Annual Report

The surveillance programme for Schmallenberg virus (SBV) in Norway 2018

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The surveillance programme for Schmallenberg virus (SBV) in Norway 2018

Content

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Summary

Bulk milk samples from southern Norway were positive for antibodies against Schmallenberg virus (SBV) in 2018. There is circumstantial evidence that SBV has circulated in Norway after the epidemic in 2012.

Introduction

Schmallenberg virus (SBV) is an arthropod born virus in the genus Orthobunyavirus and is a member of Simbu serogroup viruses. Midges (*Cullicoides* spp.) act as vectors. Vertical transmission occurs through 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 not notifiable 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 new-born lambs with congenital malformationsFrom 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 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 was responsible for carrying out the surveillance programme for SBV. The Norwegian Veterinary Institute was 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 2018 is to document if SBV has circulated or re-emerged in Norway, and to estimate the proportion of seropositive dairy herds, after the epidemic in 2012.

Materials and methods

The target population of surveillance consisted of dairy herds delivering milk to dairies during the sampling period in November, 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 2018 are given in Table 1.

Additionally, blood samples from cows having an abort between 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 tested with an Indirect ELISA (ID Screen® Schmallenberg virus Milk Indirect, ID.vet, Grabels, France) for detection of antibodies against SBV. Blood samples from cows with abortions were examined in duplicates with with another indirect ELISA (ID Screen® Schmallenberg virus Indirect Multi-species, ID.vet).

The samples were analysed at the Norwegian Veterinary Institute in Sandnes and the Section for immunology and virology in Oslo.

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 2018.

County	Dairy herds (Total no.*)	Dairy herds sampled (No.)	Positive (No.)	Prevalence (%) [95%CI]
Østfold	124	93	6	6.5 [3.0-13.4]
Oslo and Akershus	118	85	2	2.4 [0.6-8.2]
Hedmark	486	11		
Buskerud	167	6		
Vestfold	62	32	6	18.8 [8.9-35.3]
Telemark	83	13	3	23.1 [8.2-50.3]
Aust-Agder	86	44	27	61.4 [46.6-74.3]
Vest-Agder	221	106	40	37.7 [29.1-47.2]
Rogaland	1 171	113	1	0.9 [0.0-4.8]
Total	2 518	503	85	16.9 [13.9-20.4]

* Based on data from the Register of production subsidies as of 1 October 2018.

Results

From the 503 sampled dairy herds in 2018, 85 bulk milk samples were positive for antibodies against SBV (16.9%). High prevalences were recorded in the counties of Aust- and Vest-Agder, Telemark and Vestfold. Other counties had none or very few positive herds (Table 1).

Of farms tested in both 2016 and 2018 (n = 202), 21 farms had positive bulk milk results by November 2018 (10.4%). In the previous test in 2016, ten of these farms had negative, one had inconclusive, and ten farms had positive results. Nine of the dairy farms that seroconverted between 2016 and 2018 are situated in the county of Vest-Agder (Figure 1).

From the 139 sampled cows with abortions in 2018, no sample was positive for antibodies against SBV. Table 2 shows test results for cows with abortions during the period from 2013 to 2018.

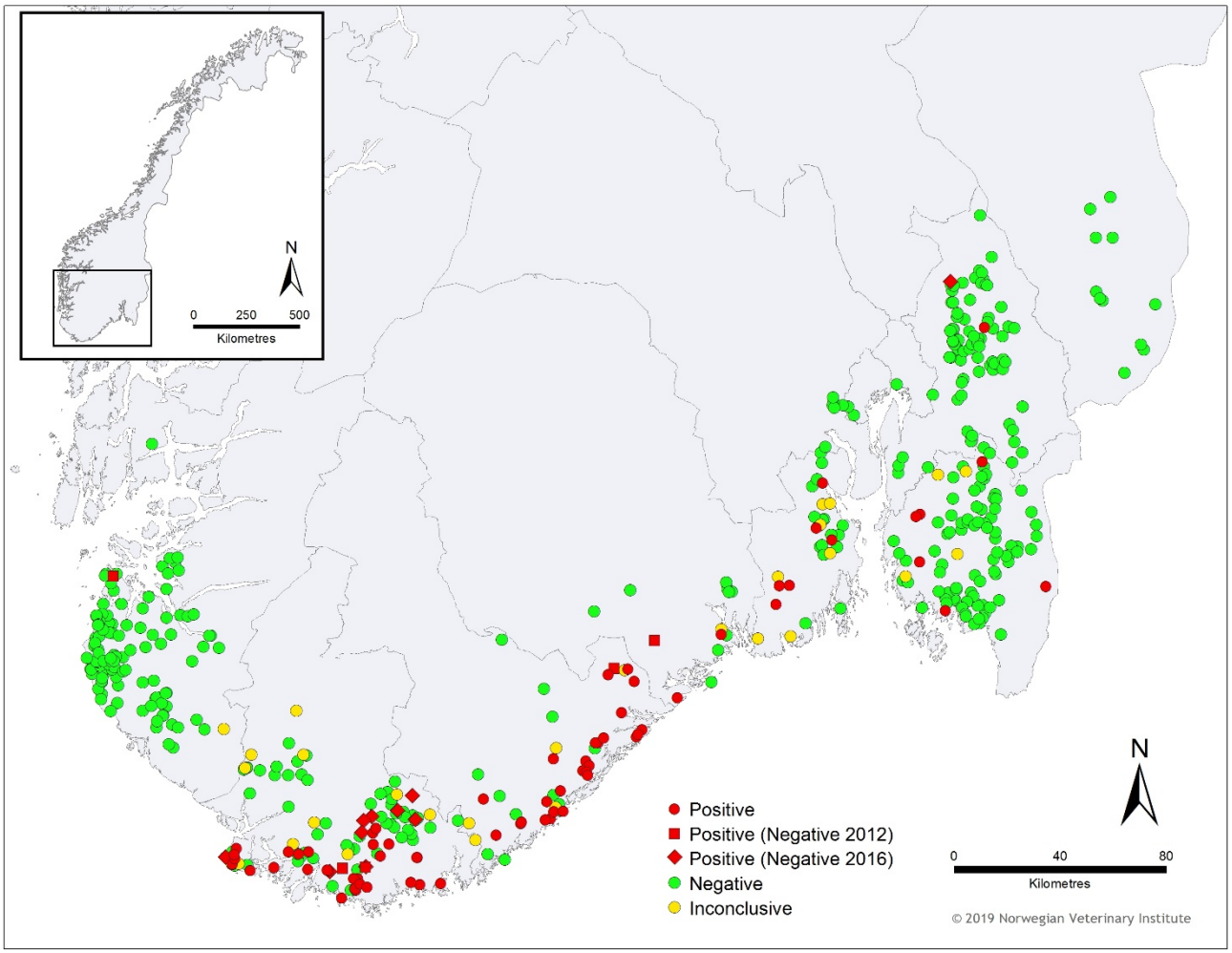

Figure 1. Schmallenbergvirus antibodies in bulk milk from 503 Norwegian dairy herds tested in 2018. Positive farms with previous negative results are marked with alternative symbols.

Table 2. Numbers of Norwegian cattle herds and numbers of cows with abortions tested for Schmallenberg virus (SBV) during the years 2013-2018.

Year	Total number of cattle herds[1]	Number of herds sampled	Number of tested cows with abortion	Number of positive herds
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	12 841	48	125	0
2018	12 633	56	139	0
Total		**302[2]**		

[1] Based on data from the Register of production subsidies as of 31 July the same year.
[2] Total number of unique herds

Discussion

The data of this report show that the prevalence of antibody positive dairy farms is high in four counties, whereas prevalence is reduced from 2012 or remain low in other counties of southern Norway (Table 1). After 2016, all tested cows with abortion tested negative for SBV antibodies. However, rising prevalence of positive farms in three counties since 2016, and new positive farms, indicates circulation of SBV after 2016 in the most southern part of Norway.

After the spread of SBV by midges, *Cullicoides* 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 2391 dairy herds in October that year revealed 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, trapped midges were negative for SBV. Since then no clinical cases or deformations in newborn ruminants due to SBV were reported.

In western Europe there has been continuous circulation of SBV at low levels since 2013 (5). It was reported from Great Britain and Ireland that SBV circulated at low levels in both 2013 and 2014, but was not detected in young stock in 2015 (6,7). Surveillance performed in Norway in 2016 with samples from 468 dairy farms, 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. Together with five seropositive cows that aborted in the 5th to 9th month of pregnancy, this implied that SBV circulated at low levels in the years after the epidemic in 2012.

Fewer animals being exposed to SBV over time result in higher numbers of immunologically naíve animals. These animals are at risk of infection if SBV should re-emerge. Schmallenberg virus re-emerged in western Europe in 2014 (8), and in Great Britain and Ireland in 2016 (9,10). The British outbreak was caused by distinct separate virus strains compared to the 2012 epidemic (11). The results of the Norwegian surveillance in 2018 show high prevalence of positive farms in four counties (Table 1) and the prevalence had increased since 2016. In three of the counties (Telemark, Aust- and Vest-Agder) the prevalence reached the level of the 2012 epidemic. Since 2016, farms in the county of Vest-Agder continue to convert from negative to positive bulk milk results. Thus, there is circumstantial evidence for recirculation of SBV in the most southern part of Norway.

Sources of re-emerging infection can be continuous low level circulation or new introduction of SBV. In the midges-free season, it is possible for the virus to over-winter in midges or in foetuses of pregnant animals (12). 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 ruminants compared to the rest of Europe makes it less likely for a widespread 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 bulk milk collected from the end of October and onwards, will detect any infection introduced during the previous vector season. Whether re-emergence of SBV is caused by low level circulation in the previously exposed population or new introduction of SBV, can be estimated by phylogenetic studies of virus isolates.

Therefore, future surveillance should include virus isolation from trapped midges from areas were animals are seroconverting.

Acknowledgement

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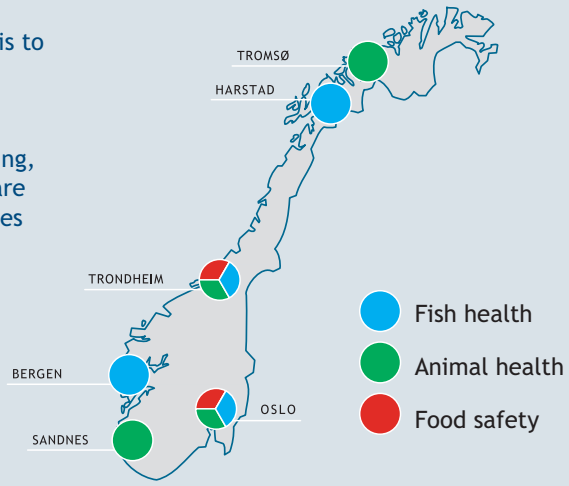

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