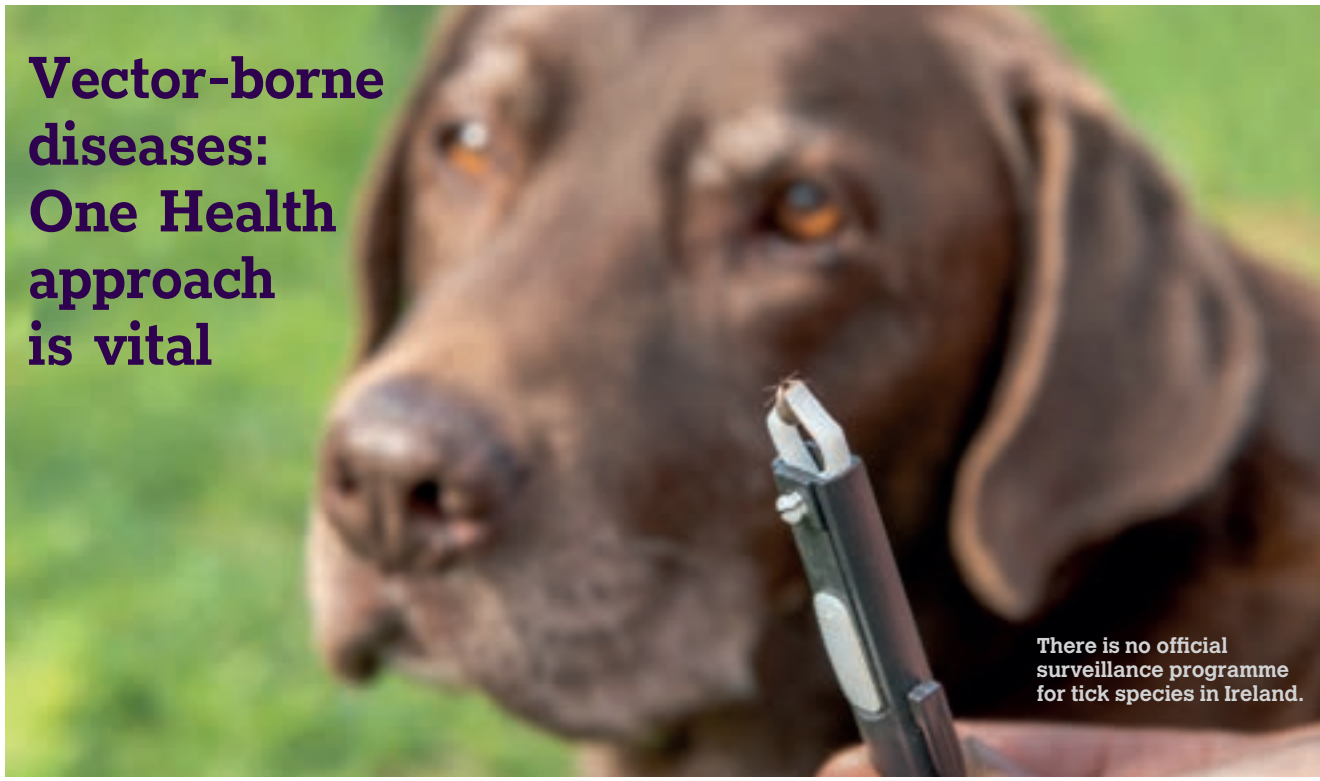
Vector-borne diseases: One Health approach is vital



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Oonagh Fitzgibbon MVB MRCVS, Companion Animal Veterinary Manager at MSD AH, discusses current and emerging risks which vector-borne diseases pose to both the animal and human members of our family

The World Health Organization states 'One Health' is an integrated, unifying approach to balance and optimize the health of people, animals, and the environment. Vector-borne diseases (VBD) are a group of illnesses where the causative organism is transmitted by several different vectors such as ticks, fleas, mosquitos, and sand-flies. The geographical distribution of these vectors is vital in understanding why VBD risks are different, depending on the geographical location. However, as the climate crisis rages on, these vectors will continue to spread beyond their current geographical regions bringing with them what were once considered to be exotic diseases.

In Ireland, ticks are the most significant vector, especially when we consider the impact vector-borne diseases have on both human and animal health. Ireland has the perfect conditions for ticks to thrive; the temperate climate is ideal and there is an abundance of suitable habitats, from the agricultural grasslands and woodlands to urban parks and back gardens. *Ixodes spp.*, are the most common species of tick found in Ireland. With *Ixodes ricinus* being the most common tick affecting cattle, sheep, and dogs, while *Ixodes hexagonus* is the most frequently encountered on cats. *Ixodes spp.* are active when it is 7° Celsius or above, consistently for five days or more and where humidity levels remain above 80 per cent. Ireland's mild and humid climate allows peak tick activity to continue from summer into autumn. However, as winters have become milder, tick activity is now being seen year-round. This activity will increase as the global temperatures continue to rise.

TICK-BORNE DISEASES

I. ricinus is not only the most prevalent species found in Ireland but also the most significant species when we consider tick-borne diseases (TBD). The role *I. hexagonus* plays as a vector is unknown in Ireland but in Europe it does play an important role as a vector of zoonotic TBD. *I. ricinus* is a three-host tick, where different hosts are required to complete each stage of

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the life cycle. Small mammals and birds are hosts for nymphal and larval stages, whereas larger mammals such as cattle, deer, dogs and even humans act as host for adults. *I. ricinus* acts as a vector for several TBD causal agents which can cause significant morbidity in cattle and sheep including *Babesia spp., Anaplasma spp.,* and Louping-ill virus. *I. ricinus* acts a reservoir of infection of *Babesia divergens* which affects cattle, but there have also been a small number of life-threatening cases reported in people in Europe.

However, the most important TBD transmitted by *I. ricinus* is Lyme disease caused by the spirochaete *Borrelia burgdorferi.* This zoonotic disease is the most common TBD in people in Europe, which also affects animal species such as dogs, deer, and horses. The number of human cases in Europe has increased steadily, with more than 360,000 cases reported over the last two decades. It is believed this increase is due to several factors: an overall increase in the number of ticks, an extension of their range, a true increase in the number of cases but also an increased awareness of the disease leading to an increase in diagnosis.

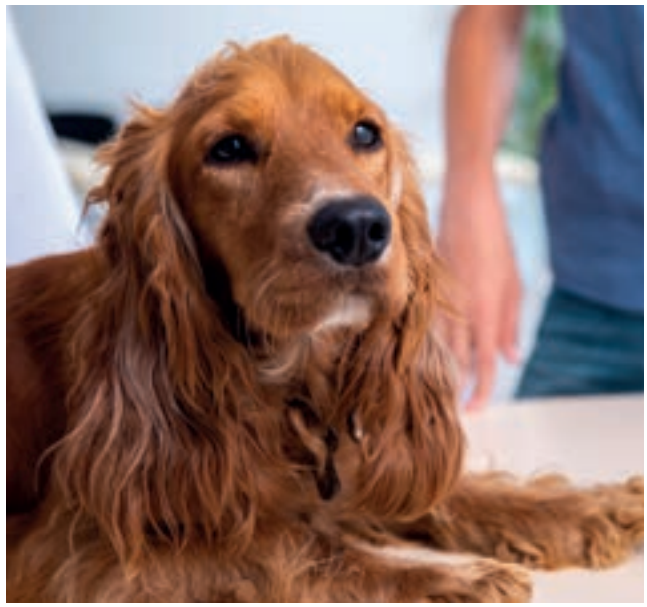
The true extent of human cases of Lyme disease in Ireland is unknown, as only the neuroborreliosis form is notifiable. Furthermore, the disease has many manifestations and can be very difficult to diagnose, often going misdiagnosed in the early stages. Canine patients may suffer relatively mild illness including pyrexia, lymphadenopathy, and polyarthritis, with serious presentations rarely seen. On the other hand, human Lyme disease often causes serious illness, with life-altering and chronic debilitating consequences.

Anaplasma phagocytophilum is the most prevalent tick-borne animal pathogen in Ireland. While it is well recognised as causing tick-borne fever in sheep, cattle, and goats, we must not forget its potential role in illness in dogs and cats. Canine granulocytotropic anaplasmosis has been recognised for many years. The current evidence also indicates that *Anaplasma phagocytophilum* is the more likely cause of the clinical and laboratory abnormalities in cats in the US in comparison to *Borrelia spp. Anaplasma* infections are increasingly recognised in both human and canine medicine, are challenging to diagnose and can be life-threatening for both dogs and humans.

TICK PROPHYLAXIS

Unfortunately, under pet travel legislation there is no requirement for tick prophylaxis when travelling, therefore leaving an open door for exotic ticks to enter to Ireland with returning pets. In the UK, a previously exotic tick species, *Dermacentor reticulatus* has become established in four regions: West Wales, Essex, North Devon, and South Devon. It is believed that due to climate change the distribution and populations of this species are expanding. There have already been several cases of *Babesia canis* seen in untravelled pets in the Harlow area between 2015 to 2017. After these initial *Babesia* cases were diagnosed, a locally infected population of *Dermacentor reticulatus* tick was identified.

There is no official surveillance programme for tick species in Ireland. Much of what is known is from several studies completed. One of these studies used blanket dragging techniques to collect ticks for identification. All ticks collected were *I. ricinus* as expected. A second study identified ticks found on dogs or cats collected at veterinary practices, *I. ricinus* and *I. hexagonus* were identified in most cases. However, a *Rhiphicephalus sanguineus* tick was submitted from an untravelled dog. This is very concerning.



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Currently our temperatures are too low for *R. sanguineus* to establish populations, like *D. reticulatus* has in the UK. However, it has been speculated that an increase of about 2-3°C in the mean temperature from April to September could result in the establishment of populations of *R. sanguineus* in regions of northern temperate Europe. Disturbingly, infestations can become established within households, cases of such have been reported worldwide including in the UK.

VITAL ROLE FOR VETS

Vector-borne diseases seen in animals can pose serious zoonotic risk to people. Veterinary staff are vital in the education of owners with regards to the risk fleas and ticks pose to their pets and their families and the importance and need for year-round protection against both fleas and ticks as recommended by ESCCAP (European Scientific Council Companion Animal Parasites). At least 65 per cent of recent major disease outbreaks are thought to have zoonotic origins.

Vets play an essential role in a 'One Health' approach to animal and human health. Veterinary staff are often the first line of surveillance and monitoring regarding new and emerging parasite and disease risks. Travel, including pet travel, has increased to pre-Covid levels and the risk of introducing formerly exotic tick species and their diseases to Ireland has once again become a real threat. Due to global warming, rising temperatures will allow new vector species to become established in areas where they were previously not found and bringing with them new vector-borne disease risks.

References available on request.