

BACTERIAL INFECTIONS

FURUNCULOSIS

Furunculosis is a disease that is caused by *Aeromonas salmonicida*, and this disease is characterized with furuncles, abscesses, haemorrhagic foci, in the surface of the fish that are septicemic. *Aeromonas salmonicida* belongs to the family of Vibrionaceae, and it is a gram negative agent. The ideal conditions for development and reproduction of the agents are; Water temperatures 20-22 °C, water range of pH 6.4-8,

When the temperature is 37° C the agent does not develop, but the bacteria can reproduce when water temperature is 10 °C degree below.

The disease progresses in two stages that are acute or chronic stages. Rarely, the subacute and latent forms can be found in the disease. Death occurs in the sick fish without symptoms in the acute form. Furunculosis can especially be seen in Salmonids. The bacteria are found in various tissues, organs and blood vessels in the fish. And, the disease mainly begins with the destruction of blood vessels.

The conditions that create predisposition to the disease can be listed as follows :

Insufficient and unsuitable environmental conditions, finding stress factors for fish, deterioration of biological factors (plankton, bacteria, fungus e.t.c.) other factors (physical and chemical factors), excessive stocking of fish, insufficient and irregular feeding on maintenance conditions, placing of newly purchased fish into ponds without being kept in quarantine, using infected feed, keeping sick or dead fish in the ponds, and frequently drug use is an important factor in outbreak of disease.

Contamination occurs when the agents enter to the body through portals, in addition to the fish get sick by eating contaminated feeds with the bacteria. Incubation period is 7-10 days, but the incubation time is short in the infection taken through the skin. The value of morbidity is 100%, and the mortality can reach 80%.

Pathology - clinical signs :

a) acute form : in the young fish or fingerling and suppressed immune system fish, this form is consisted. The infected fish death in a few days (2 to 3 days) without any clinical signs. The hemorrhagic areas or points rarely appear to the base of fins, oral region and lateral of body.

b) chronic and subacute forms : the furuncles and hemorrhagic areas in the various of body in disease fish are typical clinical signs both chronic and subacute forms. Opened furuncles combine with each other and cause the formation of large wounds that are deep and disorderly around. The color of the skin becomes darkening in the healing wound areas.

The sick fish occurs generally, illness symptoms such as depression, inactivity, anorexia e.t.c. Death rate is low in this stage.

c) latent form : the clinical signs and death are common this form. Such fish are porters , and they are very difficult to identify, and this is important in the spread of the disease.

d) necropsy findings : the following can be seen prominently in necropsy :

sero-hemorrhagic fluid accumulation in periton cavity , hemorrhagic areas in the intestinal tract , necrotic areas in surface of liver and spleen, and these organs are dark colour and hemorrhagic, blood vessels are dilated and the wall of blood vessels are thinned, exophthalmus and prolapsus of anus.

Diagnosis :

Diagnosis of disease is difficult determined according to clinical signs and necropsy findings. Furunculosis is frequently interfere other bacterial and viral infections. Laboratory diagnosis must be made, and the organs and tissues samples are sent to laboratories by cold chain.

Control and treatment :

The cost of the works to be done to prevent disease in the fish farms is less than the treatment cost.

The factors that cause the emergence of disease are eliminated in the fish farms. Some measures that can be taken are as follows ;

All kinds of factor that can stress fish should not be present in ponds , ponds should not contain fish more than capacity of ponds , care and feeding should be good – quality – sufficient, sick fish or dead fish should not be found in pond , water temperature should be optimum , the different species fish and different ages fish should not be found in the same pond , all materials and equipments should be disinfected at regular intervals, quarantine must be applied for new fish purchases, when the disease symptoms are observed in fish, the disease should be diagnosis as soon as possible, the level of protection in the vaccine used recently is up to 50 %.

Antibiotics and antiseptic solutions are used successfully. Attention should be paid to the dose and duration of use of the drug.

Sulphamerazine 150-200 mg per kg in feed for 15 days ,Sulphanamides are not used for fish treatment for more than 3 weeks , Chloramphenicol and Oxytetracycline 50-75 mg per kg X 10 days, Tetramycine 5-75 mg per kg X 10 days , Furazolidon 25-75mg per kg X 20 days

VIBRIOSIS (HITRA DISEASE)

Vibriosis is caused by one of the several members of the genus *Vibrio*.

The disease is characterized with depression, exophthalmus , red areas on body, skin hemorrhages, skin ulcers and swollen abdomen that occurs the marine and freshwater fishes, and wide spread around the world.

The disease is known as high economic loss and the mortality rate is usually 40-70 % , ranging up to 20 % in one month.

The main infection routes are via skin, the mouth and protrantre on skin. Water temperatures is important factor in the formation of the disease. The pathogenecity of the disease is increase when the temperatures are 13-16° C , and when the water temperatures are below 9-10° C the disease is occured but the mortality rate is decrease.

A major predisposing risk factor for the disease is high temperature, making it a summer disease in most. Crowding, organic pollution and other stressors can also precipitate outbreaks.

Vibriosis is typically facultative pathogen that can readily survive and multiply in the environment.

Vibriosis are commonly isolated from the mucosal surfaces and internal organs of clinically healthy fish , as well as from invertebralis, sediment, and the water column. High environmental prevalence is in organically pollution water and high salinity.

pathology - clinical signs :

The incubation period is average 7-10 days. Three systemic forms of the disease have been found in the fishes.

Peracute form : the peracute form presents as anorexia, darkening, and sudden death in young fishes. In necropsy, liver, renal and splenic necrosis are found in disease fishes.

Acute form : the fishes usually die due to the very fast progression of the disease, and this form dark, fluctuant subdermal cavitations ulcerate to release sero - sanguineous fluid. There is also abdominal distention, anemia, dermal hemorrhage . Internal signs of typical septicemia include splenomegali and renal necrosis.

Chronic form : In the chronic form of the disease, clinical signs are pronounced ;

1) the hemorrhagic areas in the skin, which are mostly located on the bottom of fins, mouth area, lateral side of body and around the anus, and are connected with the epidermis and deep muscle layers.

2) the gills are sometimes hemorrhagic, but generally are pale

3) eye lesions are common, including corneal edema, ulceration, and exophthalmus.

4) skin is darkness

5) swimming is irregular and the disease fish swims near to the water surface

6) spleen is soft and enlarged. Liver is necrotic

7) the disease is called "RED PEST " due to hemorrhagic ares throughout the body.

8) in necropsy , the hemorrhagic and necrotic lesions in the muscle and skin include all organs

diagnosis :

definitive diagnosis of vibriosis requires of the bacterium in target tissue and organs

control – treatment :

Vaccination is effective control method. The difference in active strains according to geographical regions and countries is the most important problem in vaccination applications.

Antibiotics are administered in feed or bathing style.

Furazolidan 75-100 mg / kg for 15 days , nitrofurazolidan 60 mg / kg for 10 days, tetracycline and chlortetracycline 50-75 mg / kg X 10 days , oxytetracycline 75-100 mg/kg X 10 days , sulphamethazine 100-200mg/kg X10 days , flumequine 12-20mg/kg X 7 days , florfenicol 10mg/kgX 7 days and enrofloxacin 10mg/kg X 7 days.

COLUMNARIS DISEASE

The disease is characterized by ulcers (usually swallow), reddening, erosion, and necrosis of skin, gill necrosis, yellow mucoid material on the skin or gills. The disease progresses with high mortality rate in acute form, and the disease causes very much economic loss in fish farms. High temperature, dyspnea, recent acute stress, late spring to early fall are the predisposing factors for the disease. There are two forms of the disease, acute and chronic forms. Also, the disease occurs in two types as fresh water columnaris disease and salt water columnaris disease.

The skin lesions all over the body are typical in diseased fish as follows: middle of the necrotic lesions are gray-white in color and surrounded by a red color tissue.

Flavobacterium columnare is agent in the fresh water columnaris disease, and *Flexibacter moritimus* is agent in the salt water columnaris disease. The bacterium enters through portals in the fish. The young fish are more sensitive than adult fish. The bacterium is more pathogenic when the water temperatures are between 12-18 ° C.

pathology – clinical signs :

The incubation period is 1-5 days, and the disease can progress in peracute, acute or subacute forms. If the fish dies in peracute form the clinical signs are not observed. The mortality rate can be increased 85 % in peracute form. In addition to general symptoms such as anorexia, depression and inactivity, the typical necrotic areas are found around the mouth, fins, gills, and in different parts of the body in diseased fish. The skin of necrotic foci sheds over time, and muscle tissue emerges under the skin.

As time progresses, the destruction of the cartilage tissue in the mouth and gills occurs. The skin is covered with an excessive mucus layer.

Diagnosis :

The diagnosis of the disease is difficult on the basis of clinical signs and necropsy findings, and laboratory results are required for the diagnosis.

Control and treatment :

General protection principles should be applied. Vaccination application give very succesful result. The diseased fish or fish signs of disease are immediately taken into another pond, and treatment should be maked in this pond.

Tetramycine 50-75mg/kg X10days, oxytetracyline 75mg/kg X 10 days, and antibiotics of sulphanamide group 120-200mg/kgX10 days

BACTERIAL COLD WATER DISEASE / BCWD / (PEDINCULE DISEASE, RAINBOW TROUT FRY SENDROME)

Bacterial cold water disease , caused by *Flaxobacterium psychrophilum*, is common in freshwater salmonids and a serious problem in salmonid hatcheries. It is probably endemic salmonid culture.

The water temperature is most important determining factor disease severity. BCWD is often associated with erythrocytic inclusion body syndrome (EIBS). EIBS anemia may predispose fish to bacterial cold water disease.

Flaxobacterium psychrophilum is usually pathogenic at less than 10° C , but can cause disease at up to 16 ° C. The disease usually appears in spring, when temperatures are 4-10 ° C. When the water temperature rises above 25 ° C , the bacterium can not survive in the water. Mortality usually begins within 5-10 days after infection peaks 20-60 days later. Mortality typically are 5-10 % but may reach 90 % in some epidemics. This disease may recur after stress and often co-occurs with other infections suach as viral infection.

The bacteria is found in the water, and it can be isolated the surface of clinically normal fish and also can occur in wild fishs and in water adjacent to fish farms. Colonization of fish may be for runner to disease and skin damage may be needed initate infection. The source of infection is chronically infected fishs, especially female fishs. Vertical transmission (transovarial contamination) in salmonids is likely because the bacterium are commonly found on eggs and can be isolated reproductive tissues or organs of a high percentages of fish up to 75 %. The bacteria may be very long live in the environment and both wild fish and amphibians migth severe as reservoirs. The bacteria enters fish through skin and gill.

Pathology – clinical signs :

BCWD causes epithelial erosion and necrotic skin lessions but often becomes systemics. The most form is a subacute or an acute infection young fish. In yolk sac fry, erosions damage the skin covering the yolk . But BCWD has a chronic progresssion , and the signs appears late.

The generally disease are seen in fishs, as follows depression, anorexia, unresponsiveness, reluctant swimming and sometimes darkness . The bacteria is most common in highly vascularized tissues, including seconder lamellar capillaris, kidney, heart, and spleen. Inflammation is typically mild or absent.

Clinical of affected fishs may occasionally pale gills, unilateral or bilateral exophthalmus, hemorrhagic lesions around fins and anus. In addition , infected fishs have occasionally nodules that are filled with

bloody fluid various regions of the body, and the affected fish have ulcers and abscess. In the most chronic form of the disease, recovered fish often develop spinal deformities (lordosis, scoliosis, vertebral compression) at 3-4 months of age. Fish that recover from typical BCWD may also develop neurological disease, presumably from the localization of bacteria in the cranium. The bacterium are readily isolated from brain. The main reason why the disease can not be eradicated for a long time in fish farms is that infected fish do not show clinical signs for a long time. The lesions of ulcer are commonly observed especially in kidney, in various organs that are filled with purulent fluid that is rich in the bacterium.

Diagnosis :

Rapid, presumptive identification of bacteria can be made by examining wet mounts of affected skin or internal organs. Presumptive diagnosis is sufficient in routine clinical cases. For confirmatory diagnosis, culture is required.

Control and treatment :

The use of erythromycin in long-term and low-dose food is beneficial in preventing the disease. The eggs disinfected in iodine solution for 15 minutes. Treatment fails to respond favorably in chronically infected fish. General protection principles must be, water temperature should be stable, vitamins and mineral supplements should be made. There is no effective vaccine used.

Sulfisoxazole 220mg/kg X 10 days or 88mg/kg X 26 days, sulphamerazine 220-440 mg /kg, tetracycline 50- 75mg/kgX10 days, oxytetracycline 75mg/kgx10days, aminoxicillin 80-100mg/kgX7 days, chloramphenicol 100mg/kg X 10 days.

PSEUDOMONAS INFECTION

There are four *Pseudomonas* species that cause disease in fish ; *P. anguilliseptica*, *P. fluorescens*,

P. chlororaphis and *P. aeruginosa*. The bacterium are found on the eggs, skin, digestive system and gill.

Pseudomonas anguilliseptica infection : this species infects many different fish species, mainly eels, and the disease caused by this bacteria is called " RED SPOT DISEASE ". The affected fish, hemorrhagic areas are observed around mouth and anus, ventral region of body, and in the operculum. The liver is pale, and its surface has petechial hemorrhagic areas. The high temperature has also been associated with outbreak in fish farms. Young fish are more affected by disease than adult fish.

Pseudomonas fluorescens infection : this species causes necrotic septicemia in many fish species, and causes " BACTERIAL HAEMORRHAGIC SEPTICEMIA DISEASE " in the fish. And the bacteria is found in freshwater and salt water. Despite being the opportunistic bacteria, its pathogenicity is low. Epidemics develop if the temperature below 10 ° C. This bacteria is one of the causative agents of fin and tail rot fish. The agent can be isolated from affected organs.

Control and treatment :

There is no effective vaccine used. Temperature of water in the pools are raised to 26-27 ° C and this condition is maintained for at least 2 weeks.

Kanamycine 25mg /kg , oxytetracyline 55 mg / kg

PASTEURELLOSIS (PSEUDOTUBERCULOSIS , PHOTOBACTERIOSIS)