FRIEDRICH-LOEFFLER-INSTITUT
FLI
Bundesforschungsinstitut für Tiergesundheit
Federal Research Institute for Animal Health

Infectious Salmon Anaemia (*ISA*)

Susceptible species

Infectious Salmon Anaemia (ISA) is caused by the ISA virus (ISAV). According to European legislation, only infection with HPR-deleted ISAV is listed and subject to mandatory control measures. In the annex of Implementing Regulation (EU) 2018/1882, rainbow trout (*Oncorhynchus mykiss*), Atlantic salmon (*Salmo salar*) and brown trout (*S. trutta*) are listed as susceptible species for HPR-deleted ISAV; vector species are not listed. In 2001, an ISA outbreak in silver salmon (*O. kisutch*) was described in Chile. ISAV has also been isolated from sea trout (*S. trutta trutta*) and Atlantic herring (*Clupea harengus*). These fish species do not show clinical signs, but can be considered as virus carriers. The ISAV is harmless to humans.

Distribution area

Infected salmon stocks have been reported from Canada, Norway, Chile, USA, the Faroe and Shetland Islands, as well as from Scotland and Ireland, also in rainbow trout from sea water. With regard to ISA Germany was declared disease-free by the EU Commission in 2009.

Causative agent

ISAV is an enveloped virus from the Orthomyxoviridae family and classified in risk group 1 according to TRBA 462 "Classification of viruses into risk groups". Laboratory work with ISAV should be carried out under conditions of safety level S2 and additional requirements (restricted movement of people, no contact to farmed fish for two days). For animal experiments, S3 conditions are recommended. The disease is listed in the annex of the Implementing Regulation (EU) 2018/1882 in categories C, D and E.

Transmisson

The virus can be transmitted from "smolt" salmon stocks with subclinical infections, spread between fish farms and slaughterhouses by transport or through organ material originating from infected animals and untreated wastewaters directly into the sea and infect wild salmon.

Clinical signs

This systemic viral disease is characterized by anaemia, ascites, swollen and enlarged dark liver and spleen, and petechial bleedings. Typical histopathological findings are degenerative and necrotic changes in the liver cells as well as tubular necrosis and bleedings in the kidneys. The disease occurs in fish kept in sea water and can lead to high mortalities. However, ISA has also been reported in freshwater salmon, where the virus spreads slowly and has a lower virulence.

Diagnostic

According to Delegated Regulation (EU) 2020/689, a distinction must be made between infections with highly pathogenic HPR-Del- (deletion in the highly polymorphic

region of the HE gene) and undeleted HPR0-ISAV. Diagnostic methods for recognizing or maintaining the status "free from infection with the HPR-deleted ISAV" are: Sample screening using RT-qPCR with subsequent conventional RT-PCR and sequencing of the HE gene to detect the HPR deletion and detection of the ISAV - Antigen in tissue preparations using specific antibodies against ISAV; or isolation in cell culture and subsequent genomic detection of the HPR-deleted ISAV.

For more detailed information please refer to the "Amtliche Methodensammlung" (in German language only).

Differential Diagnosis

As for differential diagnosis, all diseases of susceptible species associated with anaemia and increased mortality must be considered. Further differential diagnostic criteria can be found in the OIE "Diagnostic Manual for Aquatic Animal Diseases".

Control

ISA is an animal disease listed in the EU, the diagnosis and control of which is specified in the Regulation (EU) 2016/429 (Animal Health Law) and the corresponding implementing and delegated regulations. The spread of ISA can be reduced by controlling the transport of fish as well as regular inspections of fish farms and slaughterhouses. At the same time, control measures must be established that affect infected or suspected farms and their neighbouring farms. This also includes measures for slaughterhouse hygiene, for the disinfection of waste waters from fish farms, slaughterhouses and the fish processing industry.

Further Information: National Reference Laboratory for Infectious Salmon Anaemia

Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health
Südufer 10, D-17493 Greifswald – Insel Riems, Germany, FLI-Website