



UNIVERSITÀ
DEGLI STUDI
DI UDINE

Università degli studi di Udine

Rainbow trout (*Oncorhynchus mykiss*) red mark syndrome - a standardised approach to histopathological scoring

Original

Availability:

This version is available <http://hdl.handle.net/11390/1191067> since 2023-09-04T19:45:41Z

Publisher:

Published

DOI:

Terms of use:

The institutional repository of the University of Udine (<http://air.uniud.it>) is provided by ARIC services. The aim is to enable open access to all the world.

Publisher copyright

(Article begins on next page)

Rainbow trout **Red Mark Syndrome** - a standardised approach to histopathological classification

Massimo Orioles*, Jacob G. Schmidt**, Tine M. Iburg**, Marco Galeotti *

* Dipartimento di Dipartimento di Scienze Agroalimentari, Ambientali e Animali, Sezione di Scienze Animali e Veterinarie, Unità di Patologia Veterinaria;

** Unit for Fish and Shellfish Diseases, National Institute of Aquatic resources, Technical University of Denmark, Denmark.

BACKGROUND: Red Mark Syndrome (RMS) is an infectious disease found to affect salmonids in the *Oncorhynchus* genus. No aetiological agent has been unequivocally identified for RMS, which is thus presently defined by histopathological features.

METHODOLOGY: We propose a semi-quantitative classification based on 5 categories (**negative to mild, mild, moderate, severe, regenerative**) of **RMS** lesions using samples from a cohabitation infection model established at DTU-Aqua. In 87 cases **RMS** was followed from early lesion development until late healing stages, and samples were taken at several time-points. Histological samples were analysed blindly at the University of Udine. Histological classification is based on severity of inflammatory infiltrate in the dermis spongiosum and scale pockets and a semi-quantitative description of each layer including integrity of the layer, presence of necrosis, oedema, congestions, haemorrhages, absence of scale pockets and scale pockets resorption.

RESULTS AND CONCLUSIONS: No bacteria were observed in any of the lesion sections. Lymphocytic and macrophagic (lympho-monocytic) inflammatory infiltrate was identified. **Negative to mild** cases showed focal mild infiltrate of the dermis spongiosum with frequent dilation of the scale pockets. **Mild** cases showed multifocal mild inflammation of the dermis spongiosum and mild inflammatory infiltrate of the hypoderma. Epidermis may show infiltration as well. **Moderate** and **Severe** cases showed an increased lympho-monocytic inflammation involving all skin layers. Epidermis showed a progressive loss of integrity and ulceration. Frequent scale resorption is observed. Muscle remained mildly to moderately involved even in most severe cases. Microscopically, **Regenerative** cases showed features typical of mild cases, but with scales in regenerative phases. We identified evident correspondences between macroscopic and microscopic categories. This classification can provide a valuable standardized approach and guide the pathologist in the analysis and definition of suspected **RMS** lesions. Further studies are needed to validate statistically the results and evaluate interobserver agreement.

