Veterinærinstituttet
Norwegian Veterinary Institute

Annual Report

The surveillance programme for infectious salmon anaemia virus HPR0 (ISAV HPR0) in Norway 2019

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The surveillance programme for infectious salmon anaemia virus HPR0 (ISAV HPR0) in Norwegian hatcheries 2019

Content

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Summary
The non-pathogenic variant of the infectious salmon anaemia virus, ISAV HPR0, was detected in five of 74 hatcheries in conjunction with the surveillance programme for ISAV HPR0 in 2019. No hatcheries tested positive for ISAV HPR-del.

As the hatcheries were sampled only once in the calendar year and a limited number of tanks were sampled, this result is a likely underestimate of the true prevalence of ISAV-HPR0 in Norwegian hatcheries.

Introduction

Infectious salmon anaemia (ISA) is a serious disease in salmon caused by ISA virus (ISAV), a virus within the *Orthomyxoviridae* family. The disease was first described in Atlantic salmon (*Salmo salar)* in Norway in 1984 and has since been reported in several countries (USA, UK, Canada, Faroe Islands and Chile). In Norway, the number of outbreaks peaked in the early 1990s with more than 80 cases per year. In the late 1980s and early 1990s several measures were implemented in order to combat and limit the spread of the disease. Since 1993, the number of annual outbreaks has varied between 1 and 20, and ISA is still a recurring challenge to the salmon farming industry in Norway.

ISA is an OIE listed infection and it is notifiable (list 2) in Norway and within the EU (Council Directive 2006/88/EC). In Norway, there is a legal obligation to report suspicion of ISA to the NFSA. Following a suspicion, the NFSA performs fish sampling at the suspected site and submits the samples to the national ISA reference laboratory (the Norwegian Veterinary Institute, NVI) for diagnostic investigation. If this investigation confirms an ISA diagnosis, this is reported to the NFSA. The NFSA determines the official diagnosis for the site and makes decisions on the implementation of control measures. The latter includes immediate restrictions on fish movement followed by establishment of a containment area. ISA diagnoses are reported to the EU, the EFTA Surveillance Authority (ESA) and the OIE by the NFSA.

There are two main types of ISAV. The pathogenic type, termed ISAV HPR-deleted (ISAV HPR-del), is associated with ISA outbreaks, while the non-pathogenic type, termed ISAV HPR0, causes subclinical infections only. ISAV HPR0 is now regarded as the origin of the virulent ISAV HPR-del through differential mutations in at least two virus genes. Positive PCR-tests for ISAV HPR0 have so far not been considered notifiable by the Norwegian regulations. Both types of ISAV are reportable to the OIE, however as ISAV HPR0 is not notifiable in Norway, it is generally not reported to the OIE.

The surveillance programme for ISAV HPR0 in Norwegian hatcheries was initiated in 2019.

Aim

The aim of the ISAV HPR0 surveillance programme is to map the occurrence of ISAV HPR0 in Norwegian Atlantic salmon and rainbow trout hatcheries. Based on EUs new Animal Health Law the strategy for combating and limiting ISA must be changed. Some overview of the HPR0 situation in hatcheries can be of use in the establishment of updated measures in a new contingency plan for ISA.

Materials and methods

Hatchery selection was coordinated with the surveillance programme on *Gyrodactylus salaris*, with each hatchery being sampled every second year (50% of hatcheries sampled per year). Sampling was conducted by the NFSA.

A total of 90 fish were sampled per hatchery. In each hatchery, ten tanks were randomly selected and gill samples were collected from nine fish per tank. Samples were pooled in pools of three, giving three

samples per tank and 30 samples per hatchery. If the hatchery had less than ten tanks, the required number of samples were divided by the number of available tanks.

Samples were submitted to the Norwegian Veterinary Institute (NVI) for analysis. The samples on RNAlater™ were processed and analysed for ISAV by real-time RT-PCR with primers and probe as described by Snow et al. (2006). To differentiate ISAV HPR0 from ISAV HPR-del, ISAV positive samples were further investigated by RT-PCR and sequenced with primers recommended by the World Organisation for Animal Health (OIE, 2019) to determine the amino acids in the hypervariable region (HPR) of segment 6.

All results were made available to the NFSA through a shared database (EOS). In addition, the NVI compiles a yearly report on the data to the NFSA.

Results

In total, 74 hatcheries were sampled. The geographical locations are shown in Figure 1.

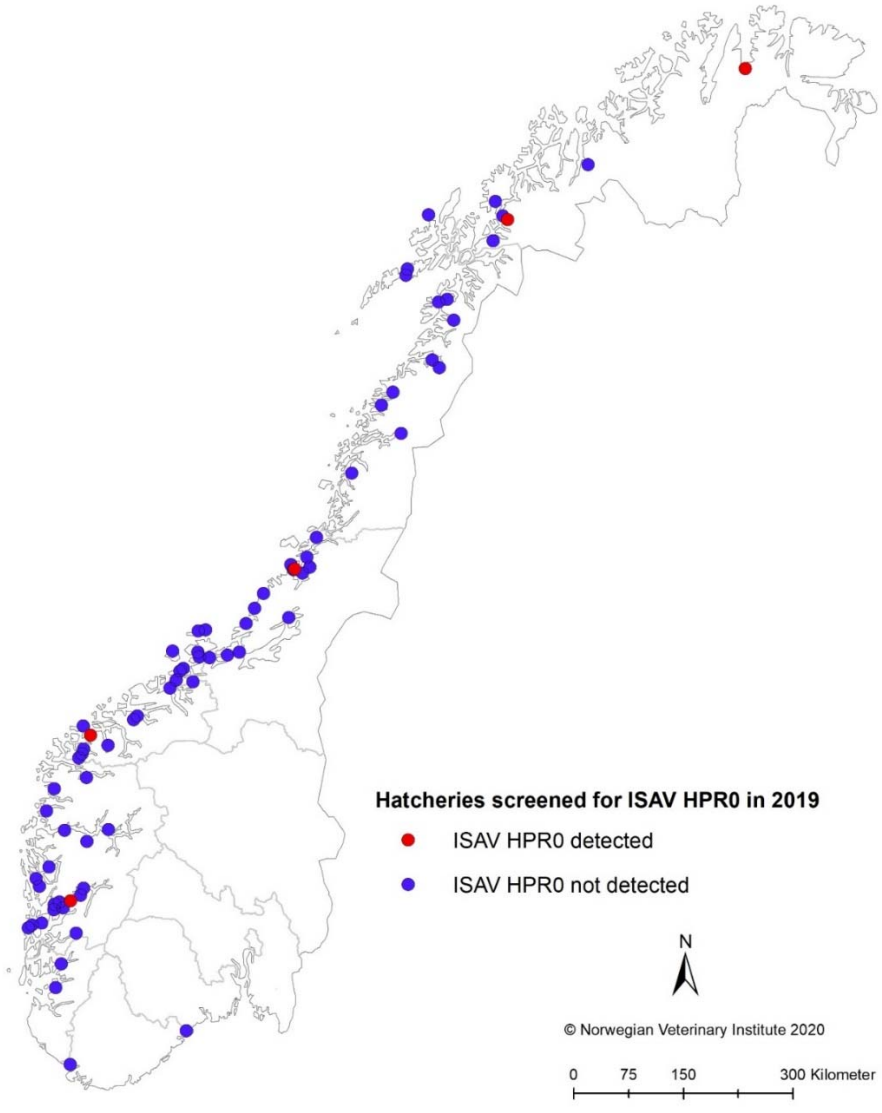

Figure 1: Geographic location of hatcheries.

The non-pathogenic variant of ISAV, ISAV HPR0, was detected in five of the hatcheries, while none tested positive for the pathogenic variant (ISAV HPR-del). All positive samples originated from Atlantic salmon.

An overview of the production technology of sampled hatcheries is shown in Table 1, while the details of the positive hatcheries are shown in Table 2.

Table 1: Summary of the hatchery technology used by the sampled hatcheries.

Hatchery technology*	Number of sampled hatcheries	Number (%) of positive hatcheries
GS only	48	1 (2)
GS and RAS	9	2 (22)
RAS only	16	2 (13)
Other (Cages in freshwater)	1	0 (0)

* GS = flow-through system, RAS = recirculation system.

Table 2: Summary of data for ISAV HPR0-positive hatcheries and tanks.

Hatchery ID	Hatchery			Positive tanks			
	Technology*	No. tanks sampled	No. positive samples	No. positive tanks	Technology*	Seawater addition	Average fish weight (g)
A	GS	10	5	3	GS	No	65 - 75
B	GS and RAS	10	6	2	RAS	Yes	32 - 50
C	GS and RAS	10	1	1	GS	Yes	60
D	RAS	10	19	7	RAS	Yes	45 - 220
E	RAS	5	9	4	RAS	Yes	15 - 60

* GS = flow-through system, RAS = recirculation system.

Discussion

This report contains the results from the first year of the surveillance programme for ISAV HPR0 in Norwegian hatcheries. Overall, approximately 7% of tested hatcheries were found to be positive for ISAV HPR0 at the time of sampling. The proportion of ISAV HPR0-positive tanks varied between hatcheries. ISAV HPR0-positive tanks were found in both recirculation systems and flow-through systems, and the majority of positive tanks were run with a degree of seawater addition at the time of sampling.

The hatcheries were only sampled once in the calendar year and a limited number of tanks were sampled per hatchery. As a result, it is likely that the results obtained in this surveillance programme is an underestimation of the true prevalence of ISAV HPR0 in Norwegian hatcheries during a calendar year.

References

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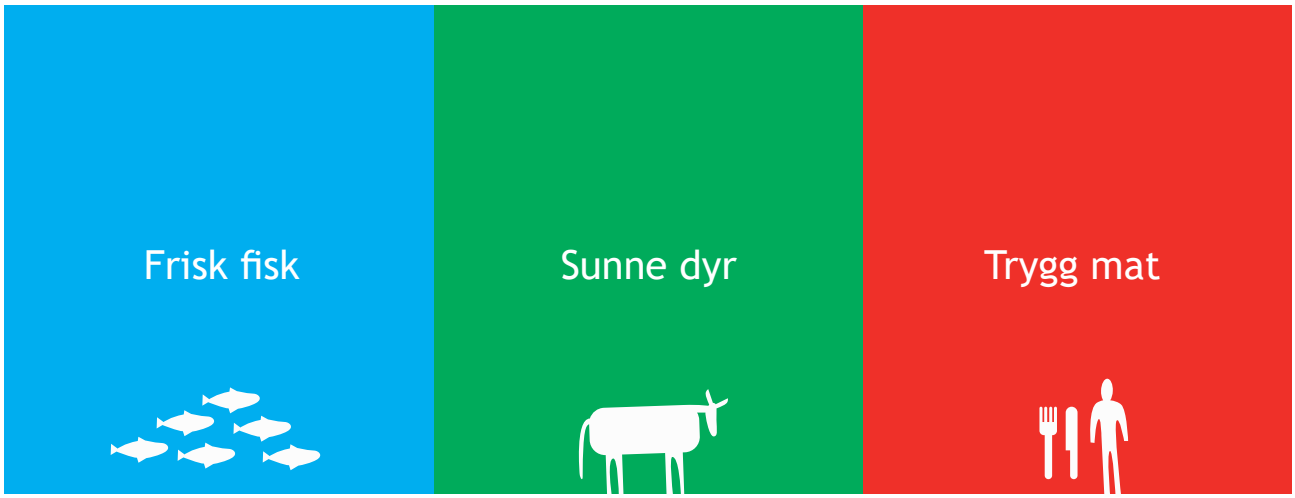

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