

RISK FACTORS ASSOCIATED WITH RED MARK SYNDROME IN SCOTTISH FARMED RAINBOW TROUT



GROSS EXTERNAL APPEARANCE OF AN RMS AFFECTED FISH WITH MULTIFOCAL REDDENED LESIONS

Introduction

Red mark syndrome (RMS) is a condition of farmed rainbow trout that causes multiple raised, red lesions on the skin surface (see above). It is non-debilitating and there is no legal requirement to report cases. However, since its first occurrence in 2003 it has become a significant problem for the industry. Over 50% of Scottish trout farms have been affected and the condition can cause substantial losses due to downgrading at harvest and processing. The cause of RMS is still unknown but due to the specific temperature window of occurrence (below 15°C) and the reported response to antibiotic treatment, an infectious bacterial agent is still suspected. In the USA and UK, molecular analysis of lesions detected the presence of 16S rDNA from an organism most closely related to *Candidatus Midichloria mitochondrii*, isolated from ixodid ticks. Subsequent analysis of fish from sites in Scotland has provided molecular evidence for the presence of the *Midichloria*-like organism (MLO) in

the organs (heart, liver, spleen, intestine, kidney) as well as the skin of RMS-affected fish. Despite a strong statistical association with RMS, the MLO has not been confirmed as the aetiological agent, and many questions remain to be answered about disease mechanisms and routes of transmission.

Risk Factors

Marine Scotland Science undertook a joint project with the Centre for Environmental, Fisheries and Aquaculture Science (Cefas) to identify risk factors for RMS at the farm level and to investigate the spread of the condition within the UK. It became clear from this study that the most promising means of control is good husbandry, at least until the aetiology is fully understood. Mechanical handling (both grading and pumps) were shown to increase the risk of RMS. However, as these are unavoidable, necessary procedures when handling

large numbers of fish, a recommendation that may help to reduce the impact of RMS is to minimise mechanical handling in susceptible batches, for example, at low temperature and shortly prior to harvesting. Fish which are affected should not be handled at all, as even mild lesions are susceptible to further damage.

Since the first case in late 2003, RMS has subsequently spread to the majority of farms in Scotland. This study indicated that the most likely source for the introduction of RMS was specific batches of imported ova. There is some evidence that RMS was introduced again in 2006, but currently the number of farms affected is decreasing.

The main route of introduction of infection to a site appears to be the movement of affected fish. Where possible, fish should be obtained from RMS-free sources, and keeping the number of sources to a minimum will help to lower the risk of introducing RMS on site. While antibiotic treatment can be considered if fish are severely affected, RMS clears spontaneously and this occurs more rapidly in warmer water.

If farms can prevent further infected batches from entering the site, RMS should clear with time and re-infection can be avoided.

Conclusions

Results from the study have indicated that to minimise the problems associated with RMS, it is necessary to ensure good husbandry practices with an emphasis on minimising mechanical handling and trying to eliminate this condition from the farm through robust biosecurity and careful sourcing of fish.

Further Information

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