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EMERGING INFECTIOUS DISEASES: WHAT HAPPENS WHEN THE BORDERS ARE OPENED?
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Perhaps one of the most significant factors in the emergence of companion animal diseases in new geographical areas is the increased movement of dogs (and cats) over long distances and through different bioclimatic areas. There have been some important examples of this in the past. The introduction and establishment of monocytic ehrlichiosis and *Babesia gibsoni* infection in the USA has been related to relocation of military dogs that had been resident in southeast Asia. In Europe, dogs travelling to and from Mediterranean areas for vacations with their owners have been incriminated in the establishment of monocytic ehrlichiosis and its tick vector *Rhipicephalus sanguineus* in Germany.

In Europe, the traditional barrier of companion animal quarantine is now being phased out between many countries and simplified requirements for pet animal movement across both land and sea borders is one part of the current political move towards greater European integration. Abolition of the quarantine requirements for animals entering from numerous countries including has resulted in a massive increase in the number of dogs travelling into the UK. The UK Pet Travel Scheme (PETS) was fully introduced in January 2000, and in six years, 369,441 dogs (cats and ferrets) entered the UK under the scheme. Most dogs travelling accompany their owners on short term vacations but relocation, adoption, showing and breeding exchange are common. Many travel destinations include areas where serious exotic and zoonotic infections are common, or where such infections are emerging. Of particular importance in Europe, are countries bordering the Mediterranean and those in central and eastern Europe. In both cases, there is an increased risk of domesticated dogs moving across adjacent borders with Africa and central Asia.

UK veterinary practitioners are now regularly dealing with travelled dogs with imported diseases as well as advising on risk and prevention protocols for owners that travel with their animals. In the 2005-2006 period, the University of Bristol diagnosed 30 cases of babesiosis, 15 cases of monocytic ehrlichiosis and 157 cases of leishmaniosis (70% diagnosed after entry, 30% diagnosed in country of origin) in UK resident dogs. Cases of *Brucella canis*, trypanosomiasis and *Ancylostoma braziliense* have also been reported in travelled non-quarantined dogs.
The Continuing Challenge of Rabies

The risk of rabies is low if the vaccination regimes recommended by manufacturers and licensed products are used, and if the risk of exposure from wild or feral sources is minimal. Many countries in western Europe have successfully eliminated classical rabies from their dog and fox population through vaccination programmes and the simplified travel requirements for dogs within the EU takes this for granted. Expansion of the EU and agreements with North America and Russia make travel of dogs to and from countries with less well controlled rabies problems much easier. Recent work in the UK has highlighted the variability in response of dogs to vaccination for rabies. At present, demonstration of an adequate post-vaccinal titre to rabies is required before dogs are allowed to enter the UK but this is currently under review and may be discontinued in 2008. In addition, the post vaccination waiting period before travel into the UK may be reduced to 21 days as is the case in the majority of European countries. Although the risk of vaccine breakthrough or inadequate vaccination is very low, it is still present. At present, routine rabies prophylaxis is not recommended for veterinary practitioners in the UK unless they are handling bats.

The problems of Leishmaniassis in the UK

Leishmaniasis is an important sand-fly transmitted protozoan disease of dogs and humans, which is endemic in the Mediterranean areas of Europe, the Middle East and many tropical and subtropical areas of the world. In northern Europe, infection is mainly restricted to dogs that have travelled to and/or from endemic areas of the Mediterranean region during periods when there is high sand-fly exposure. There is now an expanding reservoir of infected dogs in the UK. Although sensitive and specific diagnostic tests are readily available to UK practitioners, there is understandable inexperience in clinical recognition of the disease. In addition, there are no treatments licensed for dogs in the UK, and glucantime antimonate must be imported under licence from sources in continental Europe.

The disease vector has not yet been identified in the UK. However, transmission of leishmaniasis to non-travelled dogs in the absence of the sand-fly vector has been reported on several occasions in the UK over the past 4 years. In 2005, Mediterranean leishmaniasis was diagnosed in a 51 year old woman from south-east England who had no history of travel to an endemic area. It was suggested that sand flies had entered the UK in vehicles. The effect of climate change on the northern extension of the geographical range of the sand fly vector has yet to be monitored.

The Problem of moving Infected Vectors

The movement of dogs and cats is an efficient method of dispersal of infected ectoparasite vectors of disease.
Tick borne-encephalitis virus

Ixodes species ticks are widely spread throughout Europe including the UK. In northern and central Europe, Ixodes species ticks (European variant: I. ricinus; far eastern variant I. persulcatus) are the main vectors for the zoonotic tick borne encephalitis virus (TBE) which causes high morbidity and mortality in humans. Dogs, wolves and foxes are susceptible to TBE infection but reports of clinical disease in canids are uncommon. There are no reports of transmission directly to humans from infected dogs but they may act as transport hosts for infected ticks. The introduction of infected, imported ticks via dogs into the native Ixodes population may allow the establishment of new disease foci.

The Cross-Atlantic spread of Angiostrongylus Vasorum

The small heartworm Angiostrongylus vasorum is the cause of an emerging potentially fatal cardiopulmonary disease in dogs and other canids. Although previously confined to small geographic foci in northern Europe, it is now expanding with cases being reported in previously un-infected areas of the UK and Scandanavia. In addition, new cases have been reported in Newfoundland which has prompted concern about spread onto the mainland Atlantic Canada and the US. It is now considered likely that a major factor in the sudden appearance of new Angiostrongylus foci is the movement of infected dogs. The parasite then spills over via the intermediate mollusc hosts into the local fox/canid population from where it recurrently infects local dogs.

Parasite distribution can be predicted by climatic modelling to a certain degree with colonised areas being moist and temperate. Although crude, a number of areas suitable for establishment throughout the world can be identified, including SE Australia and New Zealand. The ease and frequency with which dogs currently travel long distances, may present a risk for further range expansion.

Further Reading

4. Shaw SE, Lerga A, Williams S. Exotic infectious diseases in small animals entering the United Kingdom from abroad diagnosed by PCR. The Veterinary Record.2003;152;176-177.
5. Weissenbock H. Holzmann H. Tick-borne encephalitis in Austrian dogs. The Veterinary Record. 1997; 139; 575-576