

Animal Health and Zoonosis

Monitoring Surveillance

Survey of the occurrence of the notifiable viral diseases VHS, IHN and IPN in farmed and wild salmonids in Switzerland

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Key words

VHS, IHN, IPN, prevalence, fish, aquaculture, phylogenetic analysis

Aim of the study

This study was performed to: (i) assess the prevalence of the three notifiable viral fish diseases Viral Haemorrhagic Septicaemia (VHS), Infectious Haematopoietic Necrosis (IHN) and Infectious Pancreatic Necrosis (IPN) in and within Swiss aquaculture facilities; (ii) assess the prevalence of these three viral diseases in natural habitats; (iii) assess the prevalence of these three notifiable diseases inside individual tanks of a fish farm given the existence of the virus without clear clinical signs of the disease; and (iv) analyse the transmission routes and the origin of IPN viruses by phylogenetic analysis of isolates collected since 2003 in Switzerland.

Material and methods

A total of 38 aquaculture facilities either importing fish from abroad or/and delivering live fish to other facilities were selected and sampled. Up to a maximum of 50 fish per farm were taken. Organs of five fish each were pooled resulting in a total of 210 samples. To evaluate the prevalence of VHS, IHN and IPN in natural habitats, ovarial fluid and semen from 298 mature salmonids were sampled from 59 different sampling sites. Additionally, the organs of 28 salmonids from 6 sampling sites were taken. All samples were analysed by RT-qPCR. To investigate the prevalence of IHN and IPN at tank level, 25 fish per tank were selected on known positive farms and analysed individually by RT-qPCR. A total of four tanks for IPN and three tanks for IHN were considered.

In the last 13 years the reference laboratory for fish diseases in Switzerland (NAFUS) diagnosed 35 IPN cases by cell culture isolation and indirect fluorescent antibody test (IFAT). For the phylogenetic analyses a region of 1180 base pair of the VP2 region of segment A of these viruses was amplified by RT-PCR, sequenced and multiple sequence alignment was performed. To calculate the genetic distances, a phylogenetic tree was sub-sequently drawn using the neighbor-joining method.

Results and significance

The results of the sampling showed a relatively wide distribution of IPN in farmed fish, while only single cases of VHS and IHN could be found. All cases concerned clinical healthy fish. In contrast, no notifiable viral diseases were detected in wild fish. Finally, a high variation in numbers of IPN infected fish at tank level was found, depending on the sampled organs and the involved fish species, while no fish was tested positive for IHN despite contact between tanks with diseased fish.

The results of the phylogenetic analysis suggest that fish movements represent the main way of spread and that natural water bodies and wild fish play a clearly minor role in the spread of IPN in Switzerland. As almost no data are available on the genetic diversity of IPNV from countries exporting fish to Switzerland, in most of the cases the effective origin of the virus could not be clearly determined. It seems probable that some viruses were exchanged between aquaculture facilities due to fish movements within Switzerland, while other isolates clearly ensued from import of fish from abroad.

The study provides the authorities with important information for the establishment of disease free zones and the implementation of an efficient risk based surveillance of aquatic animal diseases.

Publications, posters and presentations

- Diserens, N.; von Siebenthal, B.; Wahli, T. (2016) Untersuchungen zum Vorkommen von meldepflichtigen viralen Fischseuchen bei gezüchteten und wildlebenden Salmoniden in der Schweiz. In proceedings of the 16th bi-annual meeting of the German-speaking branches of the European Association of Fish Pathologists (EAFP). Graz, Austria, 5 – 7 October 2016 (+ presentation).
- Diserens, N.; von Siebenthal, B.; Wahli, T. (2017) Genetic diversity of infectious pancreatic necrosis virus (IPNV) isolated since 2004 from salmonids in Switzerland. In Book of Abstracts of the 18th International Conference on Diseases of Fish and Shellfish of the EAFP, Belfast, Northern Ireland, 4 7 September 2017 (+ poster).
- Diserens, N.; von Siebenthal, B.; Wahli, T. (2017) Survey of the occurrence of notifiable viral diseases in farmed and feral salmonids in Switzerland. In Book of Abstracts of the 18th International Conference on Diseases of Fish and Shellfish of the EAFP, Belfast, Northern Ireland, 4 7 September 2017 (+ presentation).

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