

A bothersome bacteria

By Hania Klobukowska

An overview of listeria-associated diseases in ruminants.

List^{er}ia organisms are Gram-positive, non-spore-forming coccobacillary to rod-shaped saprophytes that are ubiquitously found in plant-soil-rich environments. They can grow in a wide variety of temperatures (3–45°C) and have been isolated from several mammal and bird species, as well as sewerage, milk products, feedstuffs, water, silage and soil.

The genus *Listeria* comprises several species, of which the most important human and animal pathogen is *Listeria monocytogenes*. *L. monocytogenes* is very resistant in the environment and can survive for months in soil. Most cases of listeriosis are associated with feeding cattle or sheep poorly preserved baleage or silage. Silage that

is properly made and has a low pH will inhibit the proliferation of *listeria* organisms already present; however, if the pH increases there is increased proliferation of the organism. Disease may also be seen in animals grazing pasture alone.

Listeriosis is considered a sporadic disease, but sometimes small outbreaks occur. Disease is common during periods when supplementary feed is used. Several disease syndromes are associated with *L. monocytogenes* and it is important to note that these are considered to have separate pathogeneses and are very unlikely to co-exist in one animal at the same time. The nervous form of listeriosis is the most common manifestation in cattle and sheep, with occasional abortions attributed to the organism. Enteric listeriosis is even less common and predominantly seen in sheep.

Nervous listeriosis

Probably the most well-known form of listeriosis is the nervous form. Cattle and sheep with head-tilt, circling or unilateral facial paralysis symptoms are generally easily identified and a presumptive diagnosis can often be made on the identification of these symptoms alongside a history of supplementary feeding. The suggested pathogenesis involves the inoculation of oral or nasal mucosal wounds by the bacterium, which then allows the bacterium to migrate via cranial nerves to the brainstem (Cantile and Youssef, 2016). The clinical symptoms displayed by the animal are dependent on which cranial nerve is affected.

Antemortem diagnosis generally involves a thorough clinical assessment with a localisation of nervous symptoms to unilateral cranial nerve deficits.

Culturing the potential source material is generally considered of little value as silage and baleage are already expected to contain *listeria* organisms, even when ensiled under optimum conditions.

A definitive diagnosis is obtained through histopathology of the brainstem, which contains multifocal microabscesses with intralésional gram-positive coccobacilli or rod-shaped organisms.

Differential diagnoses for nervous listeriosis include otitis media, pituitary abscesses, trauma and other central nervous system diseases.



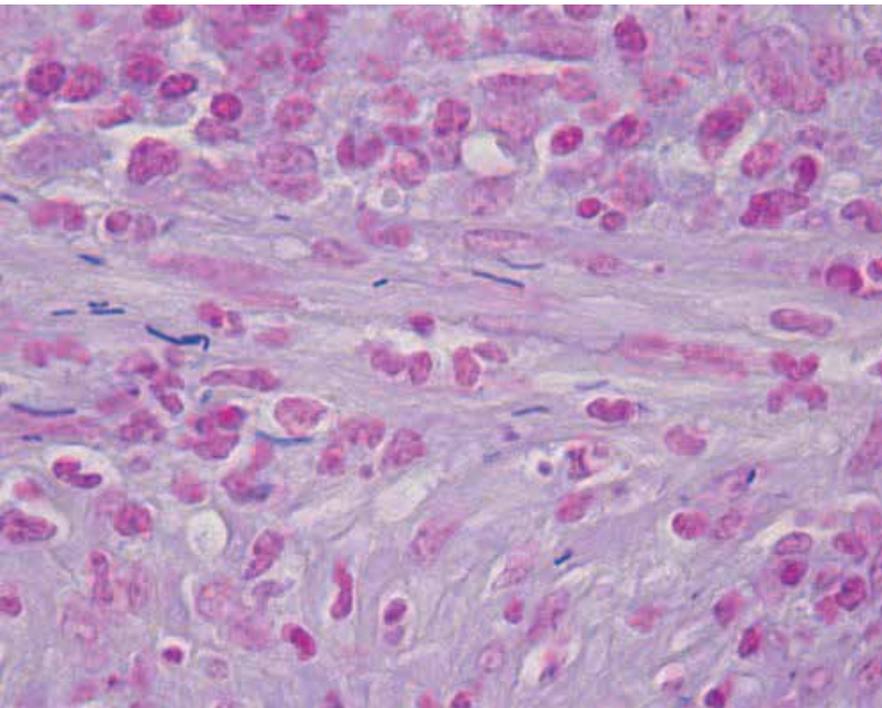


FIGURE 1: Caecum from a sheep showing Gram-positive rods within myocytes of the muscularis mucosa. Gram stain. 400X

Abortion due to *L. monocytogenes* and *L. ivanovii*

Both *L. monocytogenes* and *L. ivanovii* are implicated in causing abortion in sheep and cattle; however, in cattle most cases are attributed to *L. monocytogenes*. *L. ivanovii* is not uncommonly reported in sheep cases. As for nervous listeriosis, dams who are fed poorly ensiled supplementary feed are at risk. The route of infection is generally considered oral where the bacteria gain access to systemic circulation. The bacteria have a predilection for the placenta.

Listeria abortions are generally sporadic; however, they may occur as small outbreaks. Abortions are generally seen in the third trimester but earlier abortions may occur. Weak lambs who die soon after being born may also be a manifestation of the disease and contribute to perinatal mortality rates. Maternal sickness and death are rare occurrences.

Diagnosis is through culture or PCR detection of the organism in fetal stomach contents, lung and liver, and the presence of characteristic histological lesions of placentitis and hepatitis with gram-positive intralésional organisms (Reichel et al., 2018).

Note that, as mentioned previously, animals do not generally present with both forms of listeriosis concomitantly. However, outbreaks of both abortion and nervous listeriosis can occur in the same flock.

***Listeria* organisms are zoonotic and caution should always be exercised when handling material from suspected clinical cases.**

Enteric listeriosis

This is a relatively uncommon manifestation of *listeria* that is sporadically reported in New Zealand. It is more common in sheep than in cattle and may present with sudden death or severe abomasitis and enterocolitis. Salmonellosis is an important differential in such cases as it can present with very similar clinical symptoms. As already mentioned, disease outbreaks generally coincide with feeding supplementary feed.

Definitive diagnosis is through histopathology of sections of the gastrointestinal system. The histology (Figure 1) is unique as the organism targets the muscularis mucosae (Fairley et al., 2012).

The culture of intestinal contents or faeces is of little use as *listeria* is commonly isolated from the gastrointestinal tract of healthy and diseased animals.

Zoonotic risk

Lastly, *listeria* organisms are zoonotic and caution should always be exercised when handling material from suspected clinical cases. Handling aborted fetuses is particularly hazardous. Listeriosis in humans is rare; however, the disease can be quite devastating and include miscarriage and stillbirth in pregnant women, neonatal infection and fatal meningitis and septicaemia. ⁹⁹

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