Bluetongue Virus of Worldwide Concern

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The animal disease challenges Great Britain faced in 2007 are a stark reminder of our ever-present vulnerability and need for disease prevention and control strategies. The unfortunate 2007 Foot and Mouth Disease outbreak was closely followed by an outbreak of Bluetongue Virus (BT-8) in both sheep and cattle. This very virulent BT-8 strain incursion was the first outbreak of this serotype in this region of the world. The disease impact on this naive livestock population was significant and the financial impact on producers was substantial. Response actions and control of this outbreak of Bluetongue virus is a daunting task. Many of the unanswered questions associated with this outbreak were discussed at a recent CDFA meeting with world-renowned Bluetongue experts, Drs. Bennie Osborne and N. J. MacLachlan from the University of California Davis School of Veterinary Medicine. How did this strain of BT arrive in this region of the world? Why is this BT-8 strain so virulent? Has a new competent vector established itself in this region of the world? What can be done to effectively protect the livestock in this region? As we think about the situation in Great Britain, we should ask ourselves some questions. Are we not equally vulnerable? What can we do to better protect our livestock and to be better prepared to respond to a comparable incursion?

Bluetongue (BT) is a non-contagious, insect-borne viral disease of domesticated and wild ruminants of increased concern worldwide. Severity of the disease differs with the strain of the virus and the species of ruminant affected. Bluetongue virus, an Orbivirus, has twenty-four immunologically distinct serotypes. Midges of the genus Culicoides are the principal vectors for BT, and there are more than 1300 species of Culicoides identified around the world. Specific serotypes and strains of BT evolved around the globe associated with distribution of virus competent Culicoides insect vectors. Typically, BT-affected sheep demonstrate clinical disease that varies in severity from mild to severe. Subclinical or asymptomatic infections generally occur in cattle, goats and most wild ruminants, especially if the serotype is endemic. Cattle are considered reservoirs of the disease.

**Clinical Signs**

- Pyrexia; dyspnea
- Oral erosions and ulcers; drooling
- Lameness with coronitis
- Ocular and nasal discharge; crusting of muzzle
- Edema of the lips, muzzle, head and neck
- Inflammation of skin and mucous membranes
- Hemorrhages into or under the skin

The disease is most prevalent mid summer to early fall due to the seasonal increase in the vector. When diagnosed, Bluetongue has a direct impact on the livestock industry with economic implications associated with international trade restrictions.

In the US, five principal BT serotypes (2, 10, 11, 13 and 17) are found in domesticated and wild ruminants, although additional serotypes have recently been identified. The endemic serotypes may result in mild clinical disease compared to serotypes foreign to this country. Culicoides sonorensis and Culicoides insignis are the major vector species for BT in the US. Bluetongue vaccine for cattle is not available in the US. A USDA licensed modified-live Bluetongue vaccine, serotype 10, is available for use in sheep. Three unlicensed California-registered modified-live
virus Bluetongue Vaccines, serotypes 10, 11, and 17, are exclusively available for producers in California for use in sheep.

Globally, concerns arise for the use of modified-live virus (MVL) Bluetongue vaccines. MLV BT vaccines have been found to induce viremia allowing for potential infection and possible subsequent transmission of MLV BT strains by insects. The magnitude and duration of post vaccination viremia in uninfected animals vaccinated with most MLV BT vaccines remains to be determined. Reassortment of the MLV with field strains could result in development of new viral strains. Additionally, MLV vaccines can result in fetal malformations. Support for development and use of BT vaccines that do not produce a viremia is growing.

Control and eradication of this disease is particularly troublesome. The most advanced diagnostic tests for Bluetongue Virus are not universally available or used. Movement restriction of animals may be based on serologic titers, which may only be indicative of previous exposure and not active disease. The value of movement control and depopulation of animals may be minimal due to the inability to control the vector. Effective vector control strategies may be of limited value and also difficult to maintain. Vaccine control strategies are complicated by the multiple serotypes of the virus and the types and efficacy of Bluetongue vaccines developed to date. The circulation of BT in wildlife further compromises efforts to control this potentially devastating disease.

Global emerging animal diseases will continue to be professionally challenging to veterinarians. The ever-increasing movement of animals and people worldwide raises the potential risk of disease and vector introduction into the US. It is clear that additional Bluetongue research is needed. Our support and investment is required to obtain a better understanding of the variable pathogenesis and virulence of the BTV serotypes. Additionally, the development of more advanced effective vaccines and vaccination protocols seem essential. As vector for both Bluetongue and African Horse Sickness, the recent evidence of specific virus-competent species of *Culicoides* midges detected and adapting to new regions around the globe is a sobering thought. A national surveillance system for insect vectors of Foreign Animal Diseases (FAD), which is currently lacking, should be pursued to enhance the early detection of competent FAD vectors and enable prompt risk assessments and response strategies. Continued dialogue and collaboration between veterinary researchers, regulatory officials, practitioners and animal industry stakeholders is crucial for enhancing the protection of animal health.