Veterinærinstituttet
Norwegian Veterinary Institute

Rapport 38 - 2022

The surveillance programme for *Brucella melitensis* in small ruminants in Norway 2021

REPORT 38/2022

The surveillance programme for *Brucella melitensis* in small ruminants in Norway 2021

Authors

Annette H Kampen, Johan Åkerstedt, Siv Klevar

Suggested citation

Kampen, Annette H, Åkerstedt, Johan, Klevar, Siv. The surveillance programme for *Brucella melitensis* in small ruminants in Norway 2021. Surveillance program report. Veterinærinstituttet 2022. © Norwegian Veterinary Institute, copy permitted with citation.

Quality controlled by

Merete Hofshagen, Director of Animal Health and Food Safety, Norwegian Veterinary Institute

Published

2022 on www.vetinst.no

ISSN 1890-3290 (electronic edition)

Commissioned by

Norwegian Food Safety Authority

Mattilsynet

Colophon

Cover design: Reine Linjer

Cover photo: Colourbox

www.vetinst.no

Content

Summary 3
Introduction 3
Aims 3
Materials and methods 4
Results 4
Discussion 5
References 6

Summary

Brucella melitensis was not detected in any sheep flock or goat herd sampled in 2021.

Introduction

Brucellosis in sheep and goats is mainly caused by *Brucella melitensis*, although infection with *Brucella abortus* and *Brucella ovis* can also occur. The infection usually results in abortion in pregnant females and can cause orchitis and epididymitis in affected males (1, 2). *B. melitensis* infection is a zoonosis, and the bacterium causes a serious infection in humans known as Malta fever, characterised by undulant fever, chills, sweat and debilitation (2).

B. melitensis is prevalent in sheep and goats in several Mediterranean countries (1), but has never been diagnosed in animals in Norway or any of the other Nordic countries (3, 4). Brucellosis is classified as a list 1 disease in Norway and is notifiable to the World Organisation for Animals health (WOAH).

A surveillance programme for *B. melitensis* in sheep was established in 2004, and goats were included in the programme from 2007.

The Norwegian Food Safety Authority is responsible for carrying out the programme. The samples are collected by inspectors from the Norwegian Food Safety Authority, while the Norwegian Veterinary Institute is in charge of planning the programme, performing the analyses and reporting the results.

Aims

The aims of the programme are to document freedom from *B. melitensis* in sheep and goats according to the demands in EU Directive 91/68/EEC with amendments and to contribute to the maintenance of this favourable situation.

Materials and methods

In sheep, the programme in 2021 was based on serological screening of representative numbers of blood samples from slaughtered animals at 20 larger abattoirs from various parts of Norway. The preferred sampling period was from January to March, but a proportion of the animals were sampled from August to December. A maximum of five animals (>2.5 years old) were to be sampled per herd any given day. Collection of 9,000 blood samples from sheep taken at slaughter was planned.

In goats, collection of blood sampling was planned in 60 randomly selected goat herds. In herds of less than 30 animals, all animals (>6 months old) were sampled. In herds of 30 to 100, 100 to 200, and more than 200 animals, samples from 30, 35, and 40 animals were sampled, respectively. The preferred sampling period was from January to March, but a proportion of the animals were sampled from September to December. The numbers of herds represented in the surveillance programme for *B. melitensis* in small ruminants in 2021 is given in Table 1.

Blood samples were examined for antibodies against *B. melitensis* using the Brucella Rose Bengal Test (RBT) for the initial screening. This test is a simple spot agglutination test, using antigen stained with rose bengal and buffered to a low pH. The antigen and the positive control sera for the RBT was purchased from Bio-Rad Laboratories Inc. (Hercules, CA, USA) and IDvet (Montpellier, France).

Positive reactors were re-tested by suitable confirmatory or complementary methods, such as the ID Screen® Brucellosis Serum Indirect Multi-species ELISA (ID.Vet, Montpellier, France) and/or complement fixation test (APHA , Weybridge, Surrey, UK), to rule out false positive reactions (5). Samples with doubtful or positive status in confirmatory or complementary tests were reported, and new blood samples from the suspected animals or herd were requested and tested.

Results

In total, 9,094 blood samples from sheep flocks and 1,540 blood samples from 52 goat herds, were received in the programme in 2021. From sheep, 61 samples not suitable for analysis and five samples with unknown were rejected, leaving 9,028 samples from 3,118 flocks. The numbers of tested flocks represent approximately 23.3% of sheep flocks and 3.8% of goat herds in Norway.

Of the screened blood samples, all except for one sheep sample (0.06%) were negative in RBT. One RBT positive sample was re-tested in the Indirect Multi-species ELISA with negative result for *B. melitensis*. The flock was followed-up by sampling 30 sheep. All of them tested negative in RBT. In conclusion, all samples tested for antibodies against *B. melitensis* in 2021 were negative. The results from the surveillance programme are shown in Table 1.

***Table 1**: Results and total number of flocks within the frame of the Norwegian surveillance programme for* Brucella melitensis *in small ruminants in the years 2004-2021.*

Year	Total number of									
	Flocks in Norway[1]		Animals in Norway		Flocks tested		Animals tested (blood samples)		Positive samples	
	Sheep	Goats	Sheep >1 year	Goats	Sheep	Goats	Sheep	Goats	Sheep	Goats
2004	17 439		918 500		1 655		50 501		0	
2005	16 500		927 400		935		28 406		1[2]	
2006	15 800		894 100		911		27 812		0	
2007	15 400	1 300	854 000	71 500	1 004	183	29 633	5 734	0	0
2008	15 059	1 308	891 427	69 637	783	80	23 235	2 399	0	0
2009	14 800	1 300	877 400	67 800	816	104	24 011	3 124	0	0
2010	14 800	1 300	887 600	67 600	269	25	8 160	779	0	0
2011	14 500	1 300	882 000	66 900	467	93	13 629	2 698	0	0
2012	14 300	1 300	868 500	65 400	479	86	13 989	2 562	0	0
2013	14 242	1 276	871 976	64 112	468	95	13 550	2 827	0	0
2014	14 218	1 150	755 987	55 894	3 489	89	9 703	2 528	0	0
2015	14 425	1 177	784 558	58 048	3 353	97	9 418	3 048	0	0
2016	14 500	1 300	951 000	68 500	3 492	86	9 821	2 313	0	0
2017	14 463	1 227	984 832	72 658	3 444	61	9 017	1 712	0	0
2018	14 337	1 246	1 005 793	69 636	3 267	61	8 636	1 691	0	0
2019	13 693	1 209	936 203	71 159	3 259	58	8 951	1 751	0	0
2020	13 506	1 270	947 283	72 526	2 927	215[3]	8 701	1 498[3]	0	0
2021	13 389	1 359	943 912	74 512	3 118	52	9 028	1 540	0	0

[1] Based on data from the register of production subsidies as of 31th July the respective year until 2017. Thereafter, as of 1st March.
[2] Probably an unspecific reaction.
[3] Includes bulk milk samples from dairy goat herds.

Discussion

During the years 2004-2008, ram circles and their member flocks registered by The Norwegian Association of Sheep and Goat Farmers constituted the target population for the programme. Approximately 90% of the Norwegian sheep flocks participating in ram circles were screened for antibodies against *B. melitensis* during 2004 and 2005. Most flocks participating in the ram circles were retested in the programme during 2006 to 2008. Breeding flocks of other sheep breeds than those regulated by The Norwegian Association of Sheep and Goat Farmers were selected for sampling in 2009.

During 2010-2013 sheep and goat herds were randomly selected for sampling. From 2014, sheep have been sampled at slaughterhouses. This resulted in better surveillance of the total population with the use of less resources than needed when sampled on farm. However, less animals were tested per herd, giving less accurate results on the herd level. In goats, the surveillance is based on sampling live animals in the herds. However, in 2020 bulk milk samples were added to the surveillance programme.

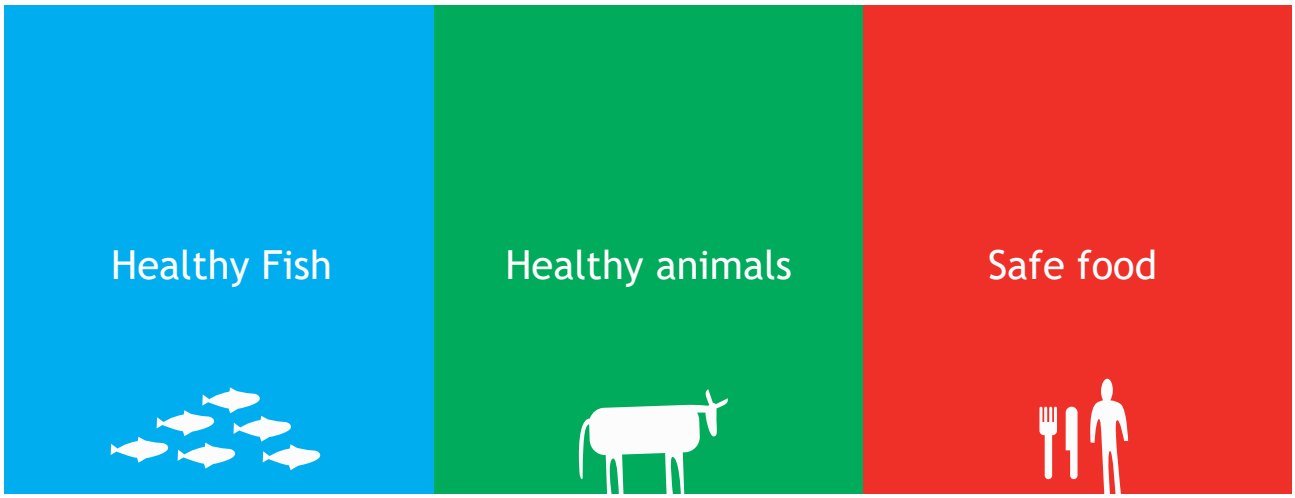
The surveillance programme for *B. melitensis* in sheep has been evaluated using scenario tree modelling (6). When taking into account results accumulated from 2004 to 2018, it has been estimated that there is a 99% probability that the prevalence of sheep flocks being positive for *B. melitensis* is lower than 0.2% (7). The results of the programme from 2019 to 2021 have further confirmed this conclusion.

Acknowledgements

The authors would like to thank the technical staff for performing the analyses with excellence.

References

1. Martin WB, Aitken ID. Diseases of Sheep. 3rd ed. Oxford: Blackwell Scientific Publications; 2000.
2. Timoney JF, Gillespie JH, Scott FW, Barlough JE. Hagan and Bruner's Microbiology and Infectious Diseases of Domestic Animals. 8th ed. Ithaca: Comstock Publishing Associates; 1988.
3. Ødegaard Ø. Brucellosis – Nordic perspective. In: Proceedings from the Course in Serious Contagious Diseases in Animals. Oslo, Norway; 2000.
4. Kampen AH, Åkerstedt J, Klevar S. The surveillance programme for *Brucella melitensis* in small ruminants in Norway 2020. Surveillance programmes for terrestrial and aquatic animals in Norway. Annual report 2020. Oslo: Norwegian Veterinary Institute; 2021.
5. OIE Manual of Diagnostic. Test and Vaccines for Terrestrial Animals. http://www.oie.int/manual-of-diagnostic-tests-and-vaccines-for-terrestrial-animals/
6. Hopp P, Vaz Y, Bakken EH, Kampen AH, Klevar S, Tharaldsen J, Viljugrein H. Optimising the sample size in the Norwegian *B. melitensis* surveillance programme. Abstract, 2nd International Conference on Animal Health Surveillance, Havana, May 7-9, 2014.
7. Hopp P, Kampen AH, Klevar S, Jarp J. Evaluation of the surveillance programme for *Brucella melitensis* in Norwegian small ruminants. Oslo: Norwegian Veterinary Institute; 2020.



Scientifically ambitious, forward-looking and collaborative- for one health!

Veterinærinstituttet
Norwegian Veterinary Institute

Ås Trondheim Sandnes Bergen Harstad Tromsø

postmottak@vetinst.no
www.vetinst.no