



## A TBE SEROPREVALENCE STUDY IN ANIMALS CONFIRMS KNOWN TBE FOCI AND SUGGESTS SO FAR UNKNOWN FOCI IN NORTHERN GERMANY

### Background

In Germany, most TBE cases (>80%) are being reported from the southern federal states Bavaria and Baden-Wuerttemberg. However, an increase in TBE cases has been observed in northern Germany, in the federal state Lower Saxony over the last few years, and the district “Emsland” has recently been declared a TBE risk region by the Robert Koch-Institut.

The geographical distribution of TBE virus is thus far not well understood in northern Germany. In contrast to the ubiquitous distribution of *Ixodes ricinus*, TBE virus circulation is limited to so-called natural foci, which can be even smaller than a football field. These foci are areas of active transmission between TBE virus and rodents.

A sero-epidemiological study has been carried out in Lower Saxony in wild and domestic animals to learn more about the distribution and the epidemiology of TBE virus in northern Germany and to further detect so far unknown TBE foci.

### Results

A total of 4,085 blood samples have been collected from 2019 to 2021 from animals in Lower Saxony, including wild animals (N=1,462) like wild boar, roe deer and red deer and domestic animals (N=2,623) like dogs, cats, horses, sheep and goats.

Overall, 8.4% of the investigated blood samples showed a positive TBE ELISA result, while 9.4% were classified as borderline. The highest proportion of positive and borderline results was obtained for horses (18.5% positive and 32.6% borderline), followed by wild boar.

For confirmation, samples from 761 animals were tested for neutralizing antibodies, of which 60 were positive. The highest frequency of positives was found in deer and wild boar (2.7% to 5.6%), while the seropositivity in horses was lower (0.8%). Most ELISA-positive and borderline samples were not confirmed positive in NT assay.

Most TBE NT-positive samples clustered predominantly in close proximity to already known TBE foci in the districts. However, new areas with positive animal blood samples were also observed, e.g., in southern Lower Saxony (districts of Holzminden, Celle and Osnabrück).

### Discussion

In general, seroprevalence data in wild and especially in domestic animals must be carefully analyzed, because of the possible travel history of the animals and the home range of animals, which could explain why, e.g., TBE-positive wild boar were also found in the neighboring districts of confirmed foci.

The specificity of ELISAs may be non-optimal (in this study, e.g., in horses and wild boar), and thus it is important to validate results by NT tests. Increasing distribution of cross-reacting flaviviruses like West Nile virus, and Usutu virus may lead to more false-positive ELISA results, and this is also true for serum samples taken postmortem from wild animals. In addition, cytotoxic effects in sera from certain animal species (e.g., horses and wild boar) have been observed in NT assays such that various limiting factors should be considered in sero-epidemiological studies in animals.



In summary, an overall TBE seropositivity of 1.5% in wild and domestic animals underlines ongoing TBE virus circulation in northern Germany, also beyond the formally recognized TBE risk areas. The presented data suggest that additional TBE foci exist in Lower Saxony, e.g., in the districts Celle and Holzminden. Public awareness should be increased in Lower Saxony, particularly in the districts with seropositive animals, and also with regard to the possibility of vaccination.

## Literature

Topp et al.

Seroprevalence of tick-borne encephalitis virus in wild and domestic animals in northern Germany  
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**Author:** Dr. Michael Bröker

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