



The surveillance programme for *Brucella melitensis* in small ruminants in Norway 2020



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The surveillance programme for *Brucella melitensis* in small ruminants in Norway 2020

Authors

Annette H Kampen, Johan Åkerstedt, Siv Klevar

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Summary

Brucella melitensis was not detected in any sheep flock or goat herd sampled in 2020.

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 A disease in Norway and is notifiable to the Office International des Epizooties.

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 2020 was based on serological screening of representative numbers of blood samples from slaughtered animals at 22 larger abattoirs from various parts

of Norway. The preferred sampling period was from January to May, but a proportion of the animals were sampled from September to November. A maximum of five animals (>2 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 (>2 years 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. In addition, bulk milk was submitted from a selection of dairy goat farms. The numbers of herds represented in the surveillance programme for *B. melitensis* in small ruminants in 2020 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 Animal and Plant Health Agency (APHA) (Weybridge, Surrey, UK). 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. Bulk milk samples from goat herds were tested with ID Screen® Brucellosis Milk Indirect Multi-ELISA (ID.Vet, Montpellier, France) and samples with doubtful or positive results were re-tested in duplicates.

Results

In total, 8,701 blood samples from 2,927 sheep flocks, 1,498 blood samples from 51 goat herds, and bulk milk samples from 186 dairy goat herds, were received in the programme in 2020. From sheep, 110 samples were not suitable for analysis and were rejected. From 22 of the goat herds both bulk milk and blood samples were submitted. Hence the total number of sampled goat herds were 215. The numbers of tested flocks represent approximately 21.6% of sheep flocks and 16.9% of goat herds in Norway.

Of the screened blood samples, all except for two samples were negative in RBT. The two RBT positive samples were re-tested in the Indirect Multi-species ELISA and concluded serologically negative for *B. melitensis*. All bulk milk samples were negative for antibodies against *B. melitensis*. In conclusion, all samples tested for antibodies against *B. melitensis* in 2020 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 2004-2020.

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	13 740	1 209	936 203	71 159	3 259	58	8 951	1 751	0	0
2020	13 546	1 272	947 499	72 542	2 927	215 ³	8 701	1 498 ³	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.

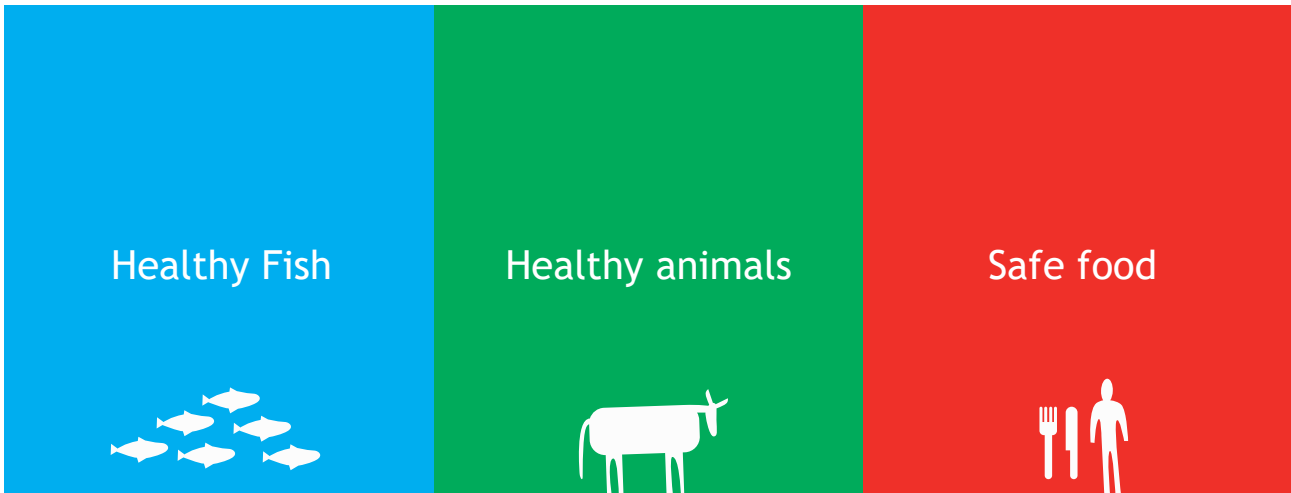
During 2010-2013 sheep and goat herds were randomly selected for sampling. From 2014, sheep have been sampled at slaughterhouses. This resulted in better surveillance of the total population with the use of less resources than needed when sampled on farm. However, less animals were tested per herd, giving 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% (P. Hopp, personal communication, 7). The results of the programme in 2019 and 2020 have further confirmed this conclusion.

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Veterinærinstituttet
Norwegian Veterinary Institute

Ås

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Sandnes

Bergen

Harstad

Tromsø

postmottak@vetinst.no
www.vetinst.no