

## The surveillance and control programme for bacterial kidney disease (BKD) in Norway

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*Renibacterium salmoninarum was not detected on any of the sites tested in the 2009 surveillance programme. However BKD was diagnosed in rainbow trout (Oncorhynchus mykiss) and Atlantic salmon (Salmo salar) during ordinary routine health inspections in on-growing sites.*

## Introduction

Bacterial kidney disease (BKD) is a chronic disease of salmonid fish caused by *Renibacterium salmoninarum*, first diagnosed in Norway in 1980. *R. salmoninarum* can be transmitted vertically from one generation to the next inside the eggs, so monitoring of brood fish is a key element of the surveillance programme. In addition, wild stocks can be a reservoir of infection and testing of mitigation and cultivation hatcheries is included.

## Aim

The surveillance and control programme started in 2005 and is designed to provide documentation of the BKD situation in Norway in order to establish standards regarding import of live material to Norway.

## Materials and methods

The sampling is done by the Food Safety Authority, for the most part in conjunction with the sampling for VHS/IHN. Freshwater sites with salmonids and seawater sites with brood fish production are selected for testing every other year (Table 1, 2, Fig 1). The tissues sampled are predominantly from kidneys with the addition of other internal organs from fingerlings. Extracts of the tissues are tested individually by a commercially available ELISA (BiosChile) utilising monoclonal antibodies specific for a bacterial surface protein (p57) (1, 2, 3). ELISA positive samples are then tested for the presence of the gene coding for this protein by an in-house real-time PCR.

## Results

No BKD positive salmon were detected by the programme in 2009 (Table 1). A higher number of samples from small fish have been discarded in 2007-2009 compared to 2005 -2006 partly because no pooling of samples has been done (Table 3).

## Discussion

The programme did not detect any BKD positive salmonids through the 2009-sampling.

However, BKD was diagnosed in rainbow trout and Atlantic salmon from three on-growing sites by local fish health service in association with the National Veterinary Institute. Both rainbow trout farms were located in a fjord recognised as a recurrent "hot spot" for BKD in Norway.

Follow up sampling from one rainbow trout farm revealed *R. salmoninarum* in sparse culture from two fish. These fish tested negative in the ELISA and real-time PCR.

This situation illustrates limitations of the BKD-surveillance programme itself in detecting low prevalence BKD. The complementary investigations done by the fish health services are therefore very important in order to increase the sensitivity of the total national surveillance.

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Table 1. Results from BKD surveillance programme in Norway 2009.

Farm types	No. of sites sampled	No. of samples	Samples discarded*	Negative	Positive
Hatcheries for cultivation and mitigation purposes	19	596	191	405	0
Smolt producing farms	93	2821	309	2512	0
On-growing farms	9	299	8	291	0
Brood stock farms	9	493	-	508	0
Research facilities	-	-	-	-	-
<b>Total</b>	<b>130</b>	<b>4209</b>	<b>508</b>	<b>3701</b>	<b>0</b>

\* Samples unfit for testing.

Table 2. Different categories of fish at the sites included in the BKD surveillance programme in Norway in 2009.

Farm types	Atlantic salmon ( <i>Salmo salar</i> )	Rainbow trout ( <i>O. mykiss</i> )	Brown trout ( <i>Salmo trutta</i> )	Arctic char ( <i>Salvelinus alpinus</i> )	Positive
Hatcheries for cultivation and mitigation purposes	12	-	6	1	0
Smolt producing farms	78	13	3	-	0
On-growing farms	-	6	-	3	0
Brood stock farms	7	2	-	1	0
Research facilities	-	-	-	-	-
<b>Total</b>	<b>97</b>	<b>21</b>	<b>9</b>	<b>5</b>	<b>0</b>

\* Some sites produce more than one species or category of fish.

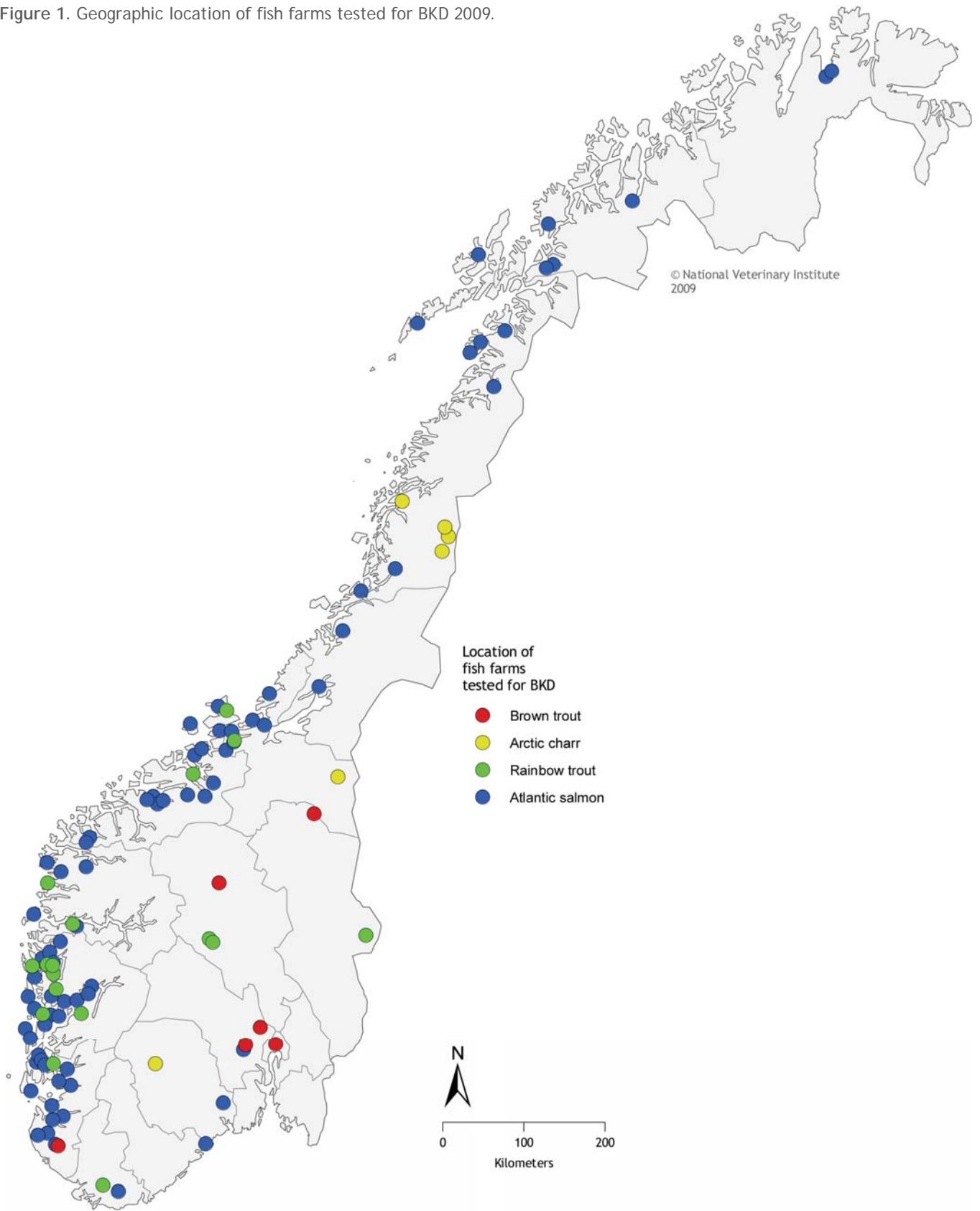
Table 3. Accumulated result from the BKD surveillance programme in Norway 2005-2009.

Year	No. of sites sampled	No. of samples	Samples discarded*	Negative	Positive
2005-2006	54	1,994	77	1,887	0
2007	150	4,943	841	4,102	0
2008	116	4,211	394	3,817	0
2009	130	4,209	508	3,701	0

\* Samples unfit for testing.



Figure 1. Geographic location of fish farms tested for BKD 2009.



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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