

The surveillance and control programme
for *Echinococcus multilocularis* in
red foxes (*Vulpes vulpes*) in Norway

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Echinococcus multilocularis was not detected in any of the 396 red foxes (*Vulpes vulpes*) examined from throughout Norway during the 2008-2009 licensed hunting season.

Introduction

Echinococcus multilocularis is endemic in large parts of the northern hemisphere, including eastern and central parts of Europe (1, 2). Currently, there is no evidence that this parasite has established in Fennoscandia (3, 4, 5). However, in 1999, *E. multilocularis* was detected in Denmark (6) and on Svalbard (7). This spread of this parasite into regions previously free from infection might occur both through infected rodents stowed away in transports or via dogs from endemic areas.

In Norway, compulsory anthelmintic treatment of imported dogs is required 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.

Materials and methods

Faecal samples collected from red foxes (*Vulpes vulpes*) shot during the 2008-2009 licensed hunting season (July and April) 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, when, how and by whom 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 2006/07 and were based upon modified taeniid egg isolation and multiplex PCR techniques. 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).



Echinococcus multilocularis.
Photo: Section for Parasitology,
National Veterinary Institute

Results

A total of 403 fox samples were collected, of which 396 were examined due to insufficient faecal amounts in seven of the samples. In total, 1633 red fox faecal samples have been tested for *E. multilocularis* between 2002-2009. All of them have been negative for *E. multilocularis* (Table 1). The red fox population in Norway is estimated to be 70 000 (Olav Hjeljord, UMB, Ås, personal communication) indicating a 95% certainty that the prevalence level of *E. multilocularis* in the red fox population in Norway is less than 0.5%.

Significantly more of the examined samples in 2008-2009 came from adult foxes (61%) than juveniles (38%) whilst there was no significant difference between the distribution of samples from male (54%) and female (46%) foxes. The sex was not recorded for three of the foxes whilst the age was omitted from the records in six of the foxes.

Discussion

Due to the low estimated prevalence (<0.5%) the negative predictive value becomes high, meaning that there is a high probability that a sample, when tested negative, is truly negative. This result supports the aim of the programme. A continuous surveillance programme is however, necessary to verify continued disease free status and hence maintain the national regulation for compulsory anthelmintic treatment of imported dogs.

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Photo: Colourbox

Table 1. Number and hunting county for red foxes, and other species, shot and examined for *Echinococcus multilocularis* in Norway during the licensed hunting periods from July to April, 2002-2009.

County	Number of red foxes sampled			Other species sampled
	2002-2008	2008-2009	Total 2002-2009	2002-2008
Østfold	31	8	39	
Akershus	140	42	182	
Oslo	26	9	35	
Hedmark	139	38	177	1 wolf
Oppland	134	21	155	
Buskerud	58	14	72	
Telemark	36	11	47	
Vestfold	38	5	43	
Aust-Agder	28	13	41	
Vest-Agder	16	8	24	
Rogaland	38	14	52	
Hordaland	44	30	74	
Sogn og Fjordane	78	52	130	
Møre og Romsdal	58	19	77	
Sør-Trøndelag	137	45	182	
Nord-Trøndelag	50	28	78	
Nordland	81	17	98	
Troms	64	15	79	
Finmark	41	7	48	1 racoon dog
Total	1237	396	1633	

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