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Experimental BTV-3 and BTV-8 infection of Culicoides sonorensis biting midges

Inhalt

Bluetongue virus (BTV) is the causative agent of a major livestock disease and it is transmitted by Culicoides biting midges between the ruminant hosts. The first recorded outbreak in Central Europe was caused in 2006/2007 by serotype BTV-8, leading to a major epidemic. In 2023, serotype BTV-3 emerged in the Netherlands and spread rapidly to neighbouring countries. Compared to the BTV-8 outbreak in 2006, the BTV-3 epizootic had a more severe clinical course and spread faster. To explore the possible causes of the different epidemiologies, we compared the replication properties of BTV-8 and BTV-3 in a laboratory colony of Culicoides sonorensis biting midges. The midges were orally infected with BTV-3 or BTV-8 via an infectious blood meal. Engorged females were either processed immediately or incubated for six days. Viral genome copies per individual midge were quantified using BTV-specific RT-qPCR. Replication was assessed using a cut-off derived from day-0 viral loads. Overall, 4.39% of the midges infected with BTV-3 replicated the virus, whereas a smaller proportion of midges infected with BTV-8 replicated the virus (3.44%). Moreover, oral infection with BTV-3 resulted in a significantly higher viral load in infected midges with demonstrated replication than infection with BTV-8. This may be a factor contributing to the observed faster progression of the BTV-3 outbreak in comparison to the BTV-8 outbreak in 2006/2007.

Keywords

Bluetongue virus, biting midges, experimental infection

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