Annual Report

The surveillance programme for virus associated with disease in rainbow trout (PRVom) in 2016

Veterinærinstituttet
Norwegian Veterinary Institute

The surveillance programme for virus associated with disease in rainbow trout (PRVom) in 2016

Content

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Summary

The virus, PRVom was detected in 9 of 19 the rainbow trout sites tested in the 2016 surveillance programme. No new cases of the virus associated disease were observed.

Introduction

During disease investigation in hatcheries of rainbow trout (*Oncorhynchus mykiss* – abb.om) in 2013, the Norwegian Veterinary Institute (NVI) isolated a gene sequence from a new virus (1). This virus is closely related to piscine orthoreovirus (PRV) which is associated with heart- and skeletal muscle inflammation in Atlantic salmon (HSMI). Currently the virus is named piscine orthoreovirus *Oncorhynchus mykiss* that can be abbreviated to PRVom.

A PCR method were developed and subsequently validated based on the sequenced gene fragment. The gene sequence was found in tissue and blood from diseased fingerlings of rainbow trout and in contact farms for these hatcheries. This included both broodstock groups and on-growing farms. In addition, small amounts of PRVom were detected in randomly selected historical material from the counties Hordaland and Møre og Romsdal back to 2011. PRVom was detected until 15 months after seawater transfer and there is reason to believe that subclinical disease may occur.

Experimental infection trials conducted in 2014 and 2015 showed that the virus can be transmitted to both rainbow trout and Atlantic salmon by injection of red blood cells from diseased rainbow trout. It was also shown that the virus is transmitted horizontally through the water between individuals of the same species. The virus replicates more slowly in salmon than in rainbow trout. No tests are carried out to show whether the disease is transmitted between species.

Aims

The aim of the programme was to map the occurrence of PRVom in Norwegian rainbow trout sites that had tested positive for the virus in the previous years.

Materials and methods

The strategy for the surveillance programme for PRVom was risk-based, i.e. targeting fish with disease signs or abnormal behaviour.

Initially sixteen sites with rainbow trout were included in the programme. Sampling of 20 samples from each site twice during the year was planned. The sampling was conducted by the Norwegian Food Safety Authority. Additionally, the NVI tested some sites for PRVom in connection with disease investigation and screening.

Samples submitted to the NVI were processed and analysed for PRVom by a reverse transcriptase real-time PCR (RT-qPCR). NVI designed this RT-qPCR method in 2014 targeting the sigma 3 protein to be able to detect PRVom (1). The PCR is in-house validated. This method detects both virus transcripts and the virus genome.

Results and Discussion

In total, 504 fish samples from 19 sites with rainbow trout were tested for PRVom in the surveillance programme in 2016 (Table 1). The virus was detected in 9 out of the 19 tested sites with rainbow trout in the 2016 PRVom surveillance programme (Table 1, Figure 1). The mean number of samples per site was 19 (minimum 11 and maximum 20).

Additionally, 53 samples from four sites were tested in connection with disease investigation and screening initiated by the farmer. PRVom virus was detected at two of these sites. The mean number per site in these samples was 10 (minimum 1 and maximum 29).

Table 1. Samples from different types of production tested in the PRVom surveillance programme in 2016.

Species	Production	Numbers investigated for virus Y by real time RT-PCR		
		Samples	Sites	Positive sites
Rainbow trout	Smolt	140	5	0
	On-growing	330	12	7
	Broodfish	34	2	2

PRVom was detected by PCR in 18 different sites with rainbow trout in the years from 2011-2016. The disease was detected in 6 sites during the same period (Table 2, Figure 2). The virus was detected in the same fish group at two different samplings for four sites, which indicates that the virus may persist in the fish for several months.

In 2016 PRVom was detected at five new sites with rainbow trout. These sites were located in the same area where PRVom was detected earlier. However, the NVI did not detect the disease associated with the virus at any of the positive sites in 2016.

Currently, the disease associated with PRVom does not seem to be a health threat to the Norwegian population of farmed salmonids, and the surveillance programme will not continue in 2017. However, PRVom is shown to persist in fish without clinical symptoms and has the potential to spread in the marine environment. There is a need for more data on the prevalence of PRVom in farmed rainbow trout in Norway. Therefore, the NVI recommend conducting a “baseline study” to map the prevalence of PRVom in the Norwegian rainbow trout population.

References

1. Olsen A.B., Hjortaas M., Tengs T., Hellberg H., Johansen R. First description of a new disease in rainbow trout (*Oncorhynchus mykiss* (Walbaum)) similar to heart and skeletal muscle inflammation (HSMI) and detection of a gene sequence related to Piscine orthoreovirus (PRV). PLOS ONE, July 15, 2015. e0131638. Doi:10.1371/journal.pone.0131638

2. Kristoffersen AB, Viljugrein H, Kongtorp RT, Brun E, Jansen PA (2009) Risk factors for pancreas disease (PD) outbreaks in farmed Atlantic salmon and rainbow trout in Norway during 2003-2007. Prev Vet Med 90: 127-136.

Table 2. Sites with rainbow trout where PRVom was detected 2011-2016.

Municipality	Site	Type	Detection of disease	PCR PRVom					
				2011	2012	2013	2014	2015	2016
A	1	Smolt producer					-		
B	2	On-growing				+	+		+
C	3	Smolt producer	2012, 2013, 2014		-		+		-
	4	Smolt producer					-		
	5	On-growing		-					
D	6	Smolt producer	2012, 2013, 2014		+	+	+		-
E	7	On-growing							+
F	8	Smolt producer					-		
G	9	Smolt producer	2014				+		-
H	10	On-growing							-
I	11	On-growing		-				+	+
	12	On-growing	2014				+		+
	13	On-growing	2014				+		+
	14	On-growing							-
	15	On-growing							-
	16	Broodfish					+		
	17	Broodfish							+
J	18	On-growing					-		+
	19	On-growing					+		-
K	20	On-growing		-					
L	21	On-growing		-					
M	22	Broodfish							+
	23	On-growing		-					+
N	24	Smolt producer	2013, 2014			+	-		-
	25	On-growing					-		
	26	Broodfish					+		+
	27	Smolt producer							-
	28	On-growing							-
O	29	On-growing			-				
	30	Smolt producer				-			
P	31	On-growing		-		-			
	32	On-growing					-		
	33	On-growing				+	+		+
Q	34	Broodfish			-		+		-
R	35	Broodfish					-		

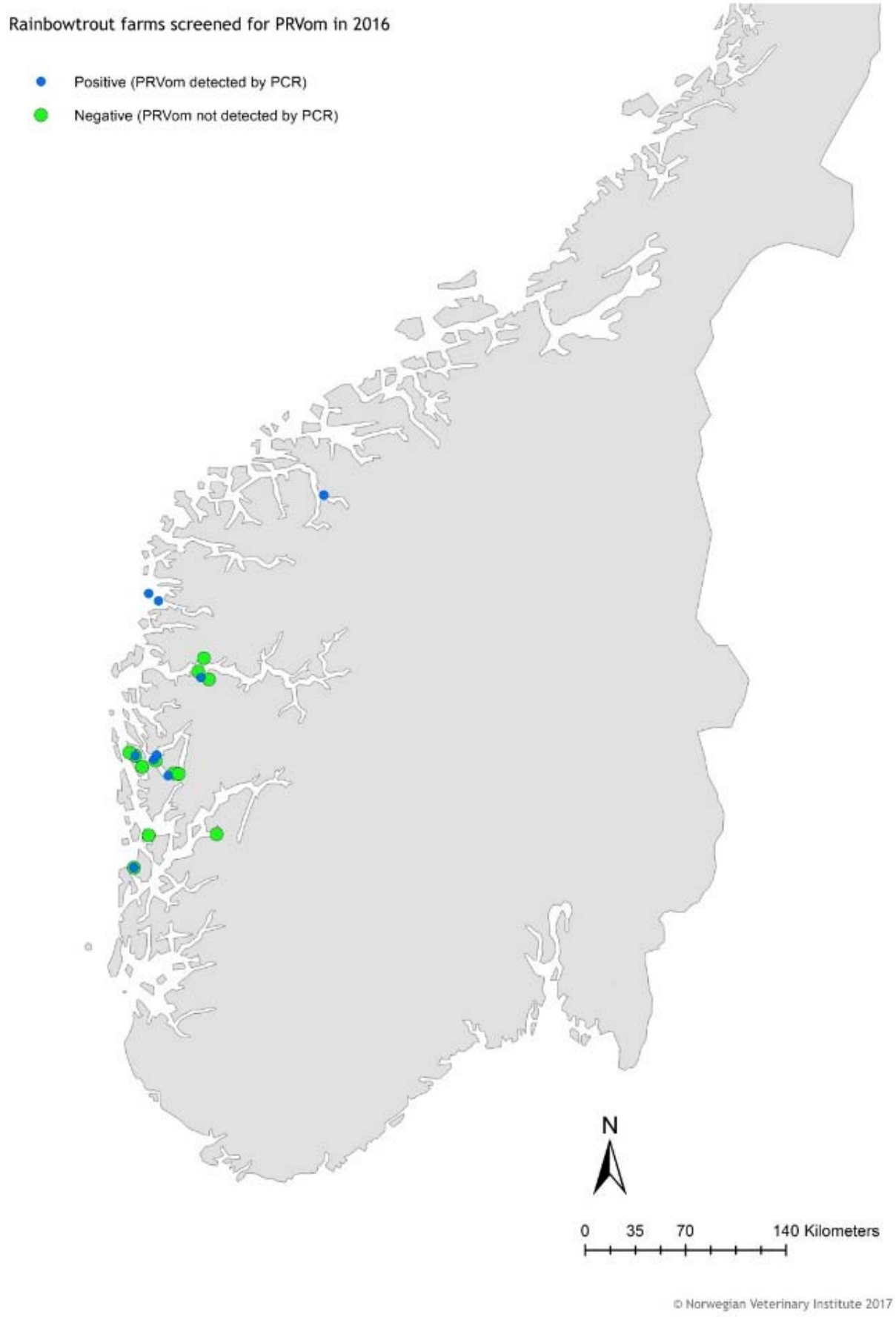

Figure 1. Map of rainbow trout farms included in the 2016 surveillance programme for PRVom.

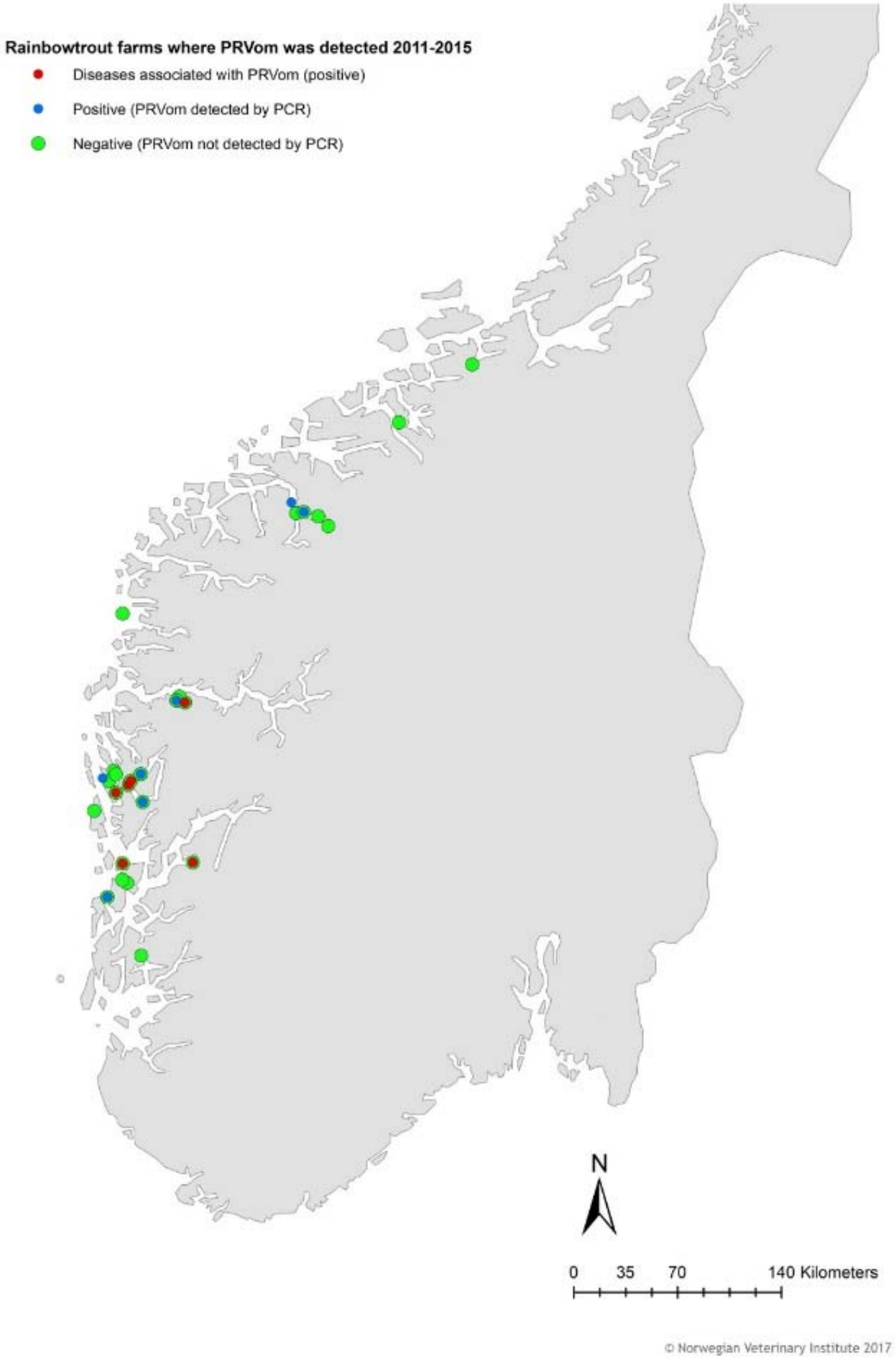

Figure 2. Map of sites included results for in the 2011-2015 surveillance programme for PRVom. Green symbols indicate rainbow trout sites tested and red indicate sites positive for PRVom.

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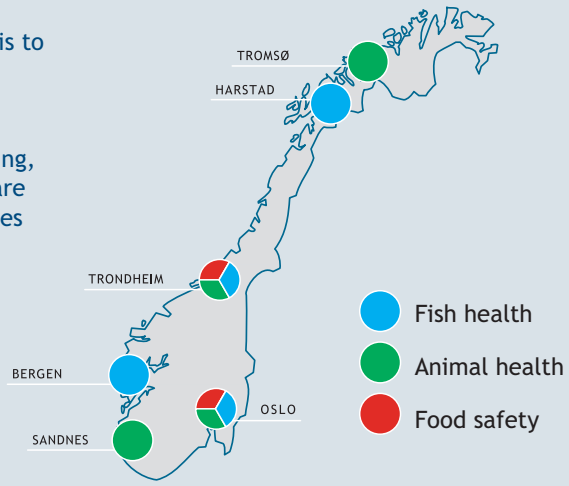

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