Assessment of Risk of Introduction of Echinococcus multilocularis to Mainland Norway

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Authors’ contributions

This work was carried out in collaboration among all authors. The opinion has been assessed and approved by the Panel on Food Additives, Flavourings, Processing Aids, Materials in Contact with Food and Cosmetics of the Norwegian Scientific Committee for Food Safety. All authors read and approved the final manuscript.

ABSTRACT

In the light of the recent findings of the tapeworm Echinococcus multilocularis (EM) in four red foxes from three different locations in Sweden, the Norwegian Scientific Committee for Food Safety (Vitenskapskomiteen; VKM), Panel of Biological Hazards (Faggruppe hygiene og smittestoffer) took the initiative to undertake a risk assessment regarding the probability of this parasite being introduced to mainland Norway and thus becoming a threat to public health in the country.

EM is a small tapeworm that resides in the intestine of carnivores (e.g. foxes, dogs) that function as final hosts for the adult tapeworm. The infection here gives few or no symptoms. Adult tapeworms produce eggs that are released in the faeces of the carnivores and may be ingested by mammals, usually rodents or lagomorphs1, which act as intermediate hosts. In the intermediate hosts, the larval form of the tapeworm produces cysts, predominantly in the liver, where they...
proliferate and may invade the surrounding tissues. If the infected intermediate host is eaten by a susceptible final host, the adult tapeworm develops in the intestine and the lifecycle is completed.

EM is of public health significance as humans may act as accidental intermediate hosts if they ingest eggs, either through contaminated foods or water, or from contact with infected final hosts (dogs, foxes) or their faeces. In untreated patients the disease is often fatal (10 year survival rate of 29 %), and in treated patients the 10 year survival rate is 80 %. The anthelmintic treatment is long-term (for several years, possibly life-long) and expensive. Liver transplantation may be required.

**Conclusions:**

Based on the fact that EM is endemic in many European countries, that the incidence in endemic countries is increasing, and that the areas of endemcity are expanding it seems likely that EM will be imported into Norway at some point, perhaps within the next 10 years.

Given the high numbers of pets crossing the border between Sweden and Norway and the paucity of checks regarding compliance with treatment legislation, this seems to be a likely route of entry of EM to Norway, should this occur. Introduction of checks may reduce this likelihood.

Under the current monitoring conditions, VKM find it less likely that EM will be detected upon the first introduction to Norway. EM will probably only be detected once the prevalence in foxes is greater than 1%. The red fox population size is estimated to be between 70 000 to 120 000 animals. This means between 700 to 1200 red foxes would need to be infected before EM infection is likely to be detected under the current monitoring program. If EM is identified early enough after introduction, then it might be possible to avoid the establishment of EM in Norway and/or to limit the region of endemcity. This is dependent on optimal detection techniques and sufficient monitoring.

VKM considers that it is unlikely that EM will be imported to Norway via contaminated produce (berries, fruits and mushrooms).

Norway’s strong ‘outdoor’ culture, in which hunting, camping, berry-picking and other outdoor activities play a significant role, may place the Norwegian population at greater likelihood of contracting EM than populations in other European countries. However, it should be noted that even in countries with endemic EM, human echinococcosis is, apparently, relatively rare.

**Keywords**: VKM; assessment; Norwegian Scientific Committee for Food Safety; biological hazards; tapeworm.

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**NOTE:**

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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