

The surveillance and control programme
for *Echinococcus multilocularis* in
red foxes (*Vulpes vulpes*) in Norway.
Hunting season 2010-2011

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The surveillance and control programme for *Echinococcus multilocularis* in red foxes (*Vulpes vulpes*) in Norway. Hunting season 2010-2011

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Echinococcus multilocularis was not detected in any of the 533 red foxes (*Vulpes vulpes*) sampled, from throughout Norway, during the 2010-2011 licensed hunting season.

Introduction

Echinococcus multilocularis is endemic in large parts of the northern hemisphere, including eastern and central parts of Europe (1, 2). In 1999, *E. multilocularis* was detected in Denmark (3) and on the high-arctic Norwegian islands of Svalbard (4).

There was no evidence that this parasite had established in mainland Fennoscandia (5) prior to its detection in Sweden in February 2011 (6).

E. multilocularis has never been detected in mainland Norway, and anthelmintic treatment of imported dogs is compulsory to prevent introduction of the parasite through infected dogs. However, according to the EU Directive 998/2003/EC on pet movement, the maintenance of this national regulation post 2008 requires documentation of an *E. multilocularis*-free status within Norway.

Aim

The aim of the programme is to document freedom of *E. multilocularis* in mainland Norway.

Material and methods

Faecal samples collected from red foxes shot during the 2010-2011 licensed hunting season (from mid-July 2010 to mid-April 2011) were included in this year's program. All regions of Norway were represented in the sampling regime. Hunters were invited to participate based on the list of registered fox hunters (Statistics Norway). A standard form, that included information on where and when the fox had been killed, as well as the sex (male, female) and presumed age of the animal (juvenile, adult), was completed by each hunter.

The methods used for the faecal material were the same as for that collected in 2006-2009 and were based upon modified taeniid egg isolation and multiplex PCR techniques (7). By this method, we can only detect the patent phase of the intestinal infection, which constitutes roughly two-thirds of the total infection period. The overall diagnostic sensitivity is therefore estimated to be only 50% (8).

The prevalence and corresponding confidence intervals were calculated in accord with the EFSA harmonised schemes for the monitoring and reporting of *Echinococcus* in animals and foodstuffs in the European Union (9) and assumed a fox population of 70,000 (Olav Hjeljord, UMB, Ås, personal communication) and a test sensitivity of 50%.

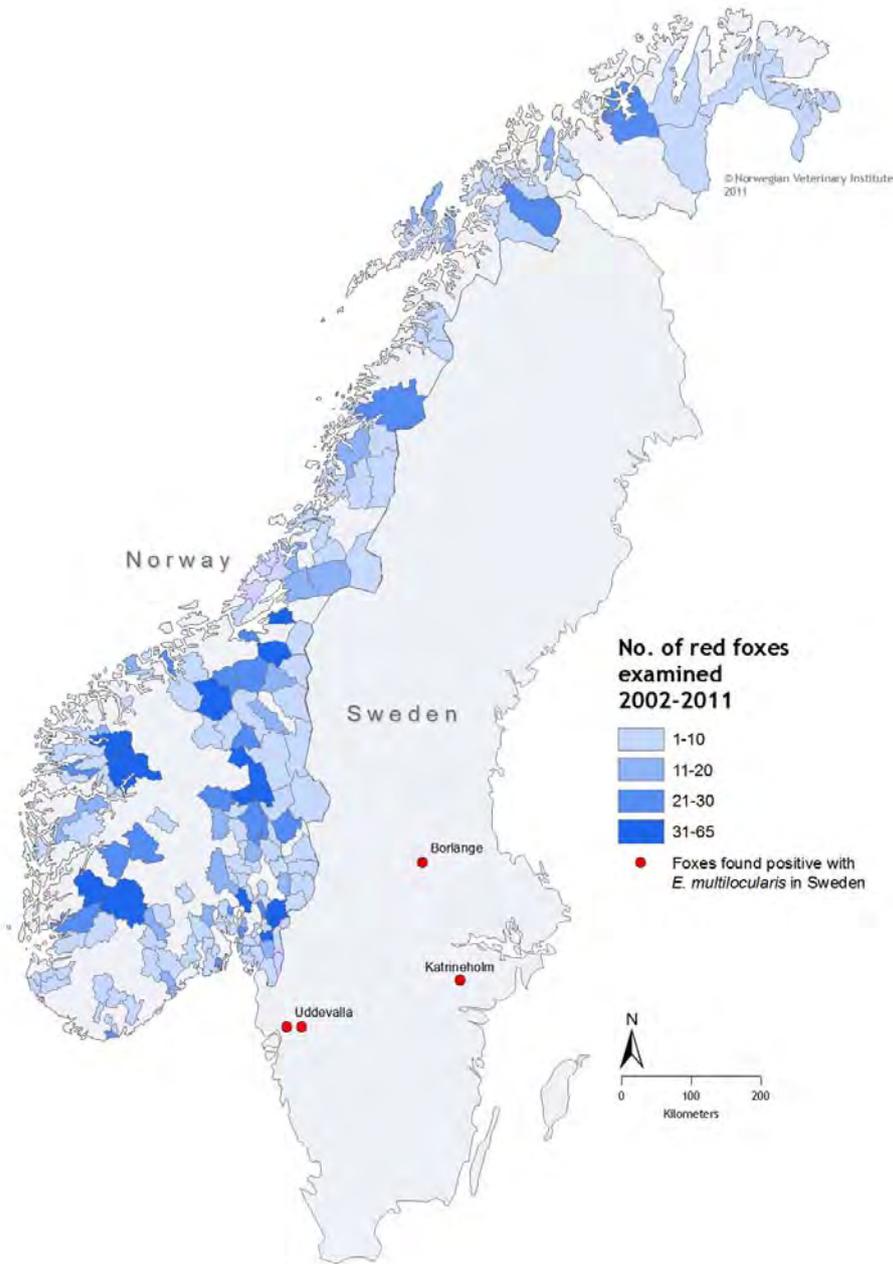
Results

A total of 541 fox samples were collected during the 2010-2011 hunting season, of which 533 were adequate for examination. All samples were negative for *E. multilocularis* giving an estimated prevalence of 0% (0 - 1.1%, 95% confidence interval). During the last five hunting seasons (from 2006-2007 to 2010-2011) a total of 1838 foxes have been examined. All foxes tested negative giving an estimated prevalence of 0% (0 - 0.33%). In total, 2166 red fox faecal samples, from mainland Norway, have been tested for *E. multilocularis* between 2002 and 2011 (Table 1, Figure 1).

Table 1. Number and hunting county of the red foxes sampled and examined for *Echinococcus multilocularis* in Norway during the red fox licensed hunting season from July to April, 2002-2011.

County	No. red foxes sampled		
	2002-2009	2010-2011	Total 2002-2011
Østfold	39	90	129
Akershus	182	41	223
Oslo	35	11	46
Hedmark	177	92	268
Oppland	155	28	183
Buskerud	72	18	90
Telemark	47	23	70
Vestfold	43	4	47
Aust-Agder	41	14	55
Vest-Agder	24	19	43
Rogaland	52	10	62
Hordaland	74	22	96
Sogn og Fjordane	130	31	161
Møre og Romsdal	77	5	82
Sør-Trøndelag	182	42	224
Nord-Trøndelag	78	33	111
Nordland	98	17	115
Troms	79	10	89
Finnmark	48	23	71
Total	1633	533	2166

Figure 1. Map of Norway showing numbers and hunting municipality of red foxes sampled and examined for *Echinococcus multilocularis* during the red fox licensed hunting periods from July to April, 2002-2011. The geographic location of the *E. multilocularis* positive red foxes, found in Sweden, are marked by red dots.



Discussion

The 2010/2011 result is in agreement with the results from previous years with no positive samples detected. The cumulative sample size during the last five years is sufficient to confirm that the prevalence is less than 1%. This means that Norway fulfills the criteria, as given by EFSA (9), to document that *E. multilocularis* infection is absent from the national fox population. However, the criteria set by EFSA allow for samples to be collected over a five year period without taking into account the probability of introduction during the same period. Wahlström et al (5) showed that, even when taking into consideration the probability of introduction of infection, the number of samples collected until 2009 in Norway was sufficient to document that the prevalence was lower than 1%.

The recent detection of *E. multilocularis* in Sweden in 2011 and consequently increased risk of introduction to Norway, means that an annual surveillance programme is necessary to verify continued disease free status in Norway. Our findings support the maintenance of the national regulation for compulsory anthelmintic treatment of imported dogs to minimise the risk of *E. multilocularis* introduction to Norway.

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