

# Enterotoxemia in small ruminants

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## Abstract

Enterotoxemia due to toxin production from *Clostridium perfringens* type C and D is reported to be the most common cause of unnatural death in small ruminants. This session addresses clinical signs, diagnostic challenges, treatment, and vaccination strategies to prevent further cases.

**Key words:** sheep, goats, small ruminants, enterotoxemia, clostridium, camelids

## Résumé

L'entérotoxémie causée par la production d'une toxine de *Clostridium perfringens* du type C et D est considérée comme la cause de mort subite la plus fréquente chez les petits ruminants. Cette session aborde les signes cliniques, les défis du diagnostic, le traitement et les stratégies de vaccination afin de prévenir de nouveaux cas.

## Introductions

Type A, C, and D *Clostridium perfringens* are gram-positive, spore-forming, motile, facultative anaerobic rod bacteria that are considered to be part of the normal gastrointestinal microflora in a wide variety of species. Changes in diet, stress, water, environment, and even weather cause these bacteria to proliferate in highly fermentable carbohydrate intestinal contents. When these bacteria overgrow, they elaborate alpha, beta, and epsilon enterotoxins, which slow gastrointestinal motility and allow more time for both production and absorption of toxin. Other digestive tract diseases such as ulcers, giardia, coccidia, and nematodes may predispose small ruminants to enterotoxemia.

## Clinical Signs

Clinical symptoms of enterotoxemia vary greatly but are often described as peracute, acute, and chronic depending on how rapidly symptoms develop. Animals with the peracute form may be found dead or may exhibit sudden loss of appetite, severe depression, abdominal distension, vocalization, weakness, recumbency, and coma before death. Neonates may demonstrate subnormal temperature, rapid pulse, injected sclera, a cold clammy mouth, and lateral recumbency within a day or 2 of birth and die within a few hours. Older, previously vaccinated animals more slowly develop signs of diarrhea, acidosis, and dehydration following feed or environmental changes. Occasionally, adult animals in herds with

a history of peracute or acute cases exhibit a chronic form characterized by repeated bouts of inappetence, listlessness, and pasty feces with decreased milk production if lactating.

## Species Differences

*Clostridium perfringens* is associated with fatal 3<sup>rd</sup> compartment gastritis and enteritis in both neonatal and adult camelids. Outbreaks of enterotoxemia in camelids are associated with damp weather due to an increase in parasites, particularly coccidiosis in young llamas and alpacas. Crias are more commonly affected than adults and may have a very high death rate due to severe co-infection with *Eimeria macusaniensis*. Clinical signs in camelids include severe depression, shock, colic, abdominal distension, fever, as well as fetid or hemorrhagic diarrhea if the sick camelid lives more than 12 hours. Type A enterotoxemia is more common in both camelids and cervids, and affected animals are often found dead within 12 hours after onset of symptoms.

## Diagnosis

Diagnosis of enterotoxemia is based on history, recognition of classic clinical symptoms and response to treatment. No antemortem tests exist to confirm the diagnosis in live animals, although radiography and ultrasonography may show gaseous distended bowel loops with thickened gastrointestinal wall. Animals that fail to respond to therapy should be necropsied to confirm the diagnosis. Postmortem examination reveals pulmonary edema, pericardial effusion, hemorrhagic thickened gastrointestinal mucosa, gaseous distension of the bowel, and possibly internal parasites.

## Treatment

Most cases of enterotoxemia are treated based on classic signs. Bactericidal antibiotics such as intramuscular procaine penicillin G at 10,000 iu/lb (22,000 iu/kg) body weight administered once daily kill the bacteria and stop production of gas and toxin. Commercially available *Clostridium perfringens* type C and D antitoxin may be administered intravenously in peracute cases or subcutaneously in acute or chronic cases with a loading dose of 20 mL that may be repeated every 4 to 6 hours until the animal stabilizes. Administration of non-steroidal anti-inflammatory drugs such as flunixin meglumine at 1 mL/50 lb (22.7 kg) is recommended to counteract the toxins as well as relieve the intense pain associated with gaseous distension of the intestinal tract. When co-infection with coccidia is suspected or diagnosed,

treatment with a fast-acting coccidiostat is appropriate, and a coccidiosis prevention program should be instituted.

### **Prevention and Control**

Experienced small ruminant producers vaccinate pregnant females 30 days prior to parturition to protect both the dams and the neonates who consume high levels of protective antibodies present in colostrum. Due to the longer and less predictable alpaca gestation length of 345 days plus or minus 30 days, camelid producers vaccinate pregnant females 45 to 56 days prior to anticipated parturition. Breeding males should be vaccinated annually 30 days prior to introduction into the female population, and non-reproducing small ruminants should be vaccinated at least annually. Many small

ruminant veterinarians recommend vaccinating against enterotoxemia twice yearly due to concern that antibodies may last only 4 to 6 months. Not all CDT vaccines are created equal, so choose a product licensed and labeled for use in sheep and goats, and follow manufacturer recommendations for dose, location for administration, and frequency of use. When an outbreak of enterotoxemia occurs, other animals housed in the same environment should be re-vaccinated, and the total diet should be carefully scrutinized to prevent future losses.