FA31

UF UNIVERSITY of FLORIDA IFAS Extension

Vibrio Infections of Fish [1]

Peggy A. Reed and Ruth Francis-Floyd[2]

Vibrio infections usually occur in fish from marine and estuarine environments, and have been reported throughout the world. Occasionally, vibriosis is reported in freshwater fish. The disease can cause significant mortality (>=50%) in fish culture facilities once an outbreak is in progress. Common names for *Vibrio* infections of fish include "red pest" of eels, "salt-water furunculosis", "red boil", and "pike pest". *Vibrio* infections can spread rapidly when fish are confined in heavily stocked, commercial systems and morbidity may reach 100% in affected facilities.

The disease is caused by gram negative bacteria in the family Vibrionaceae. This group of bacteria includes two important genera which can be significant fish pathogens. The genus *Aeromonas* includes several species which are important pathogens of freshwater fish, although they occasionally cause disease in marine species (see IFAS Extension Fact Sheet FA-14 for more information on *Aeromonas* infections of fish). Bacteria in the genus *Vibrio* are important pathogens of marine and brackish water fish, although they occasionally are reported in freshwater species. Seven species of *Vibrio* have been associated with disease in fish:

- *V. anguillarum* (isolated most commonly from marine and brackish water fish);
- *V. ordalli* (an atypical strain of
- *V. anguillarum* , sometimes referred to as Biotype 2);
- *V. damsela* (isolated from damsel fish);
- *V. carchariae* (isolated from sharks);
- *V. vulnificus* (reported in Japanese eels); and
- *V. alginolyticus* (reported from cultured seabream in Israel).

A new, extremely pathogenic *Vibrio* infection of cold-water marine fish (i.e., salmon) is caused by *V. salmonicida* and is referred to as "cold-water vibrio" or "hitra" disease. Cold-water vibrio has not been reported in warm-water fish and will not be discussed further in this publication.

Vibrio species are also known to cause disease in humans, most often following the consumption of contaminated shellfish. Most serious illness is usually limited to individuals with a suppressed immune system, such as those with liver disease or Acquired Immune Deficiency Syndrome (AIDS). However, it

1. This document is FA31, one of a series of the Fisheries and Aquatic Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date June 1, 1996. Reviewed May 2009. Visit the EDIS Web Site at http://edis.ifas.ufl.edu.
2. Peggy A. Reed, Biological Scientist, Fisheries and Aquatic Sciences; Ruth Francis-Floyd, Associate Professor, Fisheries and Aquatic Sciences, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

is always wise to wear gloves while examining sick fish, and to wash your hands thoroughly with a bactericidal soap afterwards.

Signs of Infections

The signs of vibriosis are similar to many other bacterial diseases of fish. They usually start with lethargy and a loss of appetite. As the disease progresses, the skin may become discolored, red and necrotic (dead). Boil-like sores may appear on the body, occasionally breaking through the skin surface resulting in large, open sores. Bloody blotches (erythema) are common around the fins and mouth. When the disease becomes systemic, it can cause exopthalmia ("pop-eye"), and the gut and rectum may be bloody and filled with fluid. It should be noted that all of these "signs" can be caused by other bacterial diseases, and are not proof of a *Vibrio* infection.

Diagnosis

Although a *Vibrio* infection can be suspected given certain case histories and clinical signs, proper diagnosis requires isolation of the bacteria and its identification. If you are unable to perform these tasks yourself, live, diseased fish should be delivered to a diagnostic laboratory familiar with fish diseases to confirm the infection, identify the species of *Vibrio* , and perform an antibiotic sensitivity test. Contact your county extension agent for assistance on where and how to submit samples for diagnostic services.

For those who are capable of culturing bacteria, *Vibrio* spp. prefer a blood agar supplemented with 3% salt, but enriched media such as trypticase soy agar with 5% ovine blood is adequate for initial isolation. *Vibrio* spp. can be differentiated from closely related bacteria by its specific sensitivity to Novobiocin and 0/129, two commercially available vibriostatic agents. Despite the unique "comma-shape" of *Vibrio* bacteria, microscopic examination of infected tissues cannot be used in place of culture and isolation techniques.

Transmission

The precise route of *Vibrio* infection is unclear, but oral transmission is suspected. It is possible to isolate *Vibrio* spp. from the intestinal tract of clinically normal fish. Under certain conditions, the bacteria may be capable of crossing the intestinal wall, resulting in systemic disease. Once an outbreak is in progress, the number of infectious particles in the environment rises dramatically, increasing the chance that exposed fish will get sick.

Management

In confined, heavily stocked, commercial systems, *Vibrio* disease outbreaks can proceed rapidly. Therefore, prevention is essential to any management scheme. As *Vibrio* species are believed to be opportunistic, conditions which favor a disease outbreak are often caused by environmental stress which can be avoided. Poor nutrition or water quality, improper handling, overcrowding, and the presence of other disease-causing agents will all increase your fish's chances of contracting a *Vibrio* infection. Parasites are of special concern, as they often cause damage to fish tissue, creating an ideal location for *Vibrio* infections to begin. Chemical treatments, including the use of copper compounds, can be harsh on fish and have been reported to precipitate *Vibrio* disease outbreaks.

Quarantine of new fish and good sanitation practices should be used at all times, and will minimize the spread of *Vibrio* infection from infected to uninfected fish, should a disease outbreak occur. New fish should always be kept away from existing fish. Tanks and culture facilities should be kept clean and free of any unnecessary wastes.

Treatment

Before any treatment with antibiotics, a thorough investigation of water quality and husbandry practices should be conducted. Removal of underlying problems is essential to successful resolution of the problem. Occasionally, removal of contributing factors (i.e., poor water quality) will be all that is required to control the infection, but in most cases it is prudent to treat an active *Vibrio* outbreak with antibiotic therapy.

The selection of an antibiotic should be based on results of an *in vitro* sensitivity test. There are two antibiotics which have been approved by the Food and Drug Administration (FDA) for use in food fish

(catfish and salmonids) in the United States. Terramycin contains the antibiotic oxytetracycline. It is sold for fish in a sinking feed and should be fed for 10 days. Fish which have been fed Terramycin should not be eaten for at least 21 days following treatment (the legal withdrawal time) to ensure complete elimination of drug residue from edible tissue. Romet is a potentiated sulfonamide which contains two drugs, sulfadimethoxine and ormetoprim. It is sold for fish in a floating feed and should be fed for 5 days. The withdrawal time of Romet for catfish is only 3 days because the drug is bound in the skin of the fish which is removed when catfish are cleaned. In salmonids, however, the withdrawal time is 6 weeks because the fish are not skinned during processing. Either drug will be effective if the strain of *Vibrio* is sensitive to it and if sick fish ingest enough medication to maintain the drug in the bloodstream throughout the treatment period.

In pet fish, the traditional treatment for bacterial disease has been the addition of antibiotics to tank water. This practice should only be pursued as a last resort. Antibiotics should be delivered to fish in medicated feeds or by injection. Flake foods which contain Terramycin or Romet are commercially available through pet retail outlets for use in aquarium fish. Because there is no FDA-approved antibiotic available for use in pet fish, veterinary supervision of antibiotic therapy is recommended. If fish do not respond to antibiotic therapy within 48 hours a sample of sick fish and water should be sent to a fish disease diagnostic laboratory to confirm the original diagnosis and determine whether additional problems, such as parasitism, may also be present.

Vaccination

Commercial vaccines are available to prevent vibriosis in salmonids. In the United States, animal vaccines are regulated by the United States Department of Agriculture (USDA). In species other than salmonids, veterinary supervision will be required for vaccine access and use. Vaccinated fish appear to grow and survive better than their unvaccinated counterparts, however the exact nature of the immunity provided is not clear. Most commercial products are bivalent vaccines; this means that they provide protection to two different organisms, in this case *V. anguillarum* and *V. ordalli* . Vaccines are usually administered to the fish by immersion, although injectable and oral products are also available. Efficacy of oral vaccines has not been as good as injectable or immersion products.Vaccines made from sonicated, heat-killed bacteria are also available and effective.

Summary

Vibriosis is primarily a disease of marine and estuarine fish, both in commercial production systems and natural waters throughout the world. Stress and overcrowding often are associated with disease outbreak. Although a presumptive diagnosis can be made based on history and examination of the fish, a definitive diagnosis can only be made following bacterial isolation and identification. Antibiotic therapy should be based on results of *in vitro* sensitivity tests. Two antibiotics, Terramycin (an oxytetracycline compound) and Romet (a potentiated sulfonamide) have been approved by the Food and Drug Administration for use in catfish and salmonids. Vaccination, which can be administered by injection, immersion, or orally, is used by the salmon industry to minimize the impact of vibriosis.