

Welfare and Health in Danish Organic Trout Farming.

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The Shelterfish project aims at finding solutions to improve the welfare and health of organic rainbow trout, with specific focus on control of infections by gill parasites (mainly the flagellate parasite *Ichthyobodo necator* – “Costia”) and the bacterial Red Mark Syndrome (RMS).

A multifactorial approach to control aquaculture diseases could be a critical tool to improve the health and welfare of fish under captivity. This might be particularly true in the case of organic fish farming, where the use of chemicals only is allowed to a very limited extent.

Health and welfare in organic aquaculture

Fish diseases are one of the main challenges fish farmers face on a routine basis. The fish farming environment tends to favor the spread of infectious diseases, due to the close contact among individuals and to the difficulties to keep water and facilities free of pathogen agents, such as virus, bacteria or parasites. Diseases can kill fish or render them unmarketable. Further, treatments against diseases are expensive, not always environmentally friendly, and, in the case of organic aquaculture, restrictions are in force by current regulations. Therefore, organic aquaculture is challenged to find a way to increase the health and resilience of organic fish.

A multifactorial approach to fight against common fish diseases

In relation to infectious diseases, the health of fish in aquaculture not only depends on the presence or absence of pathogenic agents in the facilities, but also on the natural ability of the fish to protect themselves against infection. It is well known in fish, as in other vertebrates including humans, that the resistance against infections is affected by the welfare state of the animal: Good health status is important for welfare, and in turn, good welfare promote disease resilience. Conditions of stress, for example, are known to have negative effects on the fish immune system, and therefore, on the ability of the fish to fight against infectious agents. This allows a multifactorial approach to fight against diseases: On one side by directly controlling the pathogen and by reducing the risk for the pathogen to occur in the facilities, and on the other side, by improving general welfare conditions, which in turn will enhance the ability of the fish to resist infections.

The shelterFish project

The ShelterFish project is using a multifactorial approach to find solutions to common diseases in Danish organic trout farms. Both the gill parasite *I. necator* and the Rickettsiales-like bacterium responsible for RMS cause important economic losses in Danish organic aquaculture. Approaches directed to improve the immune response of the fish to the pathogens are used in the project along with strategies to improve water quality, to reduce the presence of pathogens, and with strategies directed to enrich fish conditions to improve general welfare.

New prophylactic and treatment methods, compatible with organic principles, are being tested against *I. necator*, and induced immunity methods are being tried to control RMS. Furthermore, the project is also

testing new mechanical approaches to reduce organic matter in fish rearing water, which will help to reduce the presence of undesired pathogens in the farm. Finally, the project is also evaluating the use of shelters, giving the possibility to the fish to hide whenever they want, as a potential tool to reduce stress and improve overall welfare status of the farmed fish. The results of the project will provide interesting insights about the potential use of the different tested strategies.