

## **KEYNOTE: THE HISTORY AND GLOBAL EPIDEMIOLOGY OF BLUETONGUE VIRUS INFECTION**

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Bluetongue (BT) is an insect-transmitted virus disease of ruminants caused by BT virus (BTV). The disease was first described in southern Africa after European settlers introduced their fine-wool breeds of sheep to the region in the 17<sup>th</sup> century. For much of the 20<sup>th</sup> century BT was considered a disease of Africa that was being silently spread around the world, putatively by livestock trade and movement. It is now evident that BTV infection is endemic on all continents except Antarctica, coincident with the distribution of competent *Culicoides* insect vectors that occur in relatively distinct global ecosystems that include different *Culicoides* species and different constellations of BTV serotypes. Climate change has been incriminated as the cause of the remarkable recent expansion of the virus' global range, notably in Europe.

Modified live (MLV) BTV vaccines were first developed in South Africa and subsequently in California. The egg propagated MLV vaccines developed in California were highly teratogenic if used in pregnant sheep and caused characteristic brain defects in congenitally infected progeny. Until the recent emergence of BTV serotype 8 (BTV8) in northern Europe, congenital BTV infection only was described only in regions where MLV vaccines are also used; this includes teratogenic defects in calves born to unvaccinated cattle that were potentially exposed to naturally circulating vaccine viruses or reassortants thereof. The European strain of BTV8 is commonly associated with vertical transmission, which is not a feature of many other field strains of the virus, and BTV8 causes teratogenic brain defects that are identical to those caused by the original California MLV BTV vaccines.

Much attention has been paid recently to the epidemiology of BTV infection in Europe, especially in regions devoid of *Culicoides imicola*, which is the traditional African-Asian vector of BTV. However, much remains to be understood regarding the epidemiology of BTV infection in historically endemic regions such as South Africa and California. Infection in these areas is seasonal, and the mechanism of inter-seasonal maintenance (so-called "overwintering") remains uncertain. Because of renewed international interest in the epidemiology of BTV infection, including the potential role of vertical and/or oral transmission of the virus therein, we have undertaken intensive surveillance at commercial dairy farms throughout California. These studies have confirmed oral infection of newborn calves via consumption of virus-contaminated pooled colostrum, however the presence of BTV nucleic acid is transient in these calves and we have confirmed neither persistent infection nor interseasonal maintenance of BTV in cattle. Rather, data obtained to date confirm only that the annual infection of cattle in California is dependent on seasonal transmission by vector *Culcioides sonorensis* insects.