

Blue Tongue Virus and FBS

DESCRIPTION OF THE VIRUS: BLUETONGUE IS AN INSECT-TRANSMITTED, NON-CONTAGIOUS VIRAL DISEASE THAT AFFECTS DOMESTIC AND WILD RUMINANTS. THE WORST-AFFECTED DOMESTIC SPECIES IS SHEEP. GOATS AND CATTLE USUALLY HAVE MILD, SELF-LIMITING CASES. WHITE-TAIL DEER AND PRONGHORN ARE AMONG THE WILD SPECIES THAT CAN BE AFFECTED BY BLUETONGUE VIRUS. BLUETONGUE DOES NOT AFFECT HUMANS.

OTHER WEB SOURCES ABOUT BLUE TONGUE

- OIE Terrestrial Animal Health Code, Chapter 8.3 Blue Tongue http://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/2010/en_chapitre_blue-tongue.htm
- OIE Technical Disease Card, Bluetongue, http://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/Disease_cards/BLUETONGUE.pdf
- Merck Manual, Bluetongue, http://www.merckmanuals.com/vet/generalized_conditions/bluetongue/overview_of_bluetongue.html
- USAHA "The Gray Book", Bluetongue, <http://www.usaha.org/Portals/6/Publications/FAD.pdf>
- The Center for Food Security and Public Health, Blue Tongue, <http://www.cfsph.iastate.edu/Factsheets/pdfs/bluetongue.pdf>
- Coetzee, Peter, et al. Bluetongue: a historical and epidemiological perspective with the emphasis on South Africa. *Virology Journal* 2012, 9:198, <http://www.virologyj.com/content/9/1/198>

Bluetongue virus (BTV) is an Orbivirus from the Reoviridae family, a non-enveloped, double-stranded RNA virus, measuring 60-80 nm. It is primarily spread by biting insects but can also rarely be transmitted venereally by infected semen and transplacentally from mothers to offspring¹.

The primary insect vector is the biting gnat or midge (*Culicoides* spp.), which exists from tropical to temperate regions worldwide. Large outbreaks of the disease are seen when these gnat populations reach peak numbers. The disease is considered seasonal in areas where insect activity is limited by inclement weather (freezing) and is more prevalent in temperate to tropical areas.

DISTRIBUTION

BTV was first described in South Africa in 1902, and since then there have been a total of 26 serotypes

identified throughout the world. Historically (before 1998), BTV serotypes had been identified in Africa, Asia, South America, North America, the Middle East, India, and Australia (Fig. 1).

However, since 1998, seven of the existing serotypes and one new serotype of BTV (25) were identified in Europe, coinciding with large outbreaks of Bluetongue in sheep and other ruminants. (The European continent serotypes, which do not appear on the map below in Fig. 1, are: 1, 2, 4, 6, 8, 9, 11, 16, and 25)³⁻⁴.

CLINICAL SIGNS

The clinical signs in sheep include high fever; depression; labored breathing; sores or vesicles on the tongue, mouth, or nostrils; lameness associated with laminitis and coronitis of the hooves; facial and tongue edema (swelling), where the disease



Fig. 1 - Distribution of Bluetongue Virus (BTV) serotypes and major vectors. Credit: W. J. Tabachnick, UF/IFAS²

gets its name; loss of wool, weight loss; abortion; and even death.

As mentioned earlier, sheep are the hardest hit domestic species. The degree of susceptibility in sheep varies depending on age, breed, and disease serotype. In flocks infected for the first time, the morbidity (percentage of animals affected) can reach 50-75% and mortality can reach 20-50%.

Again, cattle are not usually affected with clinical signs as badly as sheep, but the *Culicoides* spp. are much more attracted to cattle, and cattle serve as the primary reservoir and amplifying host for the virus as they develop a high level of viremia (high levels of virus in the blood stream)⁵.

Cows that become infected during pregnancy usually abort the embryo, and less frequently, the cow may give birth to a malformed fetus or calf. Early embryonic loss and a decreased reproductive efficiency are more frequently seen than malformed or aborted fetuses⁶.

REGULATORY CONCERNS REGARDING IMPORTED FETAL BOVINE SERUM (FBS)

Even though Bluetongue is widely distributed throughout the world, it is a virus of regulatory concern when

importing and exporting fetal bovine serum (FBS) because the Bluetongue virus crosses the placental barrier, and different serotypes exist in different countries.

European legislation offers two options for the importation of FBS relating to Bluetongue, one of which is treatment with gamma irradiation, heat, or pH change. The other option requires the country of origin to

certify that either: a) there have been no cases of Bluetongue, seropositive animals, or vaccination of animals for Bluetongue in the last 12 months; or b) if seropositive animals are present in the country of origin, the FBS product must be transported directly from the Border Inspection Post (BIP) to the consignee. (Regulation EC No. 294/2013)⁷

The USDA requires safety testing by sheep inoculation of all imported FBS for Bluetongue virus, except for FBS from Canada and New Zealand⁸. It is very rare for the Bluetongue virus to be found in FBS. As an example, during the past 35 years (since 1980), Biowest has exported a total of approximately 2,800 batches (1.4 million liters) of FBS of Mexican and Central American origin to the United States. None of these 2,800 batches of FBS have tested positive for Bluetongue by the USDA.

CONCLUSION

It is very unlikely for BTV to be present in imported FBS because:

- Cows infected with BTV during the first part of pregnancy will normally abort the embryo/fetus.
- Technicians are not allowed to collect blood from dead or malformed fetuses.
- The processing of FBS normally includes gamma irradiation between 25-40 kGy for adventitious contaminants as required by the 9CFR 113.53⁹. ■

REFERENCES

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2. <http://edis.ifas.ufl.edu/in768>
3. <http://www.usaha.org/Portals/6/Proceedings/USAHAProceedings-2011-115th.pdf>
4. <http://www.cfsph.iastate.edu/DiseaseInfo/notes/Bluetongue.pdf>
5. http://www.colorado-serum.com/vets/vol_4/vol4_1.htm
6. <http://www.addl.purdue.edu/newsletters/2002/spring/bluetongue.shtml>
7. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:098:0001:0057:EN:PDF>
8. http://www.aphis.usda.gov/animal_health/lab_info_services/downloads/AmesDiagnosticTestingCatalog.pdf
9. <http://www.gpo.gov/fdsys/pkg/CFR-2012-title9-vol1/pdf/CFR-2012-title9-vol1-sec113-53.pdf>