

# Bluetongue in small ruminants

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## Abstract

Case descriptions and photographs depicting characteristic symptoms of bluetongue in small ruminants will be presented as well as recommendations for diagnosis, treatment, and prevention of further cases for this insect-transmitted viral disease.

**Key words:** small ruminants, bluetongue, BTV

## Résumé

Une description de cas et des photographies montrant les symptômes caractéristiques de la fièvre catarrhale chez les petits ruminants seront présentées de même que des recommandations pour le diagnostic, le traitement et la prévention de nouveaux cas de cette maladie virale transmise par des insectes.

## Introduction

Bluetongue virus (BTV) is an arthropod-borne Orbivirus from the family Reoviridae that includes both bluetongue virus and epizootic hemorrhagic disease virus. There are currently 26 serotypes of BTV worldwide, and this virus is capable of re-assorting to form new variants. Not all serotypes cause clinical disease, and the virus is transmitted from animal to animal by biting midges of the genus *Culicoides*. BTV can persist long term if the climate and vectors are suitable, and the virus can replicate in a variety of both domestic and wild ruminants without causing clinical disease. Bluetongue is not a zoonotic disease, and based on antibody testing, the virus may infect dogs and a variety of domestic and wild cats.

## Transmission

Incidence of bluetongue correlates with the late summer to early fall vector season. In the southern and western United States, BTV replicates in the red blood cells of infected cattle and sheep, while *Culicoides sonorensis* moves the virus from one infected host to another. BTV may persist in cattle for up to 11 weeks post-infection and may survive over winter in the vector. Virus concentrations are minimal in body fluids, so transmission through aerosol, direct or indirect contact is unlikely. Semen may transmit BTV if the bull or ram is viremic at breeding or collection, while embryo transfer does not transmit disease if the donor is not viremic and the embryos are adequately washed prior to transfer.

## Clinical Signs

Clinical disease is most severe in sheep, while subclinical infection is more typical in cattle, goats, and camelids. The virus has tropism for macrophages and endothelial cells. Infected sheep develop high fever of 105 to 107°F (40.5 to 41.6°C) followed by salivation, hyperemia of the oral mucosa, oral ulcers, and frothing at the mouth. The early serous nasal discharge turns mucopurulent, and the muzzle, ears, head, and neck become edematous. Inflammation of the coronary band may lead to lameness with recumbency due to pain. The *Culicoides* spp vector season coincides with testicular growth and engorgement prior to the sheep breeding season, so males may exhibit pain and lameness due to testicular swelling. Bluetongue in sheep is characterized by high morbidity and lower mortality.

The reproductive effects of bluetongue depend on the stage of pregnancy at the time of infection. Early embryonic death may occur with return to estrus, and later fetal infection may lead to congenital defects in the developing brain, mummification, arthrogryposis, and occasionally abortion. Due to fever and engorgement of the testicles, most males experience transient infertility, while others suffer permanent sterility.

Clinical signs in cattle are rare but may include fever, hyperemia of the muzzle, salivation, oral vesicles and ulcers, lameness, and abortion or delivery of abnormal calves. Bluetongue in white tail deer is characterized by fever, depression, anorexia, pulmonary edema and hemorrhage throughout the body. Pronghorn antelope may die suddenly following decrease in appetite and activity and recumbency, yet neither elk nor mule deer develop symptoms when purposefully infected. The few reported clinical cases in camelids exhibited hiccup-like breathing, anorexia, frothing at the mouth due to pulmonary edema, weakness, recumbency, and death in 24 hours. Pregnant dogs may abort or deliver stillborn pups and then die within 3 to 7 days.

## Postmortem Lesions

Animals dying from bluetongue exhibit hyperemia, hemorrhage, erosions throughout the gastrointestinal tract, heart petechiae, focal necrosis of the cardiac papillary muscle, pulmonary edema, pleural and pericardial effusion, and edema in the muscles and fascia. The cause of death is respiratory failure due to pulmonary edema. Aborted fetuses and newborns may exhibit cavitating lesions in the brain, hydranencephaly, porencephaly, retinal dysplasia, and skeletal abnormalities.

### **Diagnosis**

BTV can be isolated from blood, spleen, lymph nodes, and bone marrow. Detectable bluetongue antibodies develop within 7 to 14 days post-infection and can be identified by PCR, ELISA, or AGID tests. PCR and ELISA can be used to determine serotype and to differentiate bluetongue from epizootic hemorrhagic disease of deer, and an indirect ELISA test can be used on milk samples.

### **Treatment**

Supportive therapy forms the basis of treatment for bluetongue. Affected animals should receive soft food and warm water while being housed in deeply bedded appropriate shelter out of the wind and wet. Systemic flunixin meglumine administered once daily reduces fever and provides pain relief. Daily injections of bactericidal antibiotics such as procaine penicillin G or ceftiofur prevent secondary bacterial infections. Supplemental thiamine and niacin may stimulate appetite and support glucose production. Males who survive bluetongue should be semen tested prior to using them in a breeding program.

### **Prevention and Control**

Prevention of bluetongue is dependent on controlling the vector. *Culicoides* spp are found near water sources so eliminate standing water, prevent seepage around water devices, and remove dirty bedding as a breeding habitat. Housing sheep inside an enclosed barn with suitable insect control from dusk to dawn may decrease clinical cases during an outbreak.

Two modified live virus vaccines are currently marketed in the United States. Colorado Serum Company produces a bluetongue serotype 10 vaccine that is distributed nationwide, while the California Wool Growers Association created a serotype 10, 11, and 17 vaccine that is limited to use only in California. Both vaccines are serotype-specific, and there is no cross protection provided against other serotypes.