Rapid Risk Assesment on Rabies and Echinococcus Multilocularis via Movement of Companion Animals from Ukraine

5 April 2022

This assessment was commissioned by the Finnish Food Authority on 30 March 2022. It is based on the information available as the work was in progress (30 March–5 April 2022), and the situation may change rapidly.

Finnish Food Authority

Risk Assessment Unit

Please note that the assessment was conducted between March 30 and April 5, 2022. The import regulations for dogs coming from Ukraine have been updated as of July 1, 2023, and the exceptions mentioned in the assessment are no longer valid.

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1. BACKGROUND

As a result of the war in Ukraine, the European Commission asked the Member States to allow Ukrainian war refugees' pets to enter the EU territory with their owners even if the entry requirements applicable to the pets were not met. All Member States comply with the Commission's request: pets travelling from Ukraine or, due to a compelling reason, from Russia with their owners may enter the country without prior application or permission.

Under normal circumstances dogs, cats and ferrets aged 12 weeks or older travelling with their owners from Ukraine are required to have an identification tag (microchip compliant with ISO11784 or ISO11785 Annex A), a valid rabies vaccination and a rabies antibody test certificate (antibody concentration of 0.5 IU/ml or higher). Further requirements are a three-month waiting period in the country of origin following an acceptable antibody test, a valid EU health certificate, and a notification of the purpose of their journey declared by the owner (non-commercial purpose, related to travel by the owner). Dogs must also have been treated against the *Echinococcus multilocularis* tapeworm. The animal must enter the EU through an authorised border crossing point. In Finland, the Customs is the competent authority at the border crossing point to which both the pet and its documents must be presented.

If a dog, cat, or ferret is not travelling with its owner, advance notification must be given in the TRACES system. The animal must go through veterinary border control before entering the EU territory, after which it must be customs cleared in the EU.

Importing a dog, cat or ferret aged under 12 weeks from Ukraine to Finland is not permitted.

Potential zoonoses carried by dogs and cats may put human and animal health at risk in Finland. Pets may also spread serious animal diseases present in the country of origin. No information is available on the occurrence of several diseases substantial for Finland (such as salmonellosis and echinococcosis) in Ukraine. As the most significant zoonotic threats are regarded rabies and echinococcosis because of their severity and Finland's disease-free status.

2. DURING THE WAR IN UKRAINE

A person fleeing the war in Ukraine with a pet must report to the Customs on arrival. The Customs will control the animal's vaccination documents and microchip. The dogs arriving Finland are administered a deworming under the supervision of Customs officials, and dog owners must collect the dog's faeces for 24 hours and dispose them with household waste. If the pet does not meet the entry requirements applicable in the normal situation, it must be kept in isolation at least for 30 days. The owner also receives written instructions in their native language. The owner must contact a veterinarian within three days of arrival, and if the pet does not have a microchip and/or rabies vaccination, the veterinarian will provide them. In addition, the veterinarian will take a blood sample from all dogs, cats, and ferrets for the determination of rabies vaccine antibodies.

In principle, the owners are responsible for the costs incurred from the pet's isolation period and fulfilling the import requirements. However, the Finnish Food Authority will reimburse the veterinary costs that arise from meeting the entry requirements. While the exceptional regulations due to the crisis situation remain valid, Ukrainian pets may be isolated in the same accommodation where their owner(s) live. Contacts between the pet and humans and other animals should be avoided throughout the period of isolation. If thelevel of rabies vaccination antibodies is insufficient, the Finnish Food Authority will extend the isolation period to three months After arrival, compliance with the isolation requirement cannot be controlled anymore. Refugees fleeing the war in Ukraine may fail to observe the prevention of infectious diseases and quarantine for multiple reasons:

- Pet owners do not necessarily know that they should contact Customs after arriving in the country, and consequently, they will not receive instructions and a deworming for their dog. There is no personnel at the points of entry/border crossing points who could locate and advise pet owners immediately on arrival.
- Competent authorities are not present at every points of entry/border crossing points.
- Most official reception centres do not accept pets, which is why some of those arriving with pets end up in private accommodation, where they may not be able to receive the necessary instructions.
- Lack of language skills, difficulty in organising transport, and fear of having to pay costs or losing the pet may also prevent the owner from contacting a veterinarian for having their pet microchipped, vaccinated against rabies, and tested for rabies vaccination antibodies after arrival.
- In a stressful situation, pet owners may not have the resources to stay informed and ensure their pet's disease protection immediately after arrival. Echinococcosis and rabies may also not be diseases that pet owners are familiar with, which is why they may not understand why preventing them is considered important in Finland.
- If the pet owners have already arrived the country without following the instructions, they may avoid going to a veterinarian even if they are later informed on the requirements because of the fear of losing the animal or of other consequences.

3. SYMPTOMS AND DIAGNOSTICS

3.1. Rabies

Rabies is a zoonosis caused by the rabies virus, which belongs to the genus of lyssaviruses. It proves fatal to tens of thousands of people every year, especially in Africa and Asia (WHO 2022). Rabies occurs almost everywhere in the world and, of Finland's neighbouring countries, for example in Russia (WHO 2014, Fischer et al. 2018). In Ukraine, rabies is present in both wild and domestic animals (OIE, Figure 1). Of all rabies cases in Europe, 21% are diagnosed in Ukraine and 30% in Russia (Meyer et al. 2012). Finland is a rabies-free country, which means that this disease occurs in neither domestic nor wild animals.

The rabies virus can infect all mammals and the infection is one of the deadliest diseases, as 100% of the animals and people who contract it will die. The disease has an exceptionally long incubation period (weeks or months) during which the animal or person is asymptomatic. Prophylaxis started immediately after exposure is the only way to prevent the disease from developing. Rabies typically does not cause extensive outbreaks or spread rapidly into new areas. On average, an infected individual only transmits the virus to one new individual in the exposed population (Fischer et al. 2018). Therefore, rabies can be effectively controlled with vaccinations (Morters et al. 2014). In the EU, rabies mainly occurs in foxes and raccoon dogs; in countries with a high rabies prevalence, stray dogs present by far the highest risk of rabies to humans and cause 99% of all rabies deaths in humans.

Rabies is transmitted through the bite of an infected animal. The first symptoms of the disease in a dog are licking and scratching of the bite site, snapping and other abnormal behaviour. While the animal usually becomes aggressive and starts howling hoarsely, sometimes a silent form of the disease occurs, in which the animal becomes timid and withdrawn. An animal with rabies always dies within four to ten days after the onset of symptoms. In wild animals, the disease may make the animal exceptionally tame and lacking in self-preservation.

Diagnostics and prevention

Rabies can be diagnosed by detecting the viral antigen or RNA in the brains of a dead animal. The WHO and the OIE recommend FAT (fluorescent antibody test) staining of brain tissue as well as cell culture to verify the diagnosis. Rabies cannot be diagnosed before the onset of symptoms. As the virus successfully eludes the immune defence in the early stages of the infection, no antibodies are formed before the onset of symptoms, and neither is the virus present in the blood at any stage of the infection (Fischer et al 2018).

Vaccination effectively prevents the disease in both dogs and humans. The vaccines on the market are very well tolerated, and adverse effects are extremely rare. Long-term protection is only achieved with two or more vaccinations. Currently, the requirement applied to most countries for importing dogs is a single rabies vaccination. As the incubation period of rabies is several weeks or even months, it is possible that a dog has been infected in its country of origin even before receiving the vaccination, in which case a single vaccination can no longer prevent the disease (David et al. 2010).

3.2. Echinococcosis

Echinococcosis is a disease caused by the parasitic tapeworm Echinococcus multilocularis, which can also infect humans and cause a serious, incurable illness. Finland has an echinococcus free status, that is the parasite does not occur in wild or domestic animals. Finland strives to maintain its disease-free status, among other things by requiring that all dogs entering the country must be treated against echinococcus, excluding a few countries with a disease-free status. The requirement of echinococcus treatment applies to dogs imported from Ukraine.

The main primary host of the echinococcus is the fox. Among the wild animals occurring in Finland, raccoon dogs, wolves and Artic foxes may also serve as primary hosts (Oksanen et al. 2016). Dogs may also spread echinococcosis, especially when they are in close contact with humans (Hegglin and Deplazes, 2013). Echinococcus living in the primary host's intestines secrete eggs into the host animal's faeces, from where they are spread in the environment. The echinococcus tapeworm may live in the primary host's intestines for up to six months (Oksanen, oral communication on 31 March 2022). The intermediate hosts of echinococcus are voles and other rodents that are infected by eating the parasites' eggs from the environment, whereas the new primary hosts are infected as they eat a rodent. Rather than being transmitted from one dog to another, a dog can only pick up an echinococcus infection by eating an infected rodent. Humans may contract an echinococcus infection by eating parasite eggs that have ended up in the environment (including on wild berries) with the faeces of a dog or a fox, for example. Fresh produce contaminated with echinococcus eggs as well as dog faeces are regarded as the most likely sources of infection in humans. Echinococcus eggs can also be transferred through a dog's fur, in which case the disease can also be transmitted through contact with a dog. A dog with echinococcus is asymptomatic, and the infection cannot be diagnosed in the animal without faecal tests.

Diagnostics and prevention

Echinococcus infections in a dog are diagnosed in the laboratory by identifying parasite eggs in the faeces.

The introduction of echinococcus into Finland with dogs is prevented by treating dogs at maximum 120 hours (5 days) and at minimum 24 hours (1 day) before arrival in Finland with a product approved for dogs that contains praziquantel or epsiprantel.

As treatment, the parasite is evicted from an infected dog using the same products.

4. OVERVIEW OF THE SITUATION IN UKRAINE

4.1. Rabies in Ukraine

Hundreds of cases of rabies, both in domestic and wild animals, are diagnosed in Ukraine every year (OIE, animal disease notifications). See Figure 1 for rabies cases reported in 2005–2021. The data for 2021 only contain notifications made between January and June. Even though the number of rabies cases has decreased steadily, as recently as 2020 rabies was still reported in 304 cats, 290 dogs, 66 bovines, 13 sheep, 2 horses and 1 pig. In wild animals, 385 cases were reported, most of them in foxes (363). For the geographical prevalence of rabies cases in domestic and wild animals in Ukraine in 2020, see Figure 2.

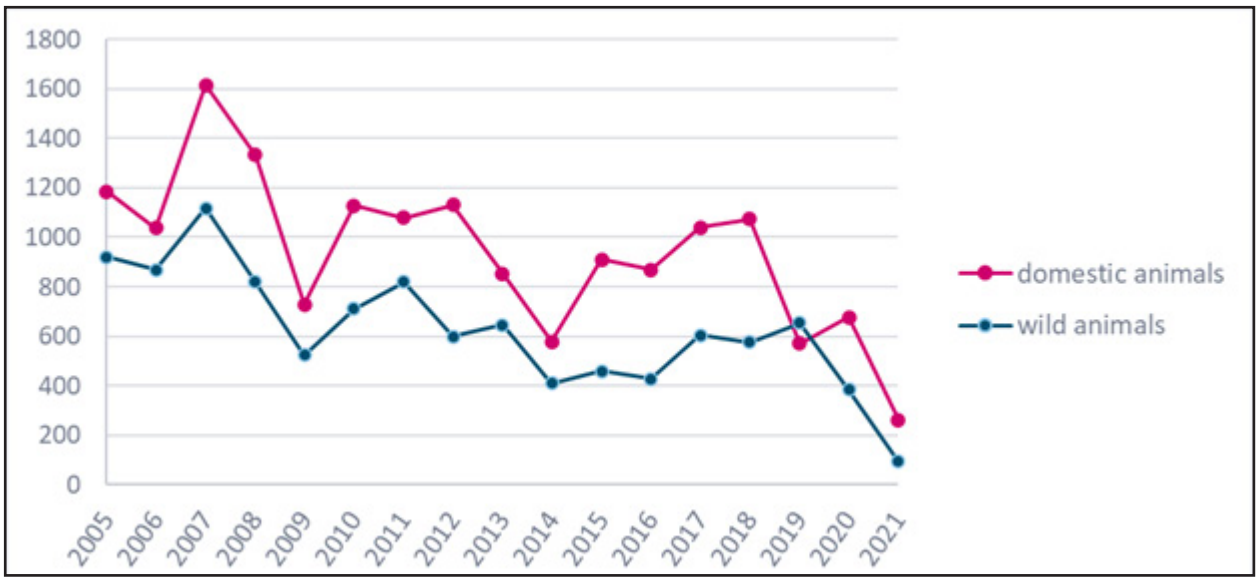

Figure 1. Rabies cases in domestic and wild animals in Ukraine between 2005 and 2021. Data for 2021 only include the period from January to June.

Nychyk et al. (2012) investigated rabies cases and antibody levels in Ukrainian dogs. The data contained 228 rabies cases, of which 26 (12.9%) in stray dogs and 202 (87.1%) in pet dogs, which obviously had inadequate vaccine protection. Antibody tests were conducted on blood samples from 234 dogs. A sufficient level of antibodies was found in 36.6% of dogs living in the city but only in 9.1% of stray dogs ('village dogs').

A study of rabies cases in humans in Ukraine between 1996 and 2020 (63 cases) found that, where the source of infection was known, it was most frequently a dog (16 cases) or a cat (11 cases) that had an owner (58.7%) (Makovska et al. 2021). In 19 cases, source of infection was a stray dog (8) or stray cat (11). Makovska et al. 2021. Consequently, contrary to common assumption, infected dogs and cats appear also to be pet animals, according to this study.

Fatal rabies infections have also been diagnosed in humans in Ukraine. See Figure 3 for human fatalities caused by rabies in different parts of Ukraine (Makovska et al. 2021). Every year, 2,100 people have suffered a bite from an animal infected with rabies, and a prophylactic treatment has been administered to over 21,000 people. Approximately one half of fatal rabies infections between 1996 and 2020 were caused by dog and the other half by cat bites.

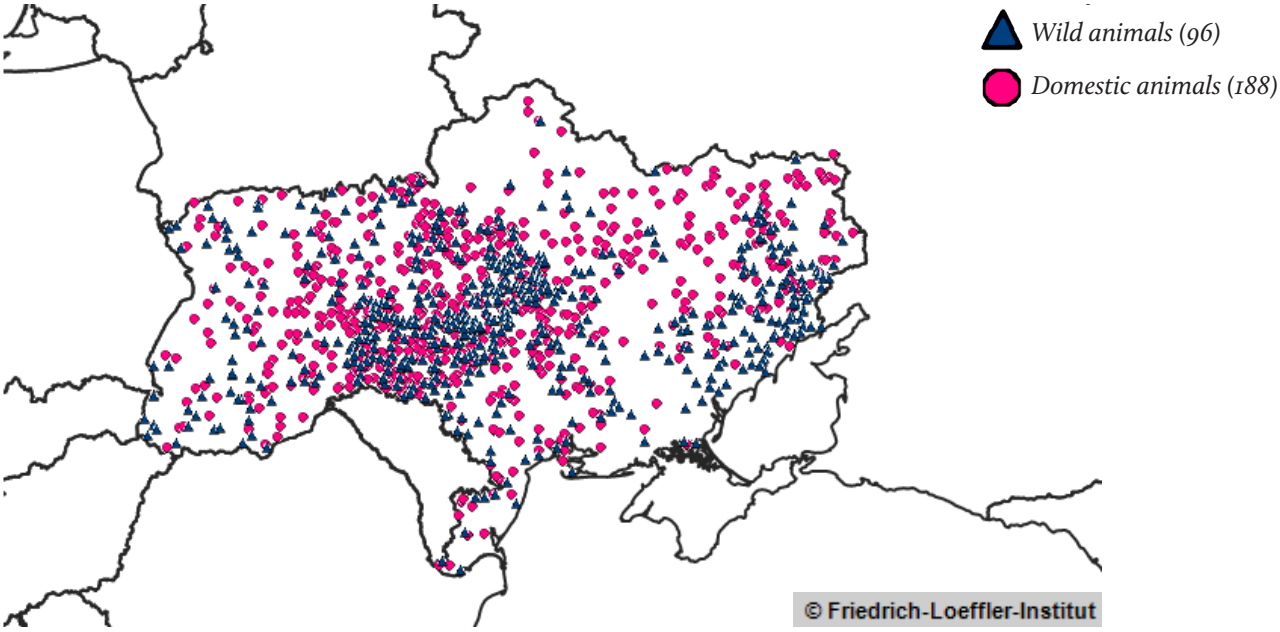

Figure 2. Geographical prevalence of rabies cases in Ukraine 2020.

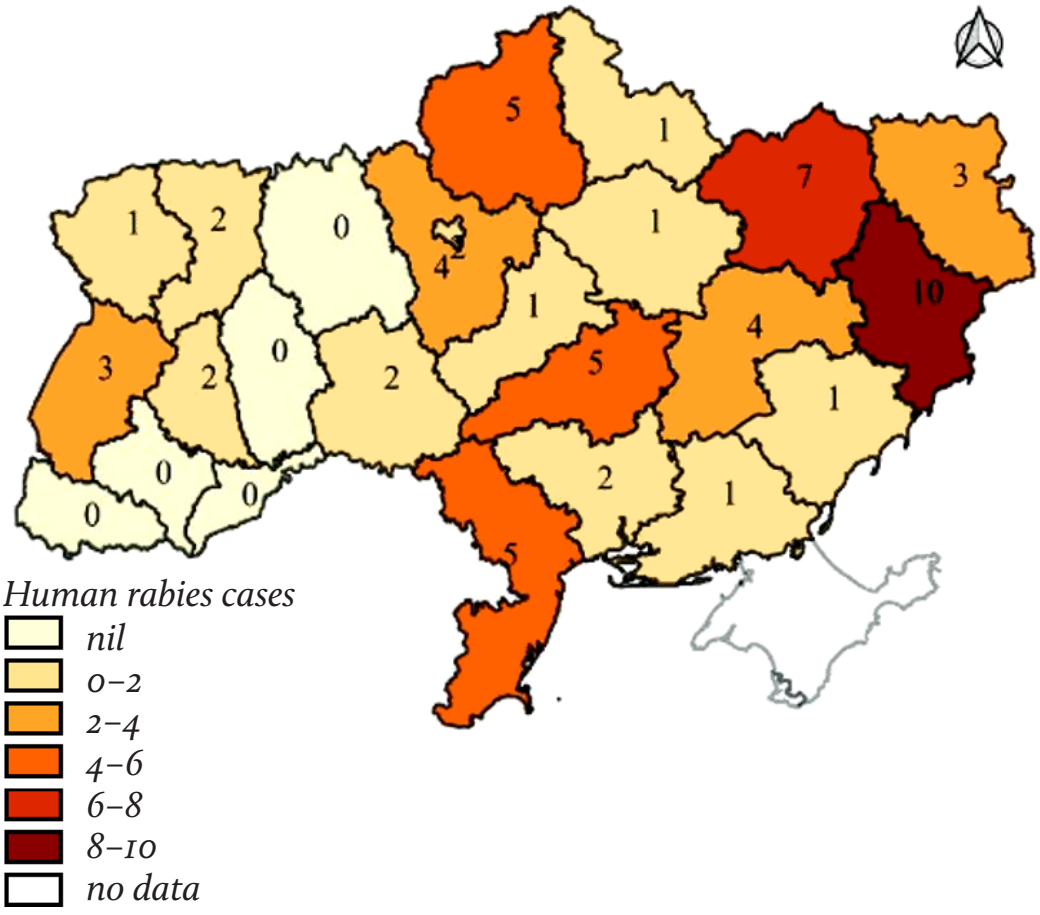

Figure 3. Human fatalities caused by rabies by region in 1996–2020 according to the Ukrainian Ministry of Health. Source: Makovska et al. 2021

4.2. Echinococcus in Ukraine

In Europe, echinococcus occurs in Central and Eastern Europe in an area extending from southern Sweden to the Alps and the Balkan Peninsula (EFSA). Little data are available on the echinococcus situation in Ukraine. In their study, Oksanen et al. (2016) found that the prevalence of echinococcus in Ukrainian foxes was 2.8% (95% confidence interval 0.1-9) in studies conducted between 2000 and 2010. No data are available on the echinococcus situation of Ukrainian dogs. In the neighbouring countries of Ukraine, the prevalence of echinococcus in foxes is over 10% in Poland and Slovakia and 4.5% in Romania.

5. RISK OF DISEASE INTRODUCTION INTO FINLAND

No precise information is available on the number of people who have fled the war in Ukraine and the pets they have brought with them. Finland can be reached using several entry routes, and competent authorities are not always present at points of entry.

The Finnish Ministry of the Interior estimates that between 40,000 and 80,000 people could arrive in Finland from Ukraine. According to a Swiss estimate, approximately 5% of the refugees would bring a dog or a cat with them (FSVO). Based on these estimates the number of dogs and cats arriving in Finland would be at most 4,000 animals.

According to the Finnish Food Authority's Animal Health and Medication Unit, the dogs arriving in Finland are family dogs – however, 'family dog' may mean animals kept under very different conditions, from those living under controlled conditions to individuals roaming free outdoors. It is likely that the cats arriving from Ukraine can be roughly divided into two different populations: indoor cats and cats with free access to outdoors.

5.1. Animals that have arrived in Finland

By 4 April 2022, 262 imported animals had been reported to the Finnish Food Authority. This number refers to animals that were reported to the Customs or taken to a veterinarian after entry. The reported animals include 168 dogs and 94 cats. Out of the 168 dogs, 43 had no microchip, and for 68 no information on the microchip has been recorded. Of the 94 cats, 34 were not microchipped, and no information on the microchip has been recorded for 26. 39 out of the 168 dogs had no rabies vaccination (no information: 75/168 dogs), and this figure for cats is 36 out of 94 (no information: 37/94 cats). Echinococcus treatment was administered at the Customs or by a veterinarian to 106 dogs who had not had it previously (63% of the dogs). The information at the border is updated daily/continuously.

Animals arrive in the country along several routes (Table 1). Currently, Finnish Food Authority veterinarians assist the Customs at Terminal 1 of West Harbour in Helsinki. Some of the arrivals enter through Terminal 2 of West Harbour, however, and may not receive the instructions immediately upon their arrival, in addition to which some arrive through other border crossing points. While the adequacy and allocation of the authorities' resources have their challenges, animal welfare organisation volunteers share information and strive to reach animal owners in addition to the authorities.

The precise number of pets brought to the country is not known.

Table 2. Border crossing points used by animal owners reported to the Finnish Food Authority and the number of animals arriving through them (27 February–4 April 2022).

Border crossing point	Number
West Harbour	37
Airport Customs	23
Sea Customs	21
Vaalimaa	11
Nuijamaa	4
Vainikkala	2
Port, Helsinki	1
No recorded information	163
Total	*262*

While ten pets were recorded as having arrived from Russia, half of them have continued their journey from Finland. Incomplete import requirements have been found regarding the pets remaining in Finland (no microchip, rabies vaccination and/or echinococcus treatment).

By 31 March 2022, 114 rabies vaccine antibody samples taken from dogs and cats arriving from Ukraine and submitted to the Finnish Food Agency had been examined (Figure 4). The level of antibodies in the sample was insufficient in approximately 45% of the dogs and 54% of the cats. Almost one half of the dogs and over 80% of the cats with an inadequate antibody level had no antibodies at all. Seven dogs and one cat had been vaccinated in Poland during their journey a few days before arriving in Finland, which means that their antibody levels were not yet sufficient on arrival.

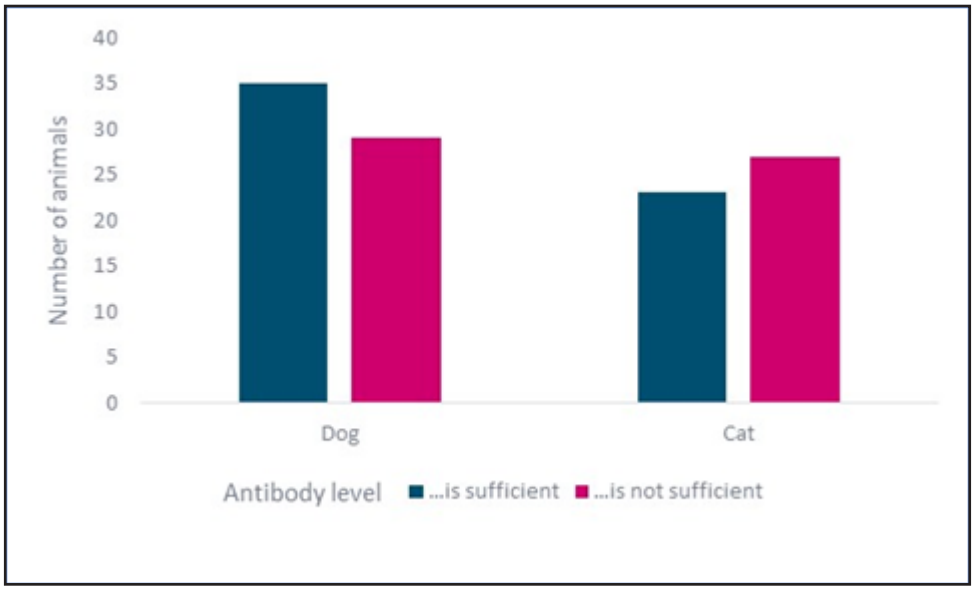

Figure 4. Antibody test results, dogs arriving in Finland from Ukraine on 31 March 2022.

The people who have fled the war in Ukraine arriving in Finland with their pets have mainly been put up in private accommodation, Finnish homes, and one reception centre opened for them arriving with pets. Dog and cat owners entering the country have been instructed to keep their animals in isolation for 30 days after arrival in Finland, during which time the dogs and cats must not come into contact with other animals or other humans besides their owners. Maintaining this isolation in private homes or other private accommodation may be challenging if it is shared with either other Ukrainian or Finnish people and their pets. Avoiding other pets may also be difficult at the reception centre if a high number of pets are living at the same centre. Dogs in private accommodation are the most likely to come into contact with Finnish dogs while they are exercised outdoors, and those at the reception centre are likely to be in contract with other pets from Ukraine.

5.2. Likelihood of a dog or cat infected with rabies arriving in Finland

In Ukraine, a new rabies case is diagnosed daily in average in one cat and one dog. A large number of wild animals (in 2020: 385 cases) and other domestic animals (in 2020: 80 cases) are additionally diagnosed with rabies. The incubation period is long, and during this time animals are asymptomatic and do not spread the infection. Animals with milder symptoms that are not identified as carrying the infection may also arrive. The vaccination coverage of Ukrainian dogs and cats is poor compared to Finland.

A German reference laboratory assessed the probability of an unvaccinated dog or cat arriving from Ukraine having a yet asymptomatic rabies infection at approx. 1:300,000 (StIKo/FLI).

We estimated the probability of rabies in dogs and cats arriving to Finland from Ukraine. It is estimated that there are 750,000 dogs and 5,500,000 cats in Ukraine. Every year, approximately 300 rabies cases are found in dogs and 300 in cats in Ukraine (OIE). People fleeing the war in Ukraine are likely to only travel with their own or other people's pets. Of the rabies cases in Ukrainian people, 67% have been caused through a bite from a dog and 50% from a cat which has an owner (Makovska et al. 2021). Consequently, the annual number of rabies cases caused by pets with an owner is around 200 for dogs and 150 for cats. The time during which an animal can carry rabies and remain asymptomatic (incubation time) may vary widely from weeks to months. In this estimate, the incubation time of 2 months has been used, during which 34 dogs and 25 cats have new rabies infections in Ukraine. Consequently, 34/750,00 of all Ukrainian dogs are currently asymptomatic carriers of rabies, equalling 1:22,000. This number for all cats is 25/5,500,000, equalling 1:220,000 carriers. Based on the results of tests for rabies vaccine antibodies in pets that have already arrived in Finland, approximately 50% of the dogs and cats do not have a sufficient level of antibodies against rabies. No accurate information is available on the number of dogs and cats in Ukraine, and the number of dogs and cats causing human rabies cases is based on a small number of cases, which make this estimate very indicative.

5.3. Likelihood of a dog with an echinococcus infection arriving in Finland

Estimating the likelihood of echinococcus being introduced into Finland is difficult because almost no information is available on its prevalence in Ukraine. While 2.8% of foxes are infected with echinococcus (Oksanen 2016), no published data are available on the prevalence of this parasite in dogs.

5.4. Spread in Finland

An animal with rabies infects on average one individual that comes into close contact with it. A rabies outbreak is unlikely, as the disease can be easily brought under control in Finland if a case occurs. The coverage of rabies vaccinations in dogs is relatively good in Finland.

If echinococcus is introduced into Finland, its spread would be difficult to detect and control. The large vole and fox populations in Finland would promote its spread, and parasite eggs are known to remain infectious in our climatic conditions.

6. MAGNITUDE OF THE RISK

The likelihood of the risk being realised and the severity of the consequences of its realisation (Table 2) as well as the uncertainty contained in the estimate are factored in when assessing the magnitude of the risk.

6.1. Rabies

Likelihood: It is possible that a dog or cat infected with rabies could arrive in Finland, but the spread of rabies in Finland can be limited and no outbreak will develop. The control of rabies is based on regular vaccination of pets against rabies.

Severity: Rabies is a serious and fatal disease in both animals and humans. If the spread of rabies into domestic animals in Finland cannot be stopped, Finland's disease-free status for rabies will be lost. The economic impacts will remain relatively minor.

6.2. Echinococcus

Likelihood: It is possible that a dog infected with echinococcus may arrive in the country. This is associated with a great deal of uncertainty. If echinococcus is introduced into Finland, it will be diagnosed with a delay and spread slowly, after which it will be practically impossible to eradicate.

Severity: The disease caused by echinococcus in humans is extremely severe, progressive and incurable. The spread of echinococcus into Finnish nature would affect both private and commercial use of wild berries

Table 2. Scale describing the likelihood and severity of the risk.

Likelihood		**Severity**	
Unlikely	Will only be realised in exceptional circumstances. Mainly a theoretical possibility	Insignificant	No significant health or economic harms
Possible	May be realised in certain cases. Has sometimes been realised in Finland or elsewhere.	Mild	Individual cases of mild illness and no significant impacts on the economy.
Likely	Realised often, or frequent 'near misses'.	Moderate	Multiple outbreaks and/or significant impacts on the economy.
Almost certain	Realisation is expected.	Severe	Severe chronic health harm, extensive outbreak or fatality and/or major impact on the national economy

6.3. Uncertainty and its causes

As the war in Ukraine goes on and becomes prolonged, more people fleeing the war with their pets will presumably arrive in Finland. Prolongation of a war typically increases chaos, also resulting in a higher disease burden in pets. It can be assumed that Ukrainian people fleeing the war may eventually move further away from the neighbouring areas of Ukraine and end up in Finland.

The uncertainty is increased by the following factors, among others:

- The number of pets having arrived in Finland is not known precisely.
- At this stage, estimating the final number of pets that will arrive in Finland is impossible.
- The numbers of dogs and cats in Ukraine are not known, which is why any estimate of rabies prevalence is associated with great uncertainty.
- There is little or no information on the prevalence of echinococcus in Ukraine.
- The numbers of dogs and cats in Russia are not known, and there is no information on the prevalence of echinococcus.
- The data on the rabies situation in Ukraine used in the calculations are based on OIE notifications from 2020. In previous years, the number of cases has been as much as double those numbers, and more recent statistics have not yet been completed, which makes more accurate assessments of the prevalence difficult to make.
- No estimates have been produced on the rabies situation in Russia. In 2020, Russia made 899 OIE rabies notifications concerning pets and 651 for wild animals.
- Uncertainties related to reporting.
- All available estimates of dogs arriving with the people from Ukraine are underpinned by fragmented information, and the data used have not been given, making the reliability of the estimates difficult to assess.

7. RECOMMENDATIONS

- Getting information across and completion of the required measures should be ensured.
- Evicting echinococcus is easy and safe with over-the-counter products.
- Testing the faeces of imported dogs could provide information of the extent to which Ukrainian dogs are infected with echinococcus.
- Animals coming from Ukraine may have been vaccinated in the country of origin, transit countries or Finland. A booster of the rabies vaccine and a clinical examination carried out by a veterinarian on all arriving dogs three to four weeks after receiving this vaccination would significantly reduce the risk.
- Treating all dogs arriving from Ukraine with a product that is effective against echinococcus as soon as possible after arrival would reduce the spread of this parasite. Collecting the faeces and disposing of them with household waste would prevent its spread through untreated dogs.

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