

CULICOIDES IMICOLA AS A VECTOR OF BLUETONGUE VIRUS SEROTYPE 8

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Based on its abundance near livestock and wide geographical distribution, one of the most important *Culicoides* virus vector species of orbiviruses is the Afro-Asiatic species *C. (Avaritia) imicola*. It is considered a proven vector of bluetongue virus (BTV) and is one of the world's most widely distributed *Culicoides* species. Strong correlations were found between the presence of *C. imicola* and outbreaks of BT and African horse sickness (AHS) in Africa and BT in Southern Europe. In 2006, BT serotype 8 (BTV-8) was responsible for the first outbreaks ever of BT recorded in Northern Europe. Outbreaks first appeared in the Netherlands and Belgium, and subsequently spread to Germany, France, and Luxemburg. The virus apparently overwintered in Northern Europe and, during 2007-2008, spread across the whole of Europe. The outbreaks in Northern Europe happened in the absence of *C. imicola*. Members of the *Culicoides* (*Culicoides*) *pulicaris* and *C. (A.) Obsoletus* complexes have been implicated in BTV transmission. In the present study, the oral susceptibility of *C. imicola* and other South African livestock associated *Culicoides* species to various isolates of BTV-8 were determined by artificial feeding. During summer 2008, a Belgium and a recent (2004) South African field isolate of BTV-8 were fed to *Culicoides* collected at two localities in South Africa. Adult *Culicoides* midges were collected at the Agricultural Research Council – Onderstepoort Veterinary Institute (ARC-OVI) and at Clarens, in a cooler mountainous area of South Africa. At ARC-OVI the dominant species was *C. imicola* and at Clarens it was *C. (A.) bolitinos*. The South African field isolate was fed at concentrations of 5.8 and 7.8 log₁₀TCID₅₀/mL in the blood meal and the Belgium isolate at 6.8 log₁₀TCID₅₀/mL. The following summer (2009) the same South African (6.8 log₁₀TCID₅₀/mL) and Belgium (6.8 log₁₀TCID₅₀/mL), a Dutch (4.8 log₁₀TCID₅₀/mL) and a Spanish (6.1 log₁₀TCID₅₀/mL) isolates of BTV-8 were

fed to *Culicoides* species collected at ARC-OVI. In the same season, the South African and Belgium isolates were also fed to midges collected at Clarens. Virus recovery, after an incubation period of 10 days at 23.5°C in *C. imicola*, was low for all isolates for both years. The South African isolate (5.8 log₁₀TCID₅₀/mL) and the Spanish isolate of BTV-8 could not be recovered from 420 and 492 midges tested after incubation. The recovery rate for the other isolates ranged from 2/403 (0.5%) (2008: SA isolate) to 1/683 (0.1%) (2009: SA isolate). These relatively low recovery rates make direct comparison between isolates problematic. Virus recovery from *C. bolitinos* fed on the South African isolate (7.8 log₁₀TCID₅₀/mL) was significantly higher than any of the other isolates. During 2008 the Belgium isolate could be recovered from 4/229 (1.7%) *C. bolitinos* tested. Other *Culicoides* species from which BTV-8 could be isolated included *C. (Meijerehelea) leucostictus*, *C. (A.) gulbenkiani* and *C. (unplaced) angolensis*. Viral concentrations in infected *C. imicola* ranged from 0.7 to 2.4 and from 0.7 to 3.4 log₁₀TCID₅₀/mL in *C. bolitinos*. These results are in agreement with previous studies indicating a similarly low susceptibility in *C. imicola* for the reference strain of BTV-8. The relatively low oral susceptibility to near refractory status of *C. imicola* as determined for some of the isolates in this study will easily be compensated for by the high abundance of *C. imicola* in South Africa. Cumulative laboratory oral susceptibility results from South Africa indicate a consistently higher susceptibility in *C. bolitinos* for BTV as well as a multi-vector potential for BTV as well as AHSV. The unique biology of potential vector competent *Culicoides* species emphasizes the complex epidemiology of these diseases.

KEYWORDS: *CULICOIDES IMICOLA* – *BLUETONGUE VIRUS* – SEROTYPE – VECTOR.

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