

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 426 red foxes (*Vulpes vulpes*) examined from throughout Norway during the 2007-2008 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 2007-2008 licensed hunting season (July and April) were included in this year's program. All counties in 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 492 fox samples were collected of which 426 were examined due to budgetary constraints. In addition, one wolf (*Canis lupus*) and one racoon dog (*Nyctereutes procyonoides*) were examined. In total, 1237 red fox faecal samples have been tested for *E. multilocularis* in the period of 2002-2008. All of them were 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 came from male foxes (56%) than female (44%) and fewer faecal samples were examined from juveniles (37%) than adults (63%).

## 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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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, 2002-2008

County	Number of red foxes sampled			Other species sampled
	2002-2007	2007-2008	Total 2002-2008	2007-2008
Østfold	25	6	31	
Akershus	80	60	140	
Oslo	15	11	26	
Hedmark	97	42	139	1 wolf
Oppland	106	28	134	
Buskerud	36	22	58	
Telemark	27	9	36	
Vestfold	26	12	38	
Aust-Agder	11	17	28	
Vest-Agder	9	7	16	
Rogaland	30	8	38	
Hordaland	30	14	44	
Sogn og Fjordane	38	40	78	
Møre og Romsdal	37	21	58	
Sør-Trøndelag	86	51	137	
Nord-Trøndelag	35	15	50	
Nordland	53	28	81	
Troms	35	29	64	
Finmark	35	6	41	1 racoon dog
<b>Total</b>	<b>811</b>	<b>426</b>	<b>1237</b>	

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