# Control of Important Clostridial Diseases of Sheep

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**KEYWORDS**

• Clostridia • Goat • Sheep • Sudden death • Toxins
• Trigger factors • Vaccines

Clostridial diseases have affected sheep ever since these animals were first domesticated. James Hogg,[1] the Ettrick shepherd, writing in 1807 described diseases that were clearly those we now recognize as caused by clostridia. The early part of the last century saw flocks decimated by clostridial disease. Huge losses occurred wherever sheep were farmed. In Scotland, lamb dysentery and braxy predominated, in Wales, black disease and in England, pulpy kidney and enterotoxemias were common. Disease caused by clostridia can be broadly divided into 4 groups: those affecting the alimentary system (the enterotoxemias), those affecting the parenchymatous organs, those causing myonecrosis and toxemia, and those causing neurologic disorders (**Table 1**). While this is a convenient generalization, many members of the clostridial family can be implicated as causing diseases in more than one group. Ten species of clostridia are involved in disease processes in sheep.

The clostridia are anaerobic rod-shaped bacteria, usually with rounded ends. The bacteria vary in length from 3 to 10 μm and in width from 0.5 to 1.5μm. All clostridial species have the ability to form spores, all with their own specific morphology. Clostridia stain gram-positive, but pleomorphism can occur and, in particular in old cultures, they will stain gram-negative. Most organisms require a trigger factor to induce rapid multiplication; in the process they release powerful exotoxins, which damage and destroy vital organs of the host. Some clostridia produce toxins and are also invasive. Variability exists between strains of the same species in their ability to produce toxin. In some cases, certain strains may be nontoxin producers whereas others produce large quantities of lethal toxin. This variation complicates diagnosis, and the presence of the bacteria alone does not indicate that it is responsible for the ensuing death. The gross postmortem lesions and the detection of the respective toxin are keys to successful diagnosis.

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**Table 1**
**Clostridial diseases of sheep**

| Organism | Associated Disease | Comment |
|---|---|---|
| The enterotoxemias | | |
| *C perfringens* type A | Enterotoxemia | Increasingly incriminated in young lambs; worldwide significance |
| *C perfringens* type B | Lamb dysentery and hemorrhagic enteritis | Worldwide prevalence, except in New Zealand and Australia |
| *C perfringens* type C subtype 1 | "Struck" | Prevalent in the UK in adult sheep; prevalent in Australia in lambs |
| *C perfringens* type C subtype 2 | Necrotic enteritis | Only reported in USA |
| *C perfringens* type D | "Pulpy kidney disease" | All ages of sheep affected; worldwide significance |
| *C septicum* | "Braxy" | Prevalent in the UK and Scandinavia, occurring in weaned lambs and shearlings during the autumn; no clinical disease reported in New Zealand, despite similar climatic conditions |
| *C sordellii* | Abomasitis and toxemia syndrome | Acute abomasitis in lambs and toxemia in older sheep; prevalent in the UK and New Zealand |
| Clostridial diseases affecting parenchymatous organs | | |
| *C novyi* type B | "Black" disease | Mainly occurring in adult sheep; worldwide prevalence |
| *C haemolyticum* (*C novyi* type D) | Bacillary hemoglobinuria | Sporadic occurrence in the UK and Ireland |
| Clostridial diseases presented with myonecrosis and toxemia | | |
| *C chauvoei* | Blackleg, blackquarter, postparturient gangrene, malignant edema | Worldwide prevalence, but more significant in hotter climates |
| *C novyi* type B | Big head and malignant edema | More frequent in rams in hotter climates |
| *C perfringens* type A | Malignant edema | Rare; usually in multiple infections |
| *C septicum* | Malignant edema | Rare in Europe; well documented in Australia and USA |
| *C sordelii* | Malignant edema | Prevalent in USA and New Zealand |
| Clostridial neurotropic diseases | | |
| *C botulinum* type C and type D | Botulism | Prevalent in South Africa and Australia, under drought conditions; in the UK, consequent to consumption of poultry litter |
| *C tetani* | Tetanus | Worldwide prevalence, mainly in lambs |
| *C perfringens* type D | Focal symmetric encephalomalacia | Worldwide prevalence |

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