

Saprolegniasis

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Description of Disease

Saprolegniasis is a fungal disease caused by species of *Saprolegnia* which is the most significant genus in freshwater fungal infections of salmonids and has been recognised for over 100 years. The commonest species involved in disease outbreaks are *Saprolegnia parasitica* and *Saprolegnia diclina*. This disease can occur in all salmonids. It is world-wide in distribution and is found in a wide range of species as well as salmonids. It affects all stages in the life cycle from eggs through to adult fish. Precocious male parr and broodstock at spawning are particularly prone. *Saprolegnia* fungi can cause primary infection. However they are most often secondary pathogens of fish already stressed by another disease, or fish with loss of scales due to mechanical damage allowing a site for the fungus to colonise. The fungus can spread rapidly between fish and the fungal spores can be spread by the water.

Clinical Signs

The fungus looks like tufts of cotton wool on the surface of fish or on eggs. It grows by producing long filamentous strands called hyphae, hence the cotton wool effect. It starts off on the head and back of the fish as circular patches which get bigger and spread all over the fish. The rate of development depends on water temperature and the condition of the fish. Up to 40 or 50 % of the body surface may be covered and the gills, nares and eyes may be infected. The tissue degeneration resulting from the

invasion of the fungus disrupts the osmotic balance of the fish. Diseased fish become increasingly lethargic and lose equilibrium shortly before death. Mortalities can range from 10 to 50 %.

Post-Mortem Findings

As the fungus radiates away from the focus of the infection, the hyphae penetrate and destroy the layers of skin, and in some cases extend into the muscle. Very severe cases have been reported where the fungus blocked the pharynx of first feeding fry and grew out over the gill lamellae preventing feeding or normal respiratory functioning.

Diagnosis

This is normally based on the appearance of tufts of grey/white cotton-wool like growth of fungus on the fish, although the growth may be brown or black due to the entrapment of suspended material. Fresh preparations are examined to distinguish it from other conditions with a similar appearance. However as *Saprolegnia* is frequently a secondary infection, post-mortem examination is normally carried out to check for any underlying infection such as furunculosis.

Transmission

Saprolegnia species of fungi are common in fresh and brackish water and are also present in moist soil. They require oxygen and a nutrient source for growth, so egg incubators and fish tanks provide ideal conditions. The

fungus produces long filamentous hyphae which can grow on and over fish, eggs and organic material such as feed. Once an infection is established on the surface of a fish, fungal enzymes damage adjacent tissue allowing the fungus to spread. Reproductive motile spores are released from the ends of the hyphae into the water and these quickly find other sites to colonise. The spores can be introduced into a system initially by the water, wind, on the feathers of birds and on faeces. The spores can quickly spread around a farm by water, on personnel and equipment and in feed.

Treatment

Fish should be starved before treatment. This will reduce the metabolic rate of the fish and the organic loading of water from food and faeces.

High organic load = High oxygen demand.

Initially only a few fish should be treated. After observing these fish for good recovery over a few hours, the remaining fish can be treated similarly. Adequate oxygenation should always be provided in treatment tanks. Water medications should never be used together.

Formalin treatments are an alternative to malachite green but are not as effective. The dose should be adjusted according to water pH. Low doses should be used at low pH and higher doses at higher pH values. Operators should avoid contact with skin and inhalation of formaldehyde fumes. Oxygen depletion of the water is rapid at high temperatures and the oxygen level should be monitored with emergency aeration available if needed. Formalin should never be mixed with potassium permanganate.

Potassium permanganate is toxic in water of high pH because manganese

dioxide may precipitate onto the gills. Potassium permanganate has an oxidising effect which is potentially dangerous and the use of this chemical should be restricted to specialists. Potassium permanganate should never be mixed with formalin.

Copper sulphate is for specialist use only as it is highly toxic and requires removal. It is inadvisable to use this compound where other treatments are available. The dose of copper sulphate used depends on the water hardness.

Methylene blue is toxic to scaleless fish and should not be used in tanks with bacterial filters.

Sodium chloride should never be used in galvanised zinc containers.

Control

Correction of any underlying husbandry problems is important and in particular stress should be minimised. (See the fact sheets entitled "The scale of stress" and "Disease prevention on salmonid fish farms".) Fish should not be overfed as uneaten food lies on the bottom of the tank or pond and becomes a focus for fungal growth. Water quality must be of the best as water can be the source of the infection as well as providing growth requirements for the fungus. Overcrowding should be avoided as it facilitates the spread of an infection. Dead eggs and alevins should be removed as they can act as a reservoir for the fungus which quickly spreads to healthy eggs and fish. If possible birds should be excluded by nets over ponds and tanks.

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