to fill the pond. A 1,000 gpm well would take 108.6 hours or 4.5 days to fill the same pond. Due to the combined effects of evaporation and seepage, ponds can lose $\frac{1}{4}$ inches or more of water depth each day. A 5-acre pond could lose 33,943 gallons daily. In this example, it would take the 50 gpm well 11.3 hours to replace the water lost due to evaporation in a 24-hour period and the 1000 gpm well about 34 minutes. Under average conditions in the southeastern United States, a minimum water supply of about 17 gpm is needed for each acre of water.

Water distribution and pumping costs should be considered in determining the potential of a site. Well

installation is a major, fixed cost. Whether ground or surface waters are used, pumping costs should be estimated. The height water has to be lifted significantly affects energy costs.

Topography and soil type are also important considerations. Earth moving is the most expensive cost in pond construction. Generally, relatively flat terrain is less expensive to develop. Clearing trees, rocks or other features can contribute greatly to costs. Geological formations, such as lime-sinks and rock outcrops, may be a problem. Generally, soils having 25 percent or less clay should be avoided. If land previously used for agriculture is considered, a pesticide analysis of the soil is advisable.

PRODUCTION METHODS

Production can be divided into two phases: 1) fingerling production and 2) food fish production. Methods in both phases may vary with stocking densities and production resources, such as availability of water, type of pond(s) and use of aeration.

Fingerling Production

Although some people operate hatcheries on their farms and produce fingerlings for stocking into their food fish production ponds, most farmers buy fingerlings. Catfish hatcheries can be simple to complex in their design. The design and intensity of production depend upon the market and objectives of the operation. Fingerling markets may include food-fish producers, recreational fishing and home-use production. A potential fingerling producer should study the market to avoid economic losses because of insufficient demand.

Broodstock Selection

As in other animal enterprises, the quality and quantity of the young produced are directly related to the quality of the broodstock. For a successful fingerling operation, use the best broodstock available and provide proper care for it. Broodstock selection factors include:

1. Fish should be 3 to 10 pounds and 3 to 6 years of age.
2. Fish recently taken from the wild should be avoided.
3. Fish from sources having a history of catfish virus disease should be avoided.
4. Fish should be full-bodied with no visible signs of sores or hemorrhages.

5. A ratio of about three females for every two males is recommended.

Determine the sex of each brooder. (See Figure 1). Primary and secondary sex traits are used to separate males from females. Body shape and color are examples of secondary traits. Mature males usually have a larger, broader and more angular head than females of the same size. Near spawning time, males develop muscle pads on the head and become very dark grey to black. Just before spawning, females have soft, swollen bellies due to egg development .



Figure 1. Male (right) and Female (left) Channel Catfish

Never use secondary traits as the only method to identify males and females. These traits may not be apparent in younger fish. The sex should be confirmed by examining the genitals. There are two openings on the belly. The opening nearest the head is the anus and the one nearest the tail is the genital opening of both sexes. Just before the spawning season, female genitals are red, swollen and sometimes pulsating. In the off-season, the area is oval and flat. In the off-season, the male genital is less oval than the females. Just prior to the spawning season, a swollen, nipple-like genital papilla may be seen on the males.

Broodstock must be in good condition for optimal spawning success. Provide a quality ration daily during warm weather. When water temperatures are below 65°F, feed every other day at 1 percent of their body weight. At temperatures below 55°F, fish may not feed. Fish should gain about 50 percent of their body weight from one spawning season to the next.

Stocking weight of broodfish should not exceed 800 to 1,200 pounds of fish per acre at any time during the year. Broodstock with deformities and other problems should be sorted, culled and replaced each year. To avoid possible loss of all brooders, keep fish in more than one pond.

Spawning

Channel catfish spawning activity begins in the spring when water temperatures reach about 75°F. Five pound and larger female catfish spawn 2,000 to 3,000 eggs per pound of body weight; smaller females, about 4,000 eggs per pound of body weight. (See Figure 2).



Figure 2. Catfish Eggs

Place spawning containers in 2 to 3 feet of water, 1 to 10 yards apart, when the water is about 75°F. The containers can be wooden boxes, ammo cans, drums, etc. They must be large enough to accommodate the breeding pair.

There are three methods of producing catfish fry:

Spawning and rearing in the pond - Spawning containers are placed in the pond; brooders and fry are left in the pond until harvest. This method is not recommended because the manager never knows how many fish are present until harvest. Survival is usually poor and the method is unreliable.

Transferring fry - This method is the same as above except the spawning containers are checked every three days. Males are allowed to incubate the eggs. Once hatched, the fry are poured from the spawning container into a bucket and transferred to a nursery pond.

Transferring eggs - Spawning containers are checked every two to four days. When found, eggs are transported to the hatchery.

Hatchery Management

Hatching catfish eggs in a hatchery is the most efficient method of producing fry and fingerlings. Eggs can be incubated in troughs made of wood, fiberglass or metal. They are usually about 8 feet long, 18 to 24 inches wide and about 12 inches deep. Paddles or aerators gently circulate water in and around the egg masses to provide sufficient oxygenation. Egg masses are placed in ¼-inch hardware cloth baskets that are suspended in the hatching trough.

Troughs are designed so water enters one end at about 5 gpm and drains through a stand pipe at the other end. The water must be 75°F to 85°F for successful hatching. Oxygen concentration of the water should be at least 6 parts per million (ppm). Water pH should be between 6.5 and 8.0.

Egg masses are subject to bacterial diseases and fungal infections. Frequent disinfection of equipment and troughs and a clean water supply minimize these problems. Removing infertile eggs and debris will help avoid fungal infections.

At hatching, sac fry fall through the wire basket and usually school on the bottom of the tank. Sac fry receive nourishment from their yolk sacs. In about three days, the yolk sac is absorbed and the fry turn black and begin swimming to the surface in search of food. Swim-up fry begin feeding at this stage. Sac fry can be left in the hatchery trough or siphoned to a nursery tank. Troughs or tanks must be cleaned several times per day to prevent water quality deterioration.

Once fry are feeding, transfer them to a nursery pond. Numbers of fry stocked into a pond should be estimated by volume or weight. Stocking density depends on the size of fingerlings desired at harvest. For example, stocking 10,000 fry per acre will yield 7- to 10-inch fingerlings in about 150 days. Stocking 100,000 fry per acre will yield 3- to 5-inch fingerlings in about 150 days.

Feed fry and fingerlings frequently. As the fingerlings grow, they will eat less food in proportion to their body weight.

Harvesting and Transport

Fingerlings are harvested more easily from ponds with clean, flat bottoms and no weeds. Fish can be partially graded with the harvest seine. For example, a ½-inch seine will retain fingerlings 6 inches in length or larger. Fingerlings can be graded further using grading boxes. Grading boxes can be made with aluminum or stainless steel rods. Rods are spaced to

allow certain size fish to pass through them. Most grading is done in tanks or vats.

Properly designed and equipped fish transport tanks and trucks can haul fingerlings long distances. Hauling tanks should have electric aerators. Bottled oxygen or air blowers are needed with heavy loads of fish. Bottled oxygen is a good back-up to electric aerators.

Food Fish Production

Stocking

The number of fingerlings to stock into a pond depends on several factors. They include:

1. pond size
2. experience of the producer
3. time of year and length of growing season
4. relative risk the producer wishes to take
5. marketing strategy
6. available water supply and aeration.

Stocking rates are based on surface acreage of the pond. Depth of the pond is not considered. New producers should stock between 2,000 and 4,000 fingerlings per acre. Lower stocking densities will reduce the risk of water quality and disease problems and affect profitability. With experience, higher stocking densities can be used.

Wild fish should be eliminated from the pond. They are a possible source of diseases and parasites, and many wild fish species will eat fish feed or prey on fingerlings. Predatory insects should be eliminated.

Feeding

High stocking densities require nutritionally complete rations for optimal growth. Most commercial rations contain 28 to 36 percent crude protein with the necessary vitamins and minerals. Sinking or floating feeds can be used. Floating feeds cost more but offer the advantages of observation of fish health and vigor and adjustment of daily feeding rates to avoid under-feeding or overfeeding.

Generally, catfish should be fed what they will consume in about 15 minutes. A more accurate alterna-

tive during warm weather months is to feed 3 percent of the total fish body weight in the pond. Fish can be sampled periodically and an estimate made of the total weight of the fish in the pond. When fish reach an average weight of 3/4 pound, they should be fed about 2 percent of their body weight daily.

Fish should be fed during the winter months. Growth and feeding slows during cold weather. Fish not fed during the winter will lose weight and are more susceptible to diseases and parasites. When water temperatures are below 55°F, feed 1 percent of their body weight every other day. Feed 1 percent every day when water temperatures are between 56°F and 65°F. Sinking pellets should be used during the winter.

WATER QUALITY MANAGEMENT

Monitoring and managing water quality is essential for successfully producing a crop of fish. Dissolved oxygen, nitrite, ammonia, pH and other factors affect the environmental quality of the production pond. Failure to maintain good water quality will at best result in poor performance and at worst result in the loss of an entire crop of fish.

Dissolved Oxygen

In many cases, lack of sufficient dissolved oxygen limits the success of a crop. Oxygen is necessary for survival of most plants and animals. In the atmosphere, oxygen concentrations are relatively constant at a given altitude. At sea level, the atmosphere is 21.23 percent oxygen. In water, oxygen concentrations fluctuate daily. The amount of oxygen water holds depends primarily on temperature. The warmer the water, the less oxygen it can hold. Also, the greater the altitude, the less oxygen water can hold.

Oxygen depletion in a pond results when demand exceeds supply. Aquatic animals, plants and decaying organic matter consume oxygen. Aquatic plants are primary producers of oxygen. Plants produce oxygen as a by-product of photosynthesis, and the rate of photosynthesis depends on the amount of light. This is why the amount of oxygen in pond water fluctuates daily.

Oxygen levels are usually highest at mid-afternoon and lowest just before sunrise. Fish kills usually occur when more oxygen is consumed during the night hours than is produced during daylight hours. Warm water does not contain as much oxygen as cold water. Thus, during warm weather months, mismanagement

of ponds by overstocking, overfeeding, overfertilization, pollution from barns and feedlots or chemical treatment of aquatic weeds can result in oxygen depletion and fish kills. Several calm, cloudy days during warm weather can also result in oxygen depletion and fish kills.

Producers should be alert to the possibility of oxygen depletion:

- after a heavy rain
- during periods of strong winds
- during periods of calm, cloudy days
- during the fall when air temperatures are rapidly cooling
- after chemical treatment of aquatic weeds
- if the water color changes suddenly

If one or more of these conditions exist, inspect ponds several times daily for signs of oxygen depletion.

Signs of oxygen depletion include:

- Large numbers of fish swim to the top and gulp air at night or early in the morning. If disturbed, they dive but quickly return to the surface.
- If oxygen depletion has not reached a lethal level, fish are at the surface in the early morning but return to deeper water as oxygen builds during the day. This may continue for several days. The producer should take corrective action immediately.
- Feeding habits suddenly change.

Measuring the oxygen level in a pond is the only reliable way to detect a developing problem. Oxygen test kits and meters are available. Test the pond at dusk or after dark and then again at dawn or shortly thereafter. If oxygen is less than 3 parts per million (ppm) in the top 3 feet of water or the pond shows signs of oxygen depletion, immediate action should be taken to prevent fish losses and reduce stress.

Emergency Aeration

The most effective emergency treatment is mechanical aeration of the water. (See Figure 3). Whichever method is used, the sooner it is applied and the larger the volume of water sprayed or agitated per unit time and the sooner a current is established, the more effective the method will be. It is important not to disturb the bottom. Bottom muck contains organic

material and decomposing bacteria that will contribute to oxygen depletion problems if mixed with water.



Figure 3. Aerator

Paddle Wheel Aerator

There are various designs for paddle wheel aerators. Plans are available for a homemade model using a car or truck differential mounted on a trailer frame, with a paddle wheel on each end of the differential and a power take-off attached. Commercial units are also available. These aerators have performance data and maintenance/service assistance from the manufacturer.

Large Volume Pumps

Various large volume water pumps can be used to aerate a pond. Ideally, the pump should be set up so that it creates a current and at the same time blows or sprays water across the pond surface.

Water Replacement

Water replacement is also very effective. Unfortunately, some ponds do not have an alternative water source with enough volume to be effective.

Supplemental Aeration

Several devices on the market are designed to provide supplemental aeration. Supplemental methods prevent oxygen depletion, while emergency methods correct oxygen depletion once it has occurred. Although emergency methods are effective, they are usually too difficult and expensive to use continuously.

For a commercial fish farmer, the use of supplemental aeration can improve water quality and pro-

duction and decrease losses. This is especially true if adequate amounts of water are not available to flush the pond periodically during the hot summer months.

pH

Fish can live in waters having a pH range from about 5 to 10. The desirable pH range for fish production is 6.5 to 9.0. The pH of pond water is influenced by the amount of carbon dioxide present. Much of the carbon dioxide (CO_2) in water is the result of animal and plant respiration. Carbon dioxide is used in photosynthesis. Therefore, carbon dioxide concentrations in water increase at night and decrease during daylight hours. Since carbon dioxide is acidic, the pH of water is usually highest in the late afternoon and lowest just before sunrise.

The extent of daily fluctuations in pH is affected by the buffering capacity of water. Bicarbonates are important buffers in pond water. In some areas, ponds and lakes have soft water and are slightly acidic. They are generally low in bicarbonate buffers. Adding agricultural lime (CaCO_3) to a pond increases the bicarbonate buffering capacity of the water. This can increase morning pH, lower afternoon pH values and reduce daily changes in pH.

Alkalinity and Total Hardness

Alkalinity is a measure of the total concentration of bases in water expressed as mg/liter (ppm) equivalent to calcium carbonate. Alkalinity is a measure of the bicarbonate-carbonate buffering system described in the section on pH. Alkalinity is a more reliable indicator of lime requirements than water hardness. However, alkalinity is more difficult to measure and is subject to change during the interval between sampling and analysis in the laboratory. Accurate measurements can be made at the pond site with a test kit.

Carbon Dioxide

High CO_2 levels can be a problem associated with oxygen depletion. Particularly high levels of CO_2 can occur in ponds after phytoplankton die-offs, after a turnover and during cloudy weather. Under these conditions, oxygen concentrations in the water may be low and the increased levels of CO_2 can interfere with the fish's ability to use any available oxygen. In situations with low oxygen and high carbon dioxide levels, emergency mechanical aerators will increase oxygen in the water and help lower CO_2 levels.

Ammonia

The effects of ammonia on fish are poorly understood; however, there is evidence that sublethal levels adversely affect fish. Ammonia toxicity can be a problem in holding tanks, live-haul tanks and aquaria.

Unionized ammonia (NH₃) is much more toxic to fish than ionized ammonia (NH₄⁺). Of the total amount of ammonia in water, the percentage of the unionized form increases with increasing pH. Thus, the toxicity of ammonia is pH dependent. Concentrations as low as 1.5 ppm ammonia have been reported to be toxic to channel catfish. Ammonia accumulates in water through excretion by fish and as a natural product of decay. Most of the nitrogen excreted by fish is in the form of ammonia. Accumulation of ammonia in pond water is usually associated with conditions leading to an oxygen depletion. Water test kits are available to determine ammonia levels.

Nitrite

Nitrite toxicity in fish is called brown blood disease. Fish suffering from nitrite exposure have blood the color of chocolate milk. Because nitrite interferes with oxygen uptake by blood hemoglobin, the symptoms of nitrite poisoning are very similar to an oxygen depletion. However, fish are likely to show symptoms any time of the day, unlike an oxygen depletion where symptoms are most likely near sunrise.

In intensively managed catfish ponds, nitrite levels should be checked every two or three days. If nitrites are detected, the water should be analyzed for chlorides. Symptoms and effects of nitrite toxicity can be prevented or controlled by adding salt (sodium chloride) to ponds at recommended rates.

FISH HEALTH

Three conditions need to be present for a disease or parasite problem to occur; a host, a disease organism and stress. Stress is usually a predisposing factor. The intensity, frequency and duration of disease outbreaks can be reduced by minimizing stress. Common stress factors include:

- rough handling;
- sudden water temperature changes;
- low oxygen;
- poor water quality;
- poor nutrition; and

- overcrowding

Diseases can be divided into non-infectious and infectious types. Non-infectious diseases include nutritional disorders, contaminant exposure, poor water quality and physiological abnormalities. Infectious diseases include parasites, bacteria and viruses.

Parasitic Diseases

Parasites are usually more devastating to small catfish. Many parasites require microscopic examination for identification and diagnosis. Infections of the gills and skin are most common. Parasites of catfish include various protozoans, trematodes (grubs), cestodes (tapeworms), nematodes (roundworms), crustaceans and fungi. Protozoan parasites cause the most deaths and can be controlled with therapeutic agents. Appropriate agent selection requires identification of the parasite. Trematodes, cestodes and nematodes are not usually life threatening in captivity and are difficult to treat.

Bacterial Diseases

Bacterial infections of channel catfish are almost always related to an environmental stress. Some of the more important bacteria are *Flexibacter columnaris*, *Aeromonas hydrophilla* and *A. salmonicida*. These are soil bacteria found in most soil and water. Because they are almost always present, these bacteria can become a problem when fish are stressed and conditions favor their growth. Other bacteria include *Edwardsiella tarda* and *E. ictaluri*. *Edwardsiella ictaluri* causes a condition known as enteric septicemia of catfish (ESC).

All of these bacterial diseases can cause significant losses. A vaccine was developed recently for ESC. Terramycin® and Romet® are the only antibiotics licensed for treating bacterial infections of channel catfish. Both usually are administered in medicated feed.

Some bacterial strains have developed resistance to these antibiotics. Producers should consult a professional diagnostician to identify the bacterial infection and test for antibiotic sensitivity.

Viral Diseases

Channel catfish virus disease (CCVD) is the only important viral disease of channel catfish. The disease primarily affects fry or fingerlings during the summer. It does not affect fish larger than 10 inches. There is no treatment for CCVD. If fish are infected, reducing environmental stress until the fish are 4 inches in

length will minimize losses.

MARKETING

Although there is an optimistic outlook for the growth of channel catfish markets, new or prospective producers should not assume there will be a willing buyer at harvest time. While most current catfish production is sold to large processing facilities, a new producer may be too far from a processor to market fish this way. Before investment, construction or production, new producers should research and understand their marketing options.

New processing plants locating in areas with little existing production and relying on promises of new production may fail within the first few years. Possible reasons for failure include:

- over capitalization and limited cash flow during the first few years
- inconsistent supply of fish
- harvesting and logistical problems in transporting fish to the processing plant
- established producers in the area may already have specialty markets for live fish which offer a better price than the processor can afford to pay
- generally, it takes 18 months in construction and production time for a farmer to produce his first crop of fish
- the availability of financing capital or high interest rates may limit the development of new production acreage
- inability to compete with existing processors for market share

Even in areas with established production and processing, farmers should continually investigate new markets. Although limited in size and availability, these markets can be more profitable than processing markets. Alternative markets include live-haulers, on-farm sales, fee fishing and local sales.

Live-haulers buy live fish from producers for resale. Fish may be resold for stocking in recreational ponds or fee-fishing ponds or to a processor. In some instances producers may contract with a live-hauler to transport fish to a buyer.

On-farm sales are usually more successful in or around metropolitan areas. Fee-fishing ponds, also called catch-out ponds, provide an opportunity for the

public to fish in private ponds. Usually the customer is charged a set amount per pound of fish caught. Another option is for the producer to process fish on the farm and sell small amounts to customers. State, county and local health departments and other state agencies should be contacted concerning licenses and regulations for on-farm processing.

Local sales involve on-farm processing and delivery to restaurants and supermarkets. For most producers this is the most attractive yet most difficult marketing alternative. These markets usually require a weekly supply of fresh fish of consistent quality, quantity and size. It is very difficult for individual producers to supply this demand year-round. Most of these retail businesses buy from established distributors. Even if they do buy local fish, one missed delivery or other problem can cause them to change suppliers immediately .

ECONOMICS

Channel catfish farming is a capital intensive enterprise in both facility development and production. Prospective producers should complete an economic feasibility study before investing in an enterprise. Most lending institutions will require a detailed economic prospectus before considering a loan to a new or established producer.

PRODUCTION COSTS

Feed and fingerlings are significant variable costs in the production of channel catfish. However, the quality of feed and fingerlings are important to the success of a farm and should not be compromised.

Other fixed and variable costs need to be considered. Depending on the location, existing equipment (if any), and other available resources, production costs will vary from farm to farm and across the country. Producers should determine their own production costs based on their situation.

Tables I and 2 can be used as a guide or adapted to your location and resources to estimate the potential profitability of a catfish farm.

Table 1. Catfish Budget, Estimated Cost and Returns.

Pond size _____ Stocking rate per acre _____

Item	Quantity	Price/Unit	Value
1. Gross Receipts			
Catfish	_____	_____	_____
2. Variable Costs			
Fingerlings	_____	_____	_____
Floating Feed	_____	_____	_____
Hired Labor	_____	_____	_____
Chemicals	_____	_____	_____
Fuel, Oil & Lube	_____	_____	_____
Equip. Repairs	_____	_____	_____
Int. on Oper. Capital	_____	_____	_____
Total Variable Cost	_____	_____	_____
3. Income Above Variable Costs			_____
4. Fixed Costs			
Overhead			_____
Depreciation			_____
Int. on Investment			_____
Taxes & Insurance			_____
Total Fixed Costs			_____
5. Total Costs			_____
6. Returns to Land, Operator's Labor & Mgmt.			_____
Less: Operator Labor			_____
7. Returns to Land & Management			_____
Less Management Charge			_____
8. Returns to Land			_____

Table 2. Investment and Fixed Cost

Item	New Cost	Charged to Catfish	Proportion		Value Useful Life	Annual Depreciation
			Charged to Catfish	Value		
Pond	_____	_____	_____	_____	_____	_____
Feed Shed	_____	_____	_____	_____	_____	_____
Dissolved Oxygen Kit	_____	_____	_____	_____	_____	_____
Aerator	_____	_____	_____	_____	_____	_____
Mower	_____	_____	_____	_____	_____	_____
Tractor (40 H.P.)	_____	_____	_____	_____	_____	_____
Truck (1/2 ton)	_____	_____	_____	_____	_____	_____
Feed Wagon	_____	_____	_____	_____	_____	_____
Boat	_____	_____	_____	_____	_____	_____
E. Motor	_____	_____	_____	_____	_____	_____
Battery	_____	_____	_____	_____	_____	_____
B. Charger	_____	_____	_____	_____	_____	_____
Seines	_____	_____	_____	_____	_____	_____
Live Cars	_____	_____	_____	_____	_____	_____
Nets	_____	_____	_____	_____	_____	_____
1. Total Catfish Investment		_____				
2. Total Depreciation:						
3. Interest in Investment:						
Investment x Int. Rate: _____ x _____ % = _____						
2						
4. Taxes & Insurance:						
Investment x 1.4%: _____ x 1.4% = _____						
2						

Harvesting and transporting costs also should be considered in a feasibility study. Generally it costs 2-3 cents per pound to harvest fish and, depending on distance and water temperatures, 1-5 cents per pound or more to transport fish. If on-farm processing is considered, these costs also need to be determined.

ALTERNATIVE PRODUCTION SYSTEMS

Alternative production systems may include cages, raceways and tanks with filters. (See Figure 4). These systems are higher risk methods than traditional pond culture. All of them require more management time and expertise and cost more. Many require high densities of fish in confined areas. This increases animal stress, diseases and parasite problems and requires a more expensive and complete feed ration.

Prospective producers considering an alternative culture system should carefully compare anticipated costs to costs using a pond culture system.

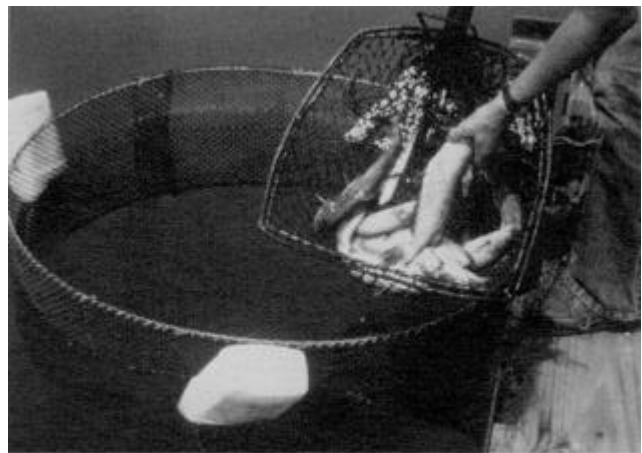


Figure 4. Cage Production

REFERENCES AND ADDITIONAL INFORMATION

If you are a new or prospective catfish farmer, not only will you need information concerning production management techniques, you may also need information concerning processing, marketing, economics, financial assistance, disease diagnostic services, water quality analyses, aquatic weed control, local and state laws and regulations, site selection and development, etc. In some areas, locating this information can be difficult. The following are possible sources of information or assistance:

1. The county Cooperative Extension Service office, usually listed under "County Government" in the telephone directory, can provide assistance. County Extension agents are employees of land grant universities. The county agent may assist you directly or draw upon the experience and training of a university expert or refer you to some other state or federal agency that can provide the information or service you need.
2. In the coastal and Great Lake states, land grant universities also have Sea Grant programs. In many of these states, marine advisory service specialists can provide needed information.
3. State game and fish agencies may also be a source of information on laws and regulations, production technology and diseases.
4. The United States Department of Agriculture Soil Conservation Service can assist in site selection and facility development. This agency is usually listed in the telephone directory under "Federal" or "United States Government."
5. The United States Department of Agriculture's five Regional Aquaculture Centers can also refer you to

state specialists for other resources specific to your needs.

Center for Tropical and
Subtropical Aquaculture
The Oceanic Institute
Makapu'i Point
Waimanalo, HI 96795

Southern Regional
Aquaculture Center
Delta Branch Experiment Station
P.O. Box 197
Stoneville, MS 38776

North Central Regional
Aquaculture Center
Room 13 Nat. Res. Bldg.
Michigan State University
East Lansing, MI 48824-1222

Western Regional
Aquaculture Consortium
School of Fisheries, WH-10
University of Washington
Seattle, WA 98195

Northeast Regional
Aquaculture Center
University of Massachusetts-Dartmouth
Research 201
North Dartmouth, MA 02747

6. The United States Department of Agriculture National Agriculture Library is the National Aquaculture Information Center. It provides informational services on aquaculture. The address is:

U.S. Department of Agriculture
Aquaculture Information Center
Room 304 National Agriculture Library
10301 Baltimore Boulevard
Beltsville, MD 20705

REFERENCES

Channel Catfish Culture, 1985. Tucker, C.S. editor.
Elsevier Science Publ. Co., Inc. NY, NY.

Channel Catfish Farming Handbook, 1990. Tucker, C.S.
and E.H. Robinson. Van Norstrand Reinhold. NY, NY.



When you have a question...

Call or visit your local office of The University of Georgia's Cooperative Extension Service.

You'll find a friendly, well-trained staff ready to help you with information, advice and free publications covering agriculture and natural resources, home economics, 4-H and youth development and resource development.

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C. Wayne Jordan, Director