

The surveillance and control programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) in Norway

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Neither VHS virus (VHSV) nor IHN virus (IHNV) were detected on any of the sites tested in the 2008 surveillance. Due to the VHS outbreaks in Storfjorden in November 2007, the approved zone has been amended, and only farms in the approved zone were sampled in 2008.

Introduction

VHS and IHN are two important diseases in salmonid fish caused by rhabdovirus infections (1). VHS occurs in several fish species in both freshwater and seawater, but has most frequently been recorded in farmed rainbow trout (*Oncorhynchus mykiss*). At present, an ongoing VHS outbreak in the Great Lakes in North America continues to cause large losses among several wild fish species (2, 3). VHS was diagnosed in farmed rainbow trout in Norway in 2007 (4). Outbreaks of IHN have resulted in significant economic losses in farmed rainbow trout and salmon in North America and Europe, and the disease has also had an impact on wild populations of Pacific salmon. IHN has never been diagnosed in Norway. For more information on fish rhabdoviruses:

<http://www.vetinst.no/nor/Faktabank/Alle-faktaark/Viral-hemoragisk-septikemi>

<http://www.vetinst.no/nor/Faktabank/Alle-faktaark/Infeksioes-Hematopoetisk-Nekrose>

<http://www.vetinst.no/eng/Research/Publications/Fish-Health-Report>

<http://www.vetinst.no/eng/Research/Publications/NOK-Reports>

Aim

The aim of the programme is to document the absence of VHSV and IHNV in fish farms within the approved zone in order to maintain Norway's VHS and IHN free status.

Materials and methods

Sampling

Sampling and inspection is carried out by the Norwegian Food Safety Authority District Offices according to Directive 91/67/EEC (5) and Decision 2001/183/EC (6). The virological examination is performed at the National Veterinary Institute. Thirty fish are sampled from each site and, depending on fish size, five or ten tissue samples are pooled on transport medium. In farms containing rainbow trout, all samples are collected from this species. In farms without rainbow trout, all other susceptible species must be sampled equally. The samples must be kept below 10°C during transport, and must arrive at the laboratory within 48 hours.

Analysis

The samples are immediately processed upon arrival at the laboratory. Following homogenisation and low speed centrifugation, the resulting supernatant is incubated with a polyclonal antibody against infectious pancreatic necrosis virus (IPNV), a virus likely to be present in the samples. The supernatant is inoculated onto BF-2 and EPC cell cultures, respectively, and the cells incubated at 15°C. After one week of incubation, the cells are investigated for cytopathic effect (CPE). The supernatant is then passaged onto fresh BF-2 and EPC cells, respectively. After incubated for another seven days, the cells are investigated for CPE. If CPE is observed, virus is identified as specified by Decision 2001/183/EC and recommendations from EU reference laboratory for fish diseases in Århus, Denmark.

Results

In 2008, a total of 1,398 pooled samples (13,980 individual fish) from 444 sites were examined (Tables 1 and 2, Figure 1). All samples were negative for VHSV and IHNV.

In samples from sixteen submissions, CPE appeared in the BF-2 cell cultures. These were negative for IPNV as tested by virus neutralization test (IPNV), and for VHSV by real-time reverse transcription polymerase chain reaction (RRT-PCR) (VHSV). Further investigations of cell cultures exhibiting CPE by immunofluorescence tests and RRT-PCR revealed the presence of salmonid alphavirus (SAV), the causative agent of pancreas disease (PD). Three SAV positive submissions from sites in Hordaland consisted of samples from rainbow trout. The remaining thirteen submissions with SAV positive tissue were from

Atlantic salmon sampled on sites in Hordaland (seven sites), Sogn og Fjordane (one site) and Rogaland (five sites). Clinical PD was diagnosed in most of the sites either before or after submission of samples for VHS and IHN surveillance.

Table 1. Different categories of fish analysed for VHSV and IHNV in 2008

	Fry - smolt		On-growing		Brood fish		Total	
	No. sites	No. of pooled samples	No. sites	No. of pooled samples	No. sites	No. of pooled samples	No. sites	No. of pooled samples
Atlantic salmon (<i>Salmo salar</i> L.)	71	215	275	831	32	128	376	1,174
Rainbow trout (<i>Oncorhynchus mykiss</i>)	6	18	34	102	8	24	48	144
Brown trout (<i>Salmo trutta</i> L.)	7	24	-	-	10	30	17	54
Arctic char (<i>Salvelinus alpinus</i> L.)	-	-	6	18	2	4	8	22
Turbot (<i>Scophthalmus maximus</i> L.)	-	-	-	-	1	4	1	4
Total	84*	257	315*	951	48*	190	444*	1,398

* The total number of sites may be less than the sum of sites per species as some sites produce more than one species.

Table 2. Number of farms and species analysed for VHSV and IHNV during the time period 1995-2008

Farm types	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<i>Per production type</i>														
Smolt producing farms	71	169	162	30	27	45	30	32	54	51	125	104	140	84
On-growing farms	207	340	346	478	527	447	508	414	429	303	280	276	282	315
Brood stock farms				2	3	7	7	14	2	9	14	15	12	48
<i>Per species</i>														
Farms with Atlantic salmon	225	425	392	417	462	382	408	372	387	295	345	316	359	376
Farms with rainbow trout	31	63	69	66	62	83	93	61	74	48	61	49	54	48
Farms with brown trout	15	13	38	21	27	28	24	23	24	21	8	24	13	17
Farms with char	1	7	6	5	4	10	8	9	9	5	7	8	5	8
Farms with turbot	6	1	1		1	1	4		1	1		1		1
Farms with sea trout				2	3	2	4	1	2	2	2	2	2	
Farms with brook trout				2		1	1	2	1	2				
Farms with relict Atlantic salmon				1						1				
Farms with cod													5	
Total	278	509	506	510	554	494	534	468	498	375	417	392	434	444

* In 2008, cultivation facilities for wild stocks were categorized as brood stock farms.

Discussion

In 1994, Norway obtained disease free status for VHS and IHN (7). In 2007, the outbreak of VHS in rainbow trout caused a temporary suspension of the disease free status. Measures to eliminate the disease and prevent its spread were immediately taken by the Food Safety Authority. In May 2008, Norway regained its VHS free status, with the exception of the VHS outbreak area (8). The surveillance programme only covers the approved zone.

In 2008, 1 pooled sample from 1 site was rejected, compared to 12 pooled samples from 4 sites in 2007.

The isolation of SAV in samples received for surveillance of VHSV and IHNV continues to represent a problem for detection of the two rhabdoviruses. Presently, neutralising antibodies against SAV are not available. Also, it is not known whether replication of SAV will inhibit replication of VHSV in the BF-2 cells.

Therefore, tissue homogenates of SAV-positive samples are always examined for VHSV by RT-PCR to ensure the absence of this virus. All sixteen SAV-positive sites are located in the region where PD is considered endemic.

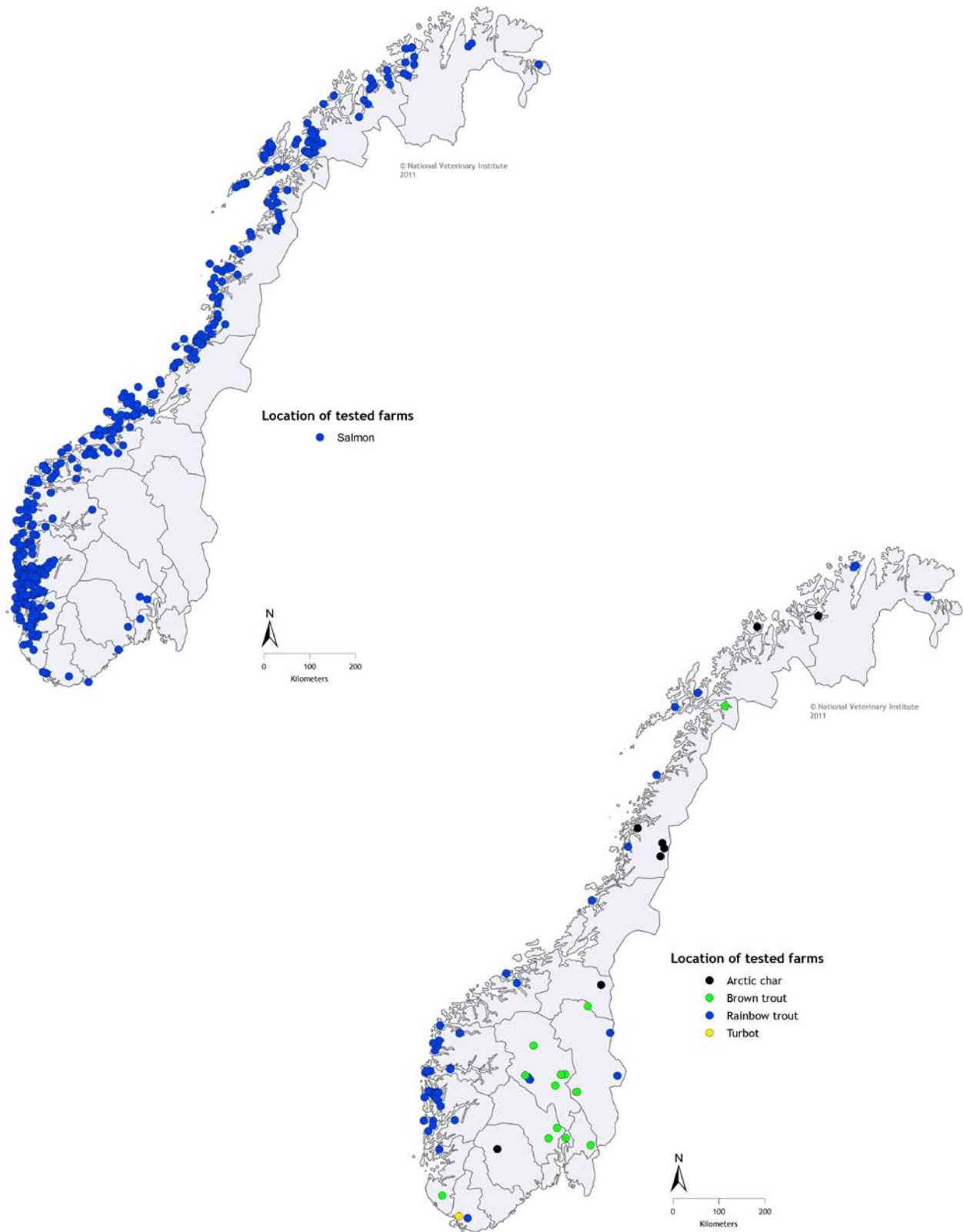
Conclusion

Based on the examinations carried out in the surveillance and control programme for VHS and IHN at the National Veterinary Institute in 2008, no confirmed or suspected cases of VHSV or IHNV were registered within the approved zone. Prior to the 2007 VHS outbreak, none of the involved sites had tested positive in the surveillance programme. The surveillance programme will be evaluated to improve its present efficiency.

References

1. Anonymous. Diseases of Fish. In: Manual of diagnostic tests for aquatic animals. Part 2, 5th ed. Paris: Office International des Epizooties; 2006.
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5. Council Directive 91/67/EEC concerning the health conditions governing the placing on the market of aquaculture animals and products.
6. Commission Decision 2001/183/EC of 22 February 2001 laying down the sampling plans and diagnostic methods for the detection and confirmation of certain fish diseases repealing Decision 96/532/EEC.
7. EFTA Surveillance Authority Decision No. 71/94/COL of June 1994.
8. EFTA Surveillance Authority Decision No. 302/08/COL of May 2008.

Figure 1. Geographical distribution of the density of tested farms with Atlantic salmon (A) and other species (B) in the surveillance and control programme for VHS and IHN in 2008.



The National Veterinary Institute (NVI) is a nation-wide research institute in the fields of animal health, fish health, and food safety. The primary mission of the NVI is to give research-based independent advisory support to ministries and governing authorities. Preparedness, diagnostics, surveillance, reference functions, risk assessments, and advisory and educational functions are the most important areas of operation.

The National Veterinary Institute has its main laboratory in Oslo, with regional laboratories in Sandnes, Bergen, Trondheim, Harstad og Tromsø, with about 360 employees in total.

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The Norwegian Food Safety Authority (NFSA) is a governmental body whose aim is to ensure through regulations and controls that food and drinking water are as safe and healthy as possible for consumers and to promote plant, fish and animal health and ethical farming of fish and animals. We encourage environmentally friendly production and we also regulate and control cosmetics, veterinary medicines and animal health personnel. The NFSA drafts and provides information on legislation, performs risk-based inspections, monitors food safety, plant, fish and animal health, draws up contingency plans and provides updates on developments in our field of competence.

The NFSA comprises three administrative levels, and has some 1300 employees.

The NFSA advises and reports to the Ministry of Agriculture and Food, the Ministry of Fisheries and Coastal Affairs and the Ministry of Health and Care Services.

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