


Nervous form of listeriosis in cattle

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ABSTRACT

Listeriosis is an infectious disease of bacterial origin, widely distributed in the world, which mainly affects small ruminants. The clinical and pathological aspects of listeriosis in cattle in the Sertão of Paraíba are described. From 2003 to 2023, the Animal Pathology Laboratory of the Federal University of Campina Grande performed 1,272 necropsies of cattle, of which 159 (12.50%) were diagnosed with diseases that affected the central nervous system (CNS) and of these, two cases were attributed to listeriosis (1.25%), being crossbreds, one female (Bovine 1) and one male (Bovine 2), aged 5 years and 18 months respectively. Bovine 1 came from the municipality of Patos, while Bovine 2 was from the municipality of Piancó, both located in the Sertão da Paraíba, raised in a semi-extensive regime. Both animals showed nervous symptoms, Bovine 1 initially receiving the presumptive diagnosis of rabies. Macroscopically, no lesions were observed in the CNS. Microscopically, in Bovine 1, microabscesses were observed characterized by moderate multifocal to coalescent areas of neutrophilic infiltrate without capsular involvement, moderate mononuclear infiltrate with rare neutrophils around vessels (cuffs) and a discrete amount of axonal spheroids in the medulla oblongata region, in addition to discrete lymphoplasmacytic infiltrate in the meninges of the occipital cortex and cerebellum. The microscopic lesions observed in Bovine 2 were similar, varying in intensity and location. The diagnosis was based on epidemiological, clinical and histopathological findings. The nervous form of listeriosis occurs rarely in cattle in the hinterland of Paraíba, and may present nonspecific clinical alterations and be confused with other pathologies of the CNS of cattle.

Keywords: Bovine diseases, Central nervous system, Bacterial diseases, Microabscesses.

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INTRODUCTION

Listeriosis is an infectious disease of bacterial origin, widely distributed in the world, which mainly affects small ruminants (Cruz 2008). The disease is caused by bacteria of the genus *Listeria*, two species of greater importance in veterinary medicine: *L. monocytogenes*, frequently reported in cases of meningoencephalitis in ruminants; and *L. ivanovii*, associated with cases of abortions in sheep and cattle (Schild 2007). Infection in the nervous form is commonly related to the consumption of poor quality silage associated with previous lesions in the oral cavity, in addition to inflammatory processes, such as periodontitis (Schild 2007). The bacterium ascends via sensory axons using retrograde axonal transport to the trigeminal ganglion until it reaches the brain/medulla or via the motor portion of the fifth pair of cranial nerves until it reaches the midbrain and medulla oblongata. Macroscopic lesions are not usually observed in this form of the disease (Rissi *et al.*, 2010). The objective of the present study was to describe cases of the nervous form of listeriosis in cattle, emphasizing its epidemiological, clinical and pathological aspects.

MATERIAL AND METHODS

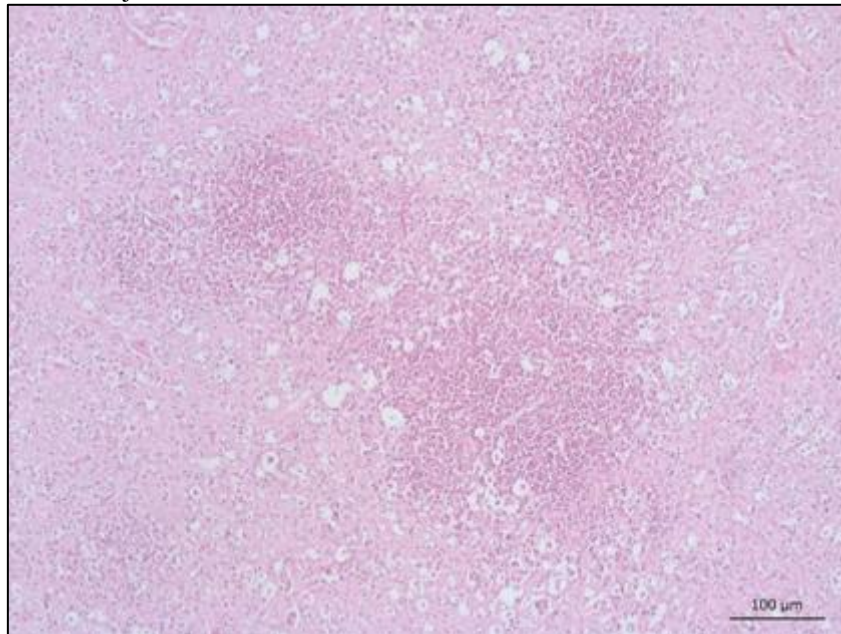
A retrospective study was carried out in search of confirmed or suspected cases of the nervous form of listeriosis in cattle. To this end, epidemiological, clinical, and pathological data were obtained after reviewing the protocols of bovine necropsies performed at the Animal Pathology Laboratory of the Veterinary Hospital of the Center for Rural Health and Technology of the Federal University of Campina Grande (LPA/HV/CSTR/UFCG), from January 2003 to December 2023. Information was obtained regarding the age, sex, breed, time of year and origin of the animal, in addition to clinical signs, macroscopic and histopathological changes. The histological slides were reviewed and, when necessary, new slides were made from the paraffin or formaldehyde material.

RESULT

During the study period, 1,272 cattle were necropsied at the LPA of UFCG, of which 159 (12.50%) were diagnosed with diseases that affected the central nervous system (CNS). Of these, two cases were diagnosed as listeriosis (1.25%). Regarding the epidemiological data, the animals were crossbred, one was female (bovine 1) and the other male (bovine 2), aged 5 years and 18 months respectively. Cattle 1 came from the municipality of Patos and was diagnosed in May 2004. Bovine 2 was from the municipality of Piancó, diagnosed in June 2009, both located in the hinterland of Paraíba. Both were raised in the semi-extensive regime, but did not receive silage. Bovine 1 presented apathy, staggering gait, sternal decubitus, head turned to the flank, nystagmus, strabismus, congested episcleral vessels, lingual paralysis, motor incoordination and tail paralysis, which initially resulted in a presumptive diagnosis of rabies. Bovine 2 presented walking in circles, motor

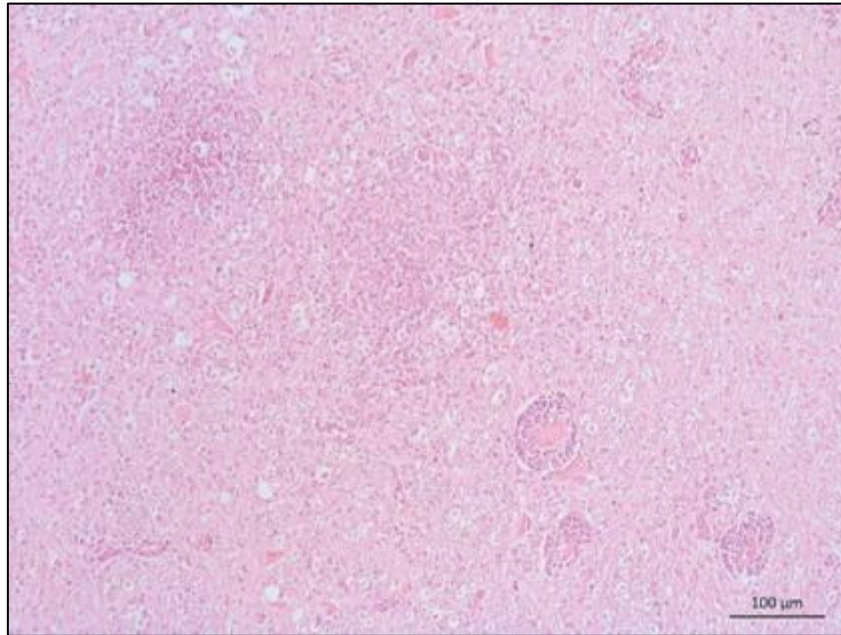
incoordination, salivation, lip ptosis, lateral decubitus and decreased anal reflex. Macroscopically, no lesions were observed in the CNS. Microscopically, in bovine 1, microabscesses were observed characterized by multifocal to coalescent areas of inflammatory infiltrate consisting of intact and degenerated neutrophils (Fig.1), there was also moderate mononuclear infiltrate, with rare neutrophils, around vessels (cuffs) and a discrete amount of axonal spheroids in the region of the medulla oblongata (Fig.2), in addition to a discrete lymphoplasmacytic infiltrate in the meninges of the occipital cortex and cerebellum. The microscopic lesions observed in bovine 2 were similar, varying in intensity and location, which were accentuated and affected the medulla oblongata, with moderate spheroids and meningitis absent.

Figure 1. Bovine, medulla oblongata cross-section at pons level, multifocal to coalescent areas of neutrophilic infiltrate forming microabscesses. HE, obj.5x.



Source: LPA-FOCG.

Figure 2. Bovine, medulla oblongata, mononuclear infiltrate with rare neutrophils around vessels (cuffs) and axonal spheroids. HE, obj.5x.



Source: LPA-FOCG.

DISCUSSION

The diagnosis was based on epidemiological, clinical and histopathological findings. The nervous form of listeriosis in cattle affects animals of varying ages, usually young adults up to 2 years old (Rissi *et al.*, 2006; Konradt *et al.*, 2017). In the present study, one of the animals was 5 years old, however, there are no studies that prove the relevance of the age group for the occurrence of the disease (Morin 2004). In addition, no predisposition by races and genders is observed (Konradt *et al.*, 2017), even though there is no contradiction, the casuistry in this report does not allow us to infer this observation. The animals were raised in a semi-extensive regime, but did not receive silage, which when of poor quality is considered one of the main sources of infection in ruminants, as reported in other countries and in Rio Grande do Sul (Barlow; McGorum 1985; Barros *et al.*, 2006; Rissi *et al.*, 2006; Schild 2007). Thus, an environmental infection is suggested in the two reported cattle. The cases occurred during the rainy season, similar to those observed in other countries during the winter (Barlow; McGorum 1985). The clinical signs observed in the two animals were mainly related to lesions in the brainstem and cranial nerves, which is consistent with the cases described in the literature (Rissi *et al.*, 2006; Oevermann 2010; Rissi *et al.*, 2010; Walland *et al.*, 2015). It is important to emphasize that the clinical symptomatology is not pathognomonic and, therefore, other differential diagnoses such as rabies, polioencephalomalacia, meningitis, coenurosis and otitis should be considered (Schild 2007). No macroscopic lesions were observed in the CNS, which is consistent with the findings of Rissi *et al.* (2006). The diagnosis of cases of the nervous form of listeriosis in this study was based on the histopathological alterations characteristic of the disease, mainly due to the visualization of microabscesses associated with the perivascular cuffs. The microscopic lesions



observed in cases of listeriosis nervosa in cattle are like those observed in sheep and goats, and are often located in the rhombocephalon, especially the medulla oblongata (Konradt *et al.*, 2017).

CONCLUSION

The nervous form of listeriosis occurs rarely in cattle in the hinterland of Paraíba, and is characterized by varied neurological manifestations and microabscesses formations in the brainstem. Depending on the evolution of the disease, clinical changes may be nonspecific and confused with other pathologies of the central nervous system of cattle.

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