Health, zoonotic pathogens and parasites

Detection of *Toxoplasma gondii* antibodies in slaughtered cattle and hunted red deer in Lithuania

Laukutė, Monika[1,2*]; Karvelienė, Birutė[2]; Zamokas, Gintaras[2]; Stadalienė, Inga[2]; Paulauskas, Algimantas[1]; Radzijevskaja, Jana[1]

[1] Vytautas Magnus University, Research Institute of Natural and Technological Sciences, Kaunas, Lithuania
[2] Lithuanian University of Health Sciences, Faculty of Veterinary Medicine, Kaunas, Lithuania
* monika.laukute@lsmu.lt

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Toxoplasmosis is one of the most common human zoonoses caused by undercooked meat. *Toxoplasma gondii* is a foodborne parasitic protozoan that poses significant concerns for public health. The disease is estimated to affect around one-third of the world's human population and can affect almost all warm-blooded animals. Detecting antibodies against *T. gondii* in livestock, such as cattle, and wildlife, such as deer, is crucial for understanding the spread and epidemiology of the parasite. The aim of the study was to analyse the prevalence of *T. gondii* in cattle housed under different conditions in Lithuania, as well as in wild red deer, and to assess the potential contamination of meat.

Beef diaphragm muscle samples were collected from three slaughterhouses during the period from January to April 2024. Based on their housing systems, the cattle were classified as kept in closed and open environments. Deer diaphragm samples were collected during the hunting season in different regions of Lithuania from November 2022 to January 2023. The detection of *T. gondii* antibodies in meat juices was conducted using an indirect ELISA method (ID Screen® Toxoplasmosis Indirect Multi-species, ID.vet, France). A total of 47 beef diaphragm and 68 venison diaphragm samples were analysed. The findings revealed that 15 beef samples tested seropositive, indicating a prevalence rate of 31.9%. Additionally, seven samples were classified as equivocal (14.9%), while 25 were confirmed negative (53.2%). The average age of the sampled cattle was found to be 36.5 months. Notably, 12.8% of the cattle were housed in closed systems, whereas 87.2% were in open systems. Importantly, all positive samples originated from cattle in open systems, with a mean age of 39.2 months. Furthermore, no infections were identified in cattle younger than 12 months. Our findings showed a significantly higher prevalence of *T. gondii* infection in cattle housed in open systems than those in closed systems ($P<0.05$). The testing of venison samples showed that 12 of them were seropositive, indicating a prevalence rate of 8.2%. Additionally, four samples were classified as equivocal (2.7%), while 52 were confirmed negative (89.1%). All seropositive samples were derived from adult deer.

The results show that cattle are frequently exposed to *T. gondii*, especially when kept in open systems. In contrast, the prevalence of *T. gondii* in deer samples was considerably lower, indicating that while deer can harbour the parasite, the transmission risk from venison appears to be less pronounced compared to beef. Of particular concern is that meat is not routinely tested for this parasite, neither in animals raised in Lithuania nor in imported meat products. To ensure food safety and quality throughout the food chain, further research is essential to determine the exact prevalence of *T. gondii* and identify effective measures to minimize the potential spread of the parasite along the epizootic chain, reducing the associated risk factors for infection.