**Context**

The transport of companion animals across borders facilitates the potential spread and introduction of infectious pathogens, including rabies virus. A harmonised pet movement policy exists in the European Economic Area (EEA), which requires dogs to have valid anti-rabies vaccination, with a 21-day waiting period in the case of primary vaccination, before cross-border transport is undertaken. Since January 1, 2012, Norway, the UK, Ireland, Malta and Sweden no longer require a serological test for rabies-neutralising antibodies. Identification of dogs by microchip, a passport certifying valid anti-rabies vaccination and prophylactic Echinococcus multilocularis treatment are now the only entry requirements for dogs entering Norway. This change of movement policy has led to an increased number of rescue dogs being imported to Norway from eastern European countries, notably Romania. A survey was undertaken to see if the internationally accepted threshold antibody titre of ≥0.5 IU/ml, recommended by the World Organisation for Animal Health (OIE), was reached in imported rescue dogs.

**Main conclusion**

In 75 rescue dogs imported to Norway with a valid vaccine passport, 53 per cent had inadequate titres after rabies vaccination, and 19 per cent of the dogs had undetectable antibody titres. Most of these dogs (84 per cent) were adopted from Romania, where rabies is endemic. The legislation regarding free movement of pets needs to be re-addressed if the risk of spreading rabies is to be minimised.

<table>
<thead>
<tr>
<th>Number of Dogs</th>
<th>Antibody titres against rabies virus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥0.10 IU/ml</td>
</tr>
<tr>
<td></td>
<td>0.11 to 0.20 IU/ml</td>
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<tr>
<td></td>
<td>0.21 to 0.30 IU/ml</td>
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<tr>
<td></td>
<td>0.31 to 0.40 IU/ml</td>
</tr>
<tr>
<td></td>
<td>0.41 to 0.49 IU/ml</td>
</tr>
<tr>
<td></td>
<td>≥0.5 IU/ml</td>
</tr>
</tbody>
</table>

**Approach**

The study included 75 rescue dogs imported to Norway from eastern Europe during 2012. Sixty-three of the 75 dogs came from Romania, eight from Hungary, and for four dogs the country of origin was not reported. Dog owners were encouraged to visit a veterinary clinic for blood sampling, with analysis costs being covered by the Norwegian Food Safety Authority. Information on age, breed, sex, date of vaccination (reported for 56 of 75 dogs) and vaccine label (reported for 38 of 75 dogs) was requested.

The antibody response was determined by the OIE-approved fluorescent antibody virus neutralisation (FAVN) test and analysed at the National Veterinary Institute in Sweden. A control group of 1766 owned dogs from Sweden, that had an antibody titre analysis carried out at the same laboratory, was selected from a previous study. The dogs in this control group had received one injection of rabies vaccine and were sampled four to six months after vaccination.

**Results**

Only 35 of the 75 dogs (47 per cent) showed a satisfactory antibody level of ≥0.5 IU/ml. In addition, 14 dogs (19 per cent) had titres of ≤0.1 IU/ml (Fig 1).

To compare the level of antibodies detected in vaccinated rescue dogs and conventionally owned dogs, we restricted the data from the rescue dogs to samples obtained four to six months after rabies vaccination (22 of 75 dogs). In this time interval, only 45.5 per cent of the rescue dogs had antibody titres of ≥0.5 IU/ml, compared to 85.7 per cent of the conventionally owned dogs.

**Interpretation**

A limitation of this study is that the number of stray dogs included was low and information was lacking for many of the rescue dogs with regard to vaccination date and vaccine label. There was no comparison group of conventionally owned Norwegian dogs that were sampled at the same time (2012) and intervals (from one to 12 months) after vaccination. Therefore, we restricted the comparison to only those dogs that had been vaccinated four to six months before sampling (22 of 75 dogs) to standardise with a control group from Sweden. The differences in the titre were still statistically significant (P<0.0001).

**Significance of findings**

The requirement for measuring rabies antibody titre in the pet movement policy was discontinued, more than 50 per cent of the studied rescue dogs imported to Norway did not have sufficient antibody levels against rabies, as recommended by OIE. In addition, a high proportion had undetectable levels of antibodies, raising doubts as to the real compliance with vaccination. Therefore, the legislation regarding free movement of pets needs to be re-addressed if the risk of spreading rabies is to be minimised.

**FIG 1:** Distribution of an antibody titre against rabies virus in 75 imported rescue dogs with a certified valid anti-rabies vaccination. A titre of ≥0.5 IU/ml is the internationally accepted threshold level after vaccination and an antibody titre of ≥0.1 IU/ml is considered negative (according to the fluorescent antibody virus neutralisation [FAVN] test).
Cross-border transport of rescue dogs may spread rabies in Europe

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