

## Prevalence of bluetongue virus antibodies in sheep from Distrito Federal, Brazil

### Prevalência de anticorpos contra o vírus da língua azul em ovinos do Distrito Federal

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#### Abstract

The aims of the present study were to determine the prevalence of bluetongue virus (BTV) antibodies in sheep from Distrito Federal. Sera from 606 sheep of 18 herds were submitted to the agar-gel immunodiffusion (AGID) for bluetongue virus antibodies. The prevalences of bluetongue infection found in Distrito Federal were 100% (CI 95%: 84.67 to 100.00) for flocks and 52.37% (389/606) (CI 95%: 35.76 to 68.98) for animals. Thus, data from the present study showed that infection by bluetongue virus is highly widespread in sheep flocks in the Distrito Federal, which intensifies the need for assessments on the impact of this disease in Brazil.

**Key words:** Bluetongue, agar-gel immunodiffusion, Distrito Federal, sheep

#### Resumo

O objetivo deste trabalho foi estimar a prevalência de anticorpos contra o vírus da língua azul (BTV) em rebanhos ovinos do Distrito Federal. Soros de 606 ovinos, pertencentes a 18 propriedades, foram analisados pela técnica de imunodifusão em ágar gel (AGID), para pesquisa de anticorpos contra o BTV. As prevalências de rebanhos e de animais infectados pelo vírus da língua azul no Distrito Federal foram respectivamente de 100% (IC 95%: 84,67% a 100%) e de 52,37% (389/606) (IC 95%: 35,76% a 68,98%). Assim, o presente estudo permite concluir que o vírus da língua azul está amplamente disseminada no rebanho ovino do Distrito Federal.

**Palavras-chave:** Língua azul, imunodifusão em ágar-gel, Distrito Federal, ovinos

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Bluetongue (BT) is a viral disease, not contagious, transmitted by hematophagous insects of the genus *Culicoides*, which notification is mandated by the World Organization for Animal Health (OIE) (2008). The disease has worldwide distribution and is most common in tropical and subtropical climate in the area of 40th N and 35th S (PURSE et al., 2005). Domestic and wild ruminants are susceptible to infection with bluetongue virus (BTV), however the disease has been observed mainly in sheep. The most prominent clinical signs in this species are declining production and mortality (LOBATO, 1999). However, the economic impact associated with this disease stems not only from direct losses in affected herds, but also restrictions on international trade of animals and their products (OIE, 2008).

In Brazil, serological surveys conducted in several states show that the BTV is widespread among the bovine, goat, buffalo and sheep (LAGE et al., 1996; GOUVEIA et al., 2003; COSTA et al., 2006; DIAS et al., 2007; TOMICH et al., 2009; NOGUEIRA et al., 2009; ALVES et al., 2009; SOUZA et al., 2010). The conditions of temperature and humidity prevailing in most of Brazilian territory favor the development and multiplication of the vector (GIBBS; GREINER, 1994). The country has about 14 million sheep, of which approximately one million are in the Midwest Region (IBGE, 2006), but until now, no serological survey for BT in sheep in the region had been described.

Considering the scarcity of studies on the prevalence of bluetongue in Brazilian sheep, especially in the Midwest Region, and the economic impact of this disease, the goal of this study was to estimate the prevalence of BTV infection sheep flocks Federal District.

Data from the sheep farms of the Distrito Federal were obtained from the Technical Assistance and Rural Extension of the Distrito Federal (Emater – DF) and the Secretary of Agriculture from Distrito Federal. Only properties with a minimum of 20 breeding sows in the herd were included in the

study. Thirty-two herds with this characteristic were found in both organs, totaling 4,507 animals. Most of animals sampled were from Santa Inês breed or their crosses. Sampling was conducted in two stages: herds and animals. The sample size of properties was estimated at 17, assuming a confidence level of 95%, 10% error and an estimated prevalence of 10%, for the sampling of animals, the sample size was calculated considering the number of sheep of each flock and assuming a confidence level of 95%, 10% error and estimated prevalence of 50% (NOORDHUIZEN et al., 1997).

Blood of 606 adult sheep of 18 properties in the Federal District was collected by jugular vein puncture in the period from March to June 2004. The sample consisted of all breeding males and a sample of mothers from each flock. Serum was separated and stored at -20°C until the time of analysis. Antibodies against BTV were performed by means of agar-gel immunodiffusion (AGID), as recommended by OIE (2008). The antigen used was produced in the Departamento de Medicina Veterinária Preventiva – Escola de Veterinária (UFMG) second Costa (1999). The prevalence and confidence intervals were calculated and analyzed according to Bennett et al. (1991) and Noordhuizen et al. (1997). This study was approved by the Ethical Committee for the use of Experimental Animals of the Universidade Federal de Minas Gerais, Brazil (CETEA) (Protocol 055/07).

All eighteen properties surveyed for the presence of serum antibodies against BTV showed positive animals proof of the AGID, showing at least three positive animals per herd, which resulted in the prevalence of flocks of 100% (CI 95%: 84.67% to 100%). The prevalence of seropositive animals for BT found in the Distrito Federal was 52.37% (389/606) (CI 95%: 35.76% to 68.98%).

These data indicate a wide BTV circulation in sheep and show that infection is widespread among the properties of the Distrito Federal. This high prevalence of infection by the BTV may result

from the annual average temperature of the Distrito Federal which is 19.8°C, reaching 30.0°C in some months, which may have contributed to the vector propagation and consequent spread of infection. It's clear that environmental factors contribute to the distribution of the virus, the introduction of viral strains and serotype distribution of BTV can be attributed to climatic changes, especially related to temperature, precipitation and wind patterns, affecting the distribution of vectors and hosts (CLAVIJO et al., 2002; PURSE et al., 2005). In addition, the Midwest Region concentrates approximately 34% of the total national herd of cattle, which are the main reservoir of the BTV and develop prolonged viremia (PURSE et al., 2005). Thus, the proximity of the beef and sheep herds favors the persistence and spread of disease.

High frequency of positive sheep for BTV were also reported in other states, Gouveia et al. (2003) found that 95% of the 436 flocks sampled had positive animals and 44.5% (964/2168) of goats and 53.8% (769/1429) of sheep studied were positive in Minas Gerais State. In Ceará, Dias et al. (2007) found 27.31% (74/271) of seropositive sheep in 11 of 16 properties surveyed (68.8%). The great occurrence of BTV found in this study and in others serological surveys are not associated with reports of clinical cases of disease in the field in the most of cases. The absence of clinical manifestations of disease may be due to differences in susceptibility among sheep races or differences in pathogenicity among BTV serotypes (COSTA, 1999; PURSE et al., 2005). Although multiple BTV serotypes circulate in South America without occurrence of clinical disease, in 2001 and 2002, four outbreaks of this disease in Paraná State were reported to the OIE, clinical cases occurring in goats and sheep, with isolation of serotype 12 (CLAVIJO et al., 2002; LAGER, 2004). So, assessments on the real impact of this disease in Brazil are necessary.

The present study indicates that the bluetongue is widespread in sheep flocks from Distrito Federal.

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## References

- ALVES, F. A. L.; ALVES, C. J.; AZEVEDO, S. S.; SILVA, W. W.; SILVA, M. L. C. R.; LOBATO, Z. I. P.; CLEMENTINO, I. J. Soroprevalência e fatores de risco para língua azul em carneiros das mesorregiões do Sertão e da Borborema, semi-árido do Estado da Paraíba, Brasil. *Ciência Rural*, Santa Maria, v. 32, n. 2, p. 84-489, 2009.
- BENNETT, S.; WOODS, T.; LIYANAGE, W. M.; SMITH, D. L. A simplified general method for cluster-sample surveys of health in developing countries. *Rapport Trimestriel Sanitaire Mondiales*, Geneva, v. 44, n. 3, p. 97-106, 1991.
- CLAVIJO, A.; SEPULVEDA, L.; RIVA, J.; PESSOA-SI, M.; TAILOR-RUTHES, A.; LOPEZ, J. W. Isolation of bluetongue virus serotype 12 from outbreak of the disease in South America. *Veterinary Records*, London, v. 151, n. 10, p. 301-302, 2002.
- COSTA J. R. R. *Língua azul: produção e padronização de antígeno para prova de imunodifusão em gel de ágar e prevalência nas mesorregiões sudoeste e sudeste do estado do Rio Grande do Sul*. 1999. Dissertação (Mestrado em Ciência Animal) – Escola de Veterinária. Universidade Federal de Minas Gerais, Belo Horizonte, MG.
- COSTA, J. R. R.; LOBATO, Z. I. P.; HERRMENN, G. P.; LEITE, R. C.; HADDAD, J. P. A. Prevalência de anticorpos contra o vírus da Língua azul em bovinos e ovinos do sudoeste e sudeste do Rio Grande do Sul. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, Belo Horizonte, v. 58, n. 2, p. 273-275, 2006.
- DIAS, R. P.; OLIVEIRA, A. A. F.; PINHEIRO, A. A.; BRITO, R. L. L.; FARIAS, D. A.; ARAGÃO, M. A. C.; PINHEIRO, R. R. Soroprevalência da Língua Azul em

- rebanhos ovinos de sete municípios do estado do Ceará, Brasil. *Archives of Veterinary Science*, Curitiba, v. 12, n. 4, p. 272-273, 2007.
- GIBBS, E. P. J.; GREINNER, E. C. The epidemiology of bluetongue. *Comparative Immunology, Microbiology & Infectious Diseases*, Oxford, v. 17, n. 3-4, p. 207-220, 1994.
- GOUVEIA, A. M. G.; LIMA, F. A.; LOBATO, Z. I. P.; ABREU, C. P.; LAENDER, J. O.; TOLEDO, E.; CYPRESTE, B. M. Língua azul em ovinos e caprinos em Minas Gerais. In: CONGRESSO LATINOAMERICANO DE BUIATRIA, 11; CONGRESSO BRASILEIRO DE BUIATRIA, 5; CONGRESSO NORDESTINO DE BUIATRIA 3., 2003, Salvador, BA. *Anais...* Salvador: Associação Brasileira de Buiatria, 2003. p. 51.
- INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA – IBGE. *Sistema IBGE de recuperação automática – Sidra. Pesquisa pecuária municipal*. 2006. Disponível em: <<http://www.sidra.ibge.gov.br/bda/pecua/default.asp?t=2&z=t&o=23&u1=1&u3=1&u4=1&u5=1&u6=1&u7=1&u2=6>>. Acesso em: 10 jul. 2010.
- LAGE, A. P.; CASTRO, R. S.; MELO, M. I.; AGUIAR, P. H.; BARRETO FILHO, J. B.; LEITE, R. C. Prevalence of antibodies to bluetongue, bovine herpesvirus 1 and bovine viral diarrhoea/mucosal disease viruses in water buffaloes in Minas Gerais state, Brazil. *Revue d'Elevage et de Medecine Veterinaire des Pays Tropicaux*, Paris, v. 49, n. 3, p. 195-197, 1996.
- LAGER, I. A. Bluetongue virus in South America: overview of viruses, vectors, surveillance and unique features. *Veterinaria Italiana*, Teramo, v. 40, n. 3, p. 89-93, 2004.
- LOBATO, Z. I. P. Língua azul: a doença nos bovinos. *Revista Brasileira de Reprodução Animal*, Belo Horizonte, v. 23, n. 4, p. 515-523, 1999.
- NOGUEIRA, A. H. C.; PITUCO, E. M.; ESTEFANO, E.; CURSI, V. C. L. M.; CARDOSO, T. C. Detecção de anticorpos contra o vírus da língua azul em ovinos na região de Araçatuba, São Paulo, Brasil. *Ciência Animal Brasileira*, Goiânia, v. 10, n. 4, p. 1271-1276, 2009.
- NOORDHUIZEN, J. P. T. M.; FRANKENA, K.; VAN DER HOOFF, C. M.; GRAAF, E. A. M. *Application of quantitative methods in veterinary epidemiology*. Wageningen: Wageningen Pers, 1997. 445 p.
- PURSE, B. V. B. V.; MELLOR, P. S.; ROGERS, D. J.; SAMUEL, A. R.; MERTENS, P. P. C.; BAYLIS, M. Climate change and the recent emergence of bluetongue in Europe. *Nature Reviews Microbiology*, London, v. 3, n. 2, p. 171-181, 2005.
- SOUZA, T. S.; COSTA, J. N.; MARTINEZ, P. M.; COSTA NETO, A. O.; PINHEIRO, R. R. Anticorpos contra o vírus da língua azul em rebanhos ovinos da microrregião de Juazeiro, Bahia. *Arquivos do Instituto Biológico*, São Paulo, v. 77, n. 3, p. 419-427, 2010.
- TOMICH, R. G. P.; NOGUEIRA, M. F.; LACERDA, A. C. R.; CAMPOS, F. S.; TOMAS, W. M.; HERRERA, H. M.; LIMA-BORGES, P. A.; PELLEGRIN, A. O.; LOBATO, Z. I. P.; SILVA, R. A. M. S.; PELLEGRIN, L. A.; BARBOSA-STANCIOLLI, E. F. Sorologia para o vírus da língua azul em bovinos de corte, ovinos e veados campeiros no Pantanal sul-mato-grossense. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, Belo Horizonte, v. 61, n. 5, p. 1222-1226, 2009.
- WORLD ORGANISATION FOR ANIMAL HEALTH – OIE. *Manual of diagnostic tests and vaccines for terrestrial animals*. 2008. Disponível em: <<http://www.oie.int>>. Acesso em: 15 jul. 2010.