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The surveillance programme for Schmallenberg virus (SBV) in Norway 2022

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Content

Summary

A high number of herds in southern Norway were positive for antibodies against Schmallenberg virus (SBV) in bulk milk samples in 2022. The prevalence of antibodies in the tested Norwegian herds declined gradually after the epidemic in 2012. However, after year 2020 many herds have converted to seropositive.

Introduction

Schmallenberg virus (SBV) is an arthropod born virus in the genus Orthobunyavirus and is a member of Simbu serogroup viruses. Midges (*Culicoides* spp.) act as vectors. Vertical transmission occurs through the placenta. The virus causes subclinical infection or mild non-specific clinical signs in cattle and sheep during the vector season. In pregnant cattle, sheep, goats and bison, SBV causes stillbirth and congenital malformations. Disease caused by Schmallenberg virus is classified as a list 3 disease in Norway.

Orthobunyavirus of the Simbu serogroup was not detected in Europe before 2011. Schmallenberg virus was first identified in Germany and the Netherlands from dairy cattle diseased in summer and autumn of 2011. Soon after, presence of SBV was confirmed in newborn lambs with congenital malformations. From Germany and the Netherlands SBV rapidly spread to many European countries (1).

In Norway, Schmallenberg virus was detected in midges in September 2012. Two months later, a high proportion (17.3%) of dairy herds in the southern part of the country were seropositive for SBV. Retrospective analysis of some of these herds showed that they had seroconverted in the previous summer months (2). In the following winter, a calf was born with malformations due to Schmallenberg virus infection (3). After the SBV epidemic in 2012, bulk milk analyses revealed no infected dairy farm further north along the west coast of Norway. A total of 60 samples of midges collected at five locations in southern Norway in 2013 were negative for SBV (2). No clinical case of Schmallenberg disease, or deformations in newborn ruminants due to SBV, was recorded.

Surveillance in 2016, 2018 and 2020 showed that the prevalence of bulk milk positive herds had declined. However, abortions in seropositive cows, and positive bulk milk samples from previously negative farms, indicated that the virus could have circulated in Norway after the epidemic in 2012 (4).

The Norwegian Food Safety Authority is responsible for implementing the surveillance programme for SBV. The Norwegian Veterinary Institute is in charge of designing the programme, collecting the bulk milk samples from the dairies and performing the tests. Blood samples from cattle herds were collected by inspectors from the Norwegian Food Safety Authority.

Aim

The aim of the surveillance and control programme for SBV in 2022 was to document if SBV has circulated or re-emerged in Norway after the epidemic in 2012, and to estimate the proportion of seropositive dairy herds.

Materials and methods

The target population of surveillance consisted of dairy herds delivering milk to dairies during the sampling period in December, after the end of the vector season. Bulk milk samples were collected from 503 dairy herds in southern Norway. The number of herds per county and the number of herds selected in the surveillance programme for Schmallenberg virus (SBV) in 2022 are given in Table 1.

Additionally, blood samples from cows having an abortion between the 5th and 9th month of pregnancy were collected after approximately a month in farms having at least two such abortions within a year (Table 2). These samples came from both beef cattle and dairy farms all over Norway.

The bulk milk samples were analysed with an Indirect ELISA (ID Screen® Schmallenberg virus Milk Indirect, IDvet, Grabels, France) for detection of antibodies against SBV. Blood samples from cows with abortions were analysed in duplicates with another indirect ELISA (ID Screen® Schmallenberg virus Indirect Multi-species, IDvet).

***Table 1**: Numbers of dairy herds, numbers of dairy herds sampled and number of positive herds in the surveillance programme for Schmallenberg virus (SBV) in Norway in 2022.*

County	Dairy herds (Total no.*)	Dairy herds sampled (No.)	Positive dairy herds (No.)	Prevalence (%) [95%CI]
Oslo	2	2	1	50 [2.6-97.4]
Viken	360	185	163	88.1 [82.7-92.0]
Vestfold og Telemark	128	58	51	98.3 [77.1-94.0]
Agder	268	139	86	61.9 [53.6-69.5]
Rogaland	1 034	119	5	4.2 [1.8-9.5]
Total	**1 792**	**503**	**306**	**60.8 [56.5-65.0]**

Results

From the 503 sampled dairy herds in 2022, 306 bulk milk samples were positive for antibodies against SBV (60.8%). The prevalence of herds with bulk milk antibodies was high in all counties of the sampling area, except for Rogaland county (Table 1).

Of farms tested in both 2020 and 2022 (n = 185), 92 farms that tested negative for antibodies in in 2020, had positive bulk milk results by December 2022 (50.3%). Farms with seroconversion were situated in all counties were sampling had taken place, except for Rogaland county (Figure 1).

From the 184 sampled cows with abortions in 2021 and 2022, no cow was seropositive for SBV. Table 2 shows test results for cows with abortions during the period from 2012 to 2022.

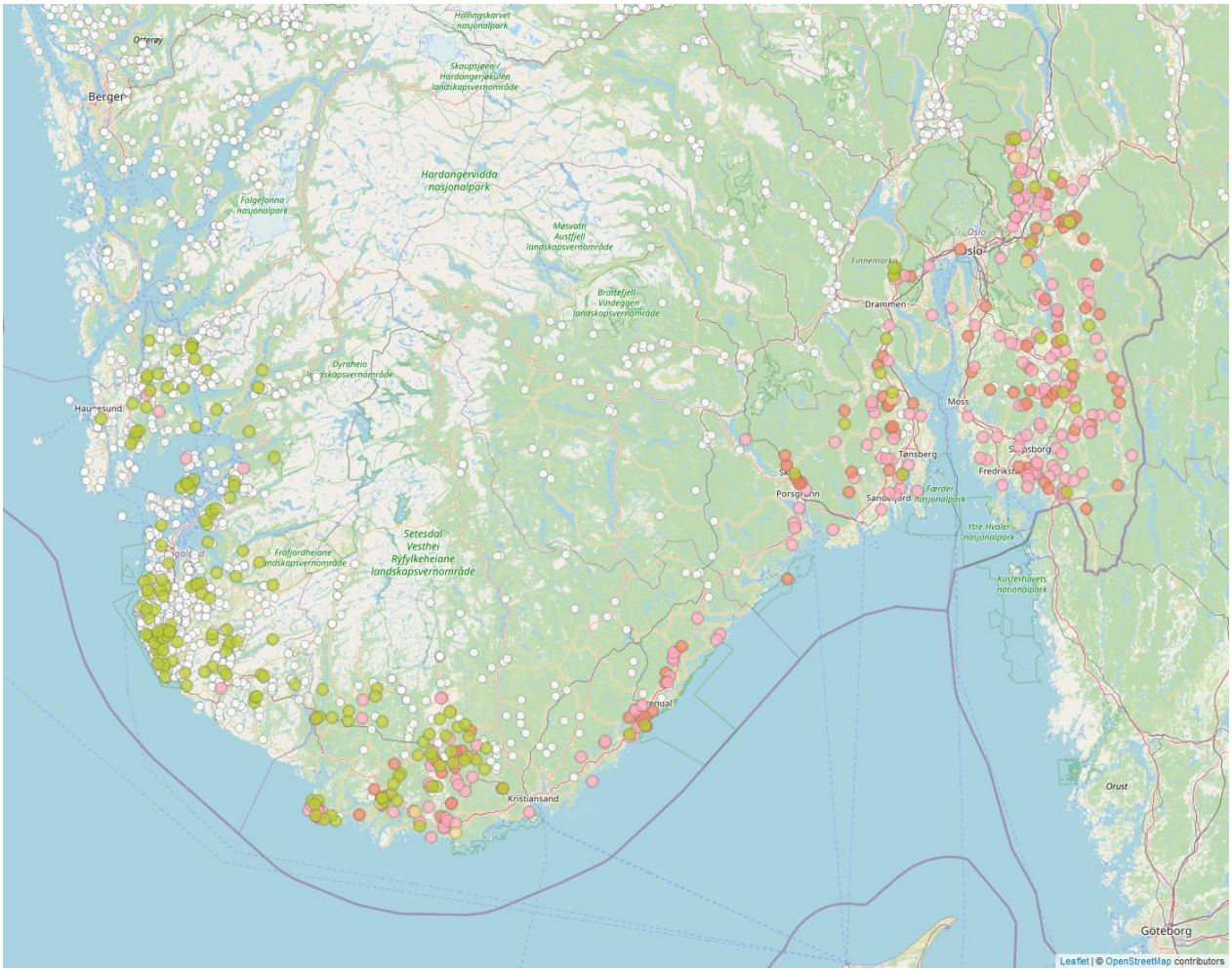

***Figure 1**: Schmallenbergvirus antibodies in bulk milk from 503 Norwegian dairy herds tested in 2022. Positive farms with negative results in 2020 are marked with red symbols, whereas other positive farms are pink, and negative farms have green symbols. White dots represent untested dairy farms.*

Table 2: *Number of Norwegian cattle herds and number of cows with abortions tested for Schmallenberg virus (SBV) during the years 2012-2022.*

Year	Total number of cattle herds[1]	Number of herds sampled	Number of tested cows with abortion	Number of positive herds
2012	15 057	6	9	0
2013	15 079	68	150	1
2014	14 550	44	102	0
2015	14 210	48	104	3
2016	14 047	62	149	1
2017	13 880	48	125	0
2018	13 646	56	139	0
2019	13 264	31	108	2
2020	12 994	43	128	0
2021	12 818	34	106	0
2022	12 588	23	78	0
Total		**422[2]**	**1 197**	**6[2]**

[1] Based on data from the register of production subsidies as of 31st of July the respective year until 2017. Thereafter, data from 1st of October was used.
[2] Total number of unique herds.

Discussion

The data of the previous Schmallenberg surveillance reports showed that the prevalence of antibody positive dairy farms declined from 2012, even if foci of virus spread by seroconversion of farms in certain areas were documented both in the 2018 and 2020 reports. The results of this report show a massive rise in seropositive dairy herds, which indicates that active spread of the virus has taken place in Southern Norway since 2020. There is now a high prevalence of SBV seropositive farms in four of five counties in Southern Norway (Table 1).

After the spread of SBV by midges, *Culicoides* spp., in the summer season of 2012, SBV had its largest dissemination in central and northern Europe. The surveillance showed that Schmallenberg disease was introduced to southern Norway in 2012 (2). Not all herds were infected in endemic areas, nor were all animals in one herd infected. Bulk milk testing of 2,391 dairy herds in October that year revealed a high prevalence of infection in counties along the southern coast of Norway (23.8-75.0%), whereas counties of the interior (Hedmark and Oppland) and west coast (Rogaland and Hordaland) had few infected farms (0.0-1.8%). In 2013, all trapped and tested midges were negative for SBV.

In western Europe there has been continuous circulation of SBV at low levels since 2013 (5). Surveillance performed in Norway in 2016, showed that the prevalence declined in all counties that had a high prevalence in 2012 (4). Prevalence remained high in the counties Aust- and Vest-Agder (18.8% and 23.8%, respectively). Twenty of the positive dairy farms, had converted from negative to positive bulk milk between 2012 and 2016, and eleven of these farms were situated in Vest-Agder. The results of the Norwegian surveillance in 2018 showed high prevalence of positive farms in four counties and the prevalence had increased since 2016.

The results of the Norwegian surveillance program in 2020 showed that the prevalence had declined since 2018, but there were herds in Viken and Agder that had converted from negative to positive for SBV antibodies in bulk milk. The results of the 2022 surveillance show a significant rise of bulk milk positive dairy herds. Thus, there is circumstantial evidence for circulation of SBV in the southern part of Norway, especially after year 2020.

Sources of re-emerging infection can be continuous low level circulation or new introduction of SBV. In the midge-free season, it is possible for the virus to over-winter in midges or in foetuses of pregnant animals (6). New introduction with animal trade is less likely since very few ruminants are imported to Norway. Re-introduction would most likely be airborne transfer of infected midges from neighbouring countries, i.e. Sweden, Denmark or Scotland, to southern Norway from the beginning of May until the end of October. The topography in Norway with hills and valleys makes it difficult for long distance transfer of midges from one local area to another and the relatively low density of domesticated ruminants compared to the rest of Europe makes it less likely for a wide spread of the agent.

The most important purpose of the surveillance programme is to reveal potential infections brought in with airborne midges during the vector season. Cattle are efficient sentinel animals for SBV. Most dairy cattle have to be kept outdoors, at least eight weeks during the summer, making their exposure to midges not very different from the exposure of beef cattle or small ruminants to the vector. Testing of bulk milk collected from the end of October and onwards, will detect any infection introduced during the previous vector season.

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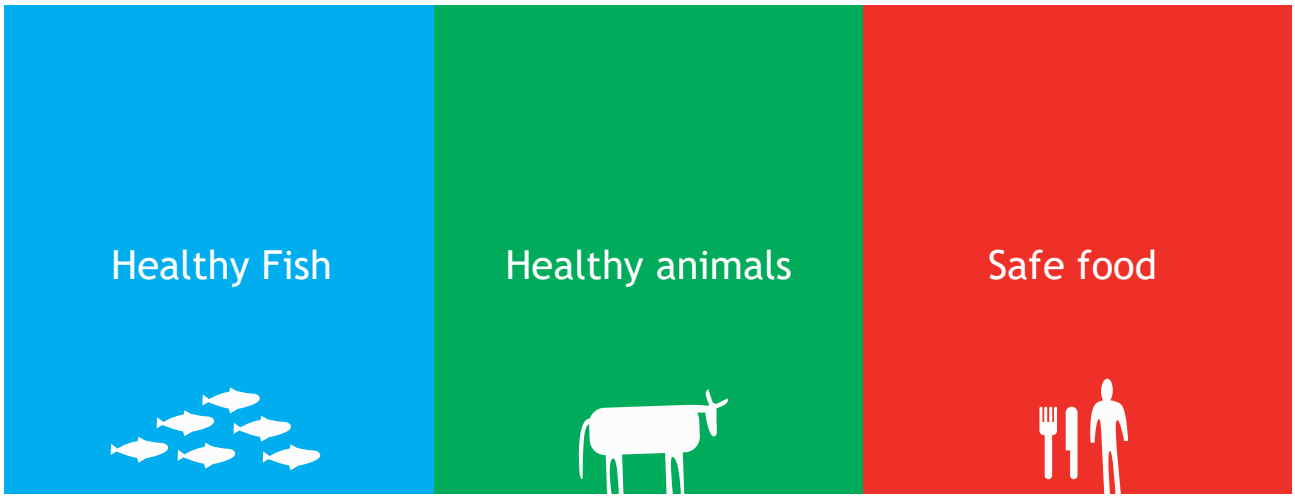

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