What is the risk of tick-borne diseases to UK pets?

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At this time of year many animal owners will be finding ticks on their pets and themselves, and it is therefore appropriate to discuss the One Health risk that tick-borne diseases (TBD) pose (1). Public Health England’s (PHE) Tick Surveillance Scheme (TSS) (<https://www.gov.uk/guidance/tick-surveillance-scheme>), whose data Wright et al’s paper utilises, stands out as a fantastic example of what can be achieved with a One Health surveillance approach (1). The TSS is well supported by the veterinary profession, who submitted 46.8% of all ticks (2). Their work provides a solid evidence base enabling the veterinary profession to offer sound advice to clients and the general public. It is important that such coordinated surveillance schemes continue to be supported and funded. However, there is a large hole in our knowledge of TBDs in companion animals; the actual incidence of clinical disease.

Wright et al describe where clinical examinations for ticks should be focused, the range of tick species found, and the seasonality of exposure (1). By combining their findings with other work displaying the geographic distribution of ticks, we have an understanding of the expanding tick distribution in the UK (2–4). These studies describe resident species of tick being the most prevalent (predominately *Ixodes ricinus* and *Ixodes hexagonus).* With this information available, vets should no longer say, ‘This is the wrong time of year for ticks’ or ‘This isn’t a tick area’.

Pet owners are 1.5 times more likely to be bitten by a tick than non-pet owners (5). This risk extends beyond rural areas as it is now well established that exposure can occur in urban parks (6,7). Current estimates suggest that a tick needs to feed for more than 24 to 48 hours before pathogen transmission occurs (8). As Wright et al discuss, regular tick checks should be encouraged and seen as an everyday part of pet care, regardless of whether you live in a rural or urban area (1). This should equally be extended to checking yourself for ticks. Therefore prompt recognition and correct removal is important (TSS offer useful advice on their website). In short, client education is fundamental and no pet owning household should be without a tick removal tool.

**Exotic ticks and TBDs**

A major concern is the increasing number of exotic ticks that are entering the UK (2,9), due to a mix of climate change (10), and the removal of compulsory tick treatments as part of the pet passport scheme (11,12). The TSS have confirmed 399 ticks being imported on animals from 15 different countries (9). This is an underestimate as not all imported animals would have ticks submitted to the TSS. Most worryingly six non-endemic species were found, the most prevalent of these was *Rhipicephalus sanguineus.* Their numbers are increasing and they could bring to the UK canine babesiosis, ehrlichiosis and Mediterranean spotted fever (a human infectious disease). There has already been a house infestation of *R.sanguineus,* whose source was an imported Spanish dog (13). There has been much coverage in this journal of the 2016 *Babesia canis* cases in Essex, showing how a once exotic TBD can gain a foothold into the UK tick population (14–17).

Exotic TBDs of human concern include Crimean-Congo Haemorrhagic Fever (CCHF) virus, a zoonotic pathogen carried by *Hyalomma* ticks (18), and Tick-borne encephalitis (TBE) virus, a flavivirus carried by *I.ricinus* (19)*.* Both of these viruses pose a serious and fatal threat to human health. The likely route of CCHF to the UK is via migratory birds, though a tick found on a dog originating from Portugal had the potential to carry CCHF (9). TBE is spreading from Eastern to Western Europe, with Belgium and the Netherlands confirming cases in the last couple of years (20,21). As the host tick species is resident in the UK, the potential of TBE arriving and establishing in the UK tick population is clear. The risk of these viruses entering the UK is currently deemed low; however vigilance is needed to detect the first arrival of ticks carrying these pathogens.

**TBDs in the UK**

There are two useful reference works from 2001 describing TBDs in dogs and cats (22,23). They interestingly describe *Babesia canis* as having a ‘tropical/semitropical’ geographical distribution, showing how the TBD landscape is rapidly changing. Recent research describes the tick infection rate of ticks found on pets (24,25). Ticks found on dogs showed a prevalence of 2% for *Borrelia burgdorferi* sensu lato (the spirochaetal genuspecies complex responsible for Lyme disease) and 1.5% for *Babesia spp.* In ticks found on cats this was 1.8% and 1.1% respectively.

Lyme disease is the TBD with the highest awareness amongst the general public. The ACVIM in their recent consensus state that ‘*It is not proven that European LB* (Lyme borreliosis) *causes clinical signs in dogs*’ and that ‘*although cats may be seropositive, it’s unknown if infection causes illness in cats*’ (26). In the majority of cases dogs show no clinical manifestations, otherwise the two most common presentations are arthritis and nephritis. The current recommendation for diagnosis is serology, however this only shows pathogen exposure, and is ‘*not the proof of cause of clinical signs, nor can it be used as a predictor for development of future clinical signs*’ (26). To my knowledge, there are no studies describing the epidemiology of Lyme disease in UK companion animals; without this how can the profession provide advice to worried owners about the possible risk it poses to their pets?

In humans the UK reports around 1200 laboratory confirmed cases a year (27). This is likely an underestimate, as patients presenting with the pathognomonic bull’s eye rash (erythema migrans)*,* something not seen in companion animals, are recommended to be treated without performing diagnostics. Interestingly, the NICE guidelines similarly state that, ‘*there is a lack of robust epidemiological data on Lyme disease in the UK*’ (28). For further advice about Lyme disease see PHE’s (<https://www.gov.uk/government/collections/lyme-disease-guidance-data-and-analysis>) and NHS Choices (<https://www.nhs.uk/conditions/lyme-disease/>) webpages. It is likely that the risk of Lyme disease is greater to owners rather than their pets.

**Risk Outcomes**

The profession must remain vigilant to TBDs, but risks need to be placed into perspective. For the overwhelming majority of companion animals the main clinical consequence of a tick bite is a tick bite reaction or infection (although incidence studies are lacking). Therefore, by examining pets, removing ticks appropriately, educating owners and using appropriate tick treatments, unnecessary antibiotic treatment and minor procedures can be avoided. To aid surveillance, ticks from recently travelled dogs, and especially re-homed continental dogs, should be examined. To help in-practice identification of ticks the Bristol University Tick ID website (<http://www.bristoluniversitytickid.uk/>), supported by ESCCAP, offers a great first point of call. It must be stressed that tick identification is challenging, and sending suspicious ticks onwards to the TSS is still recommended. Without surveillance schemes, like the TSS, and the active reporting of suspicious clinical cases by the veterinary profession, we won’t know when TBDs are entering the country.

To summarise; the understanding of ticks and TBDs in the UK is rapidly improving, but we are missing the critical piece of the puzzle. Without this we will remain in the dark of how badly/well policy changes (i.e. the pet passport scheme) have performed. This piece is the clinical incidence of disease. The research and laboratory community need to perform, at the bare minimum, a cross-sectional seroprevalence study of TBDs in companion animals, ideally stratified by travelled and resident pets. This is likely to overestimate disease, as it only describes exposure not clinical disease, and therefore a study identifying the clinical incidence of TBDs is also warranted. Without these data we cannot fully explain the risk of ticks and TBDs to our clients in an evidenced based manner.

The findings of the Tick Surveillance Scheme highlight why vector surveillance is critical to the UK, and the benefit it can provide to the health status of the nation and their pets. Vets and vet nurses form an integral part of this surveillance. They, over many other professions, come in to contact with a high number of ticks on a weekly if not daily basis. As such they should see themselves as sentinels to the introduction of exotic TBDs to the UK, and educators to the general public. If you see an unusual tick, don’t ponder and put it in the clinical waste, send it to the TSS.

**What you need to know:**

* Check for ticks during routine physical examinations of companion animals. Focus the search on the head, legs and neck. Remove appropriately and ensure animals are covered with appropriate tick treatment. Ensure owners know how to remove ticks, and highlight the need for them to check themselves too.
* Ticks are found over large parts of the UK, all year round, and so they should never be ruled out in a consult if an owner describes one.
* Increasingly, exotic tick species are found in the UK and potentially carry exotic tick-borne diseases.
* Submit any ticks of unknown identity, or from animals that have a history of foreign travel, to **The Tick Surveillance Scheme**.
* Little is known about the clinical incidence of tick-borne diseases in companion animals in the UK. Research is greatly needed.

**Disclaimer**

John Tulloch is funded by the National Institute for Health Research Health Protection Research Unit (NIHR HPRU) in Emerging and Zoonotic Infections at University of Liverpool in partnership with Public Health England (PHE), in collaboration with Liverpool School of Tropical Medicine. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR, the Department of Health or Public Health England.

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