

How to Bring Up Cultured Catfish

By John A. Plumb

Since the beginning of commercial catfish farming in the United States in the late 1950's, the industry has grown to where it was worth about \$200 million in 1983. Projections place the potential value of the catfish industry at \$1.5 billion by the end of the century.

In 1984 about 85,000 acres of water are in catfish production in the United States, with channel catfish the principal culture species.

The catfish industry is becoming a significant agricultural enterprise in certain parts of the United States, especially the South where water temperatures are warm enough for a 6- to 8-month growing season each year.

In a rapidly expanding

agricultural industry such as catfish farming there are many problems. Any time a fish is taken from an extensive environment (such as a farm pond) and placed in an intensive environment (culture pond), health problems occur.

Normal catfish-carrying capacity of a fertilized farm pond is no more than a few hundred pounds per acre. However, the carrying capacity of an efficient catfish culture pond may be 5,000 pounds or more. These high densities result in increased susceptibility to infectious disease. Although there are many potential infectious diseases of cultured channel catfish, only the most serious and frequent will be discussed here.

Fish diseases have some basic characteristics that separate mortalities caused by infections from those caused by low oxygen and other water

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In 1984, about 85,000 acres of water are in catfish production in the United States. Channel catfish are the most popular species being commercially produced. These freshly harvested channel catfish in the 3 to 5 pound range are ready for processing. Harvested catfish are skinned and cleaned before they are sold to restaurants and supermarkets.



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quality problems or pesticides. Diseased fish usually have external sores, bloody areas in the skin, swim slowly at the surface, stop feeding before death occurs, and have a gradually increasing mortality pattern over a period of days or weeks. Pesticide- or oxygen-caused fish kills usually occur overnight or in a very short period during which a high number of fish die.

CCV Has High Kill

1) *Virus Diseases*. Channel catfish virus disease (CCV) is the most serious virus disease of these fish. It occurs in fingerling production facilities and may result in 50 to 90 percent mortality in fry and fingerling populations. CCV causes disease during the first summer of the fish's life, while water temperature is above 80° F (27° C). The disease is more severe while fish are less than 6 weeks old. As the fish get older and grow to 4 inches and larger they become more resistant and the mortality is less severe.

Channel catfish infected with CCV have bloody areas at the base of fins and in the skin, swollen bellies, and are popeyed. A clear straw-colored fluid is present in the body cavity. Gills and internal organs are generally pale. Just

before death, infected fish swim slowly at the surface with occasional erratic movements.

CCV is easily transmitted from infected fish to noninfected fish by contact through the water. But it is not known how the virus is transmitted from one generation to another. It is presumed, and there is strong circumstantial evidence, that CCV is passed from the carrier broodfish to their offspring via reproduction.

Impact of CCV on the catfish industry as a whole is not as severe as that of some other diseases. However, due to the often high rate of mortality, the effect on fish farms where it occurs can be devastating.

2) *Bacterial Diseases*.

There are four major bacterial diseases of farm-raised channel catfish. The most common is "Motile *Aeromonas* Septicemia" (MAS), usually caused by *Aeromonas hydrophila*. This widespread water-borne bacterium is present in nearly all fresh water.

Stress Is Factor

The disease most often occurs after fish have been stressed due to some environmental problem such as low oxygen, excessively low or high tem-

peratures, improper handling, or some other debilitating infectious or noninfectious disease.

Symptoms of MAS vary. Infected catfish may have frayed fins and/or deeply eroded open sores in the skin and muscle. The body cavity often contains a bloody fluid, and internal organs are mottled in color and very soft. Fish of all ages are susceptible to MAS. It may occur at any time of the year, but most frequently in spring and fall. Mortalities are low to moderate (5 to 30 percent). The disease usually is chronic, with a few fish continuously dying over a long period of time, but mortality may be acute.

Columnaris is a bacterial disease that most frequently causes problems in young fish, but occasionally infects production-size fish. It may occur at any time of the year.

Like MAS, columnaris (caused by *Flexibacter columnaris*) is usually associated with environmentally induced stress or handling. The bacterium produces light areas on the skin and frayed fins, as well as causing white sores on the gills. Although mortality patterns of columnaris infections are generally chronic, with fish dying at a slow rate for a long period of time,

deaths may increase rapidly over a few days.

Fish Gangrene

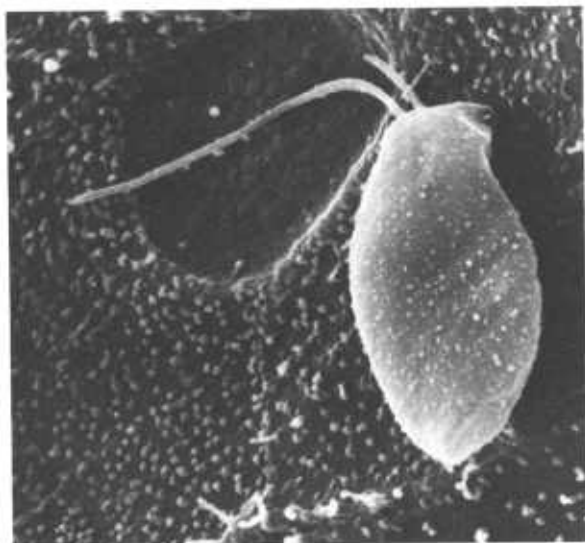
Edwardsiella tarda causes fish gangrene, a disease that affects cultured channel catfish. This bacterial infection does not result in high losses in production ponds; however, when fish are crowded into tanks, up to 50 percent of them may die.

Infected fish develop light areas on the skin surrounded by small bloody spots. When these areas are cut, there is a pocket of gas in the muscle that has an unpleasant odor.

Fish gangrene usually affects large fish, and most frequently during warm summer months. When fish with fish gangrene are harvested for market, the gas-filled pockets contaminate the processing line during dressing. The contaminated line must then be shut down and facilities disinfected and cleaned, causing loss of time and money.

Edwardsiella ictaluri causes enteric septicemia of catfish (ESC). Although this bacterial disease is the most recently described infectious disease of channel catfish, it has rapidly become one of the most important.

Fish with ESC have severe bleeding in the skin



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Ichthyobodo (Costia), a single-celled protozoan, on the skin of a fish viewed by a scanning electron microscope. The flagella are visible and may aid in attaching the parasite to the host.

around the mouth, under the throat and on the gill covers. There usually is an open ulcer in the skull of diseased fish.

ESC occurs in all size fish, but is most severe when water temperature is between 68° to 80° F (20° to 27° C). This usually is in May and June and again in September and October. Mortalities will range from less than 5 to over 50 percent of infected populations. Some fish disease experts believe ESC is the most serious infectious disease of cultured channel catfish.

3) Parasitic Diseases.

There are a large number of protozoan and worm parasites of cultured channel catfish, but only a few are of much consequence.

The best known and possibly most serious protozoan parasite of catfish is *Ichthyophthirius* (Ich). The parasite infects skin and gills of the fish where it produces small pinhead size white spots that can be seen with the unaided eye. After the parasite matures on the fish, it drops into the water where it undergoes a series of divisions, and the resulting juvenile parasites then reinfect other fish.

Difficult to Treat

Ich can cause very high mortality but the most severe cases occur when the water temperature is between 65° to 80° F (19° to 27° C). It also is one of the most difficult parasites to treat because part of

its life cycle is spent imbedded in the skin where it is protected from most chemicals.

Other protozoans that cause problems on the skin of the fish are *Trichodina*, *Costia* (*Ichthyobodo*), *Trichophrya*, and *Ambiphrya*. The signs of these are all similar, and identification requires microscopic examination. They cause excessive mucus on the skin and gills. The skin has a light gray appearance. Infected gills are swollen and pale.

Henneguya is a sporozoan parasite that has several forms which infect the skin or gills of catfish. The most serious is the interlamellar form which occurs in cysts between folds of each gill filament. When cysts are present in high numbers, the gills' respiratory function is destroyed. This form has been thought to cause extensive deaths in young catfish.

Parasitic trematodes, known as gill worms, commonly infest catfish gills. Although the worms are present on gills of most catfish, they are of little consequence unless the parasite becomes overly abundant.

4) *Treatment, Control.* Through experience and experimentation, it has been found that many infectious

diseases are stimulated by poor environmental and other stressful conditions which reduce fish resistance to infection. Therefore, the best method of disease control on cultured catfish is by prevention. Optimum environmental conditions in cultured facilities will prevent many infections from progressing to the point where fish are killed.

We also know from experience that despite efforts of the fish farmer to maintain good environmental conditions in culture ponds, infectious diseases do occur in catfish. When this happens, the farmer must apply some type of treatment.

Virus diseases are untreatable, but bacterial diseases may be treated by adding chemicals—such as potassium permanganate—to the water or feeding a prepared feed that contains an antibiotic (Terramycin). Protozoan parasites may be treated by bathing the fish in a chemical such as potassium permanganate, formalin or copper sulfate. When treating fish that are to be used as human food, only chemicals or antibiotics approved by the U.S. Food and Drug Administration may be used.