Enterotoxaemia is a severe disease affecting sheep, it less frequently affects goats and is rarely seen in cattle. The disease is caused by the bacterium *Clostridium perfringens* (usually type C and D) which are naturally present in the intestinal passage of the duodenum the animal. When the animal’s digestive system is upset, generally from overfeeding or rapid ration change, the bacteria multiply so rapidly that they produce a strong, highly lethal epsilon toxin. Absorption of this toxin leads rapidly to diarrhoea, convulsions and death. Death may occur so quickly that diarrhoea is never exhibited. Generally the healthiest, fastest growing animals are affected first.

As stated above, animals most at risk are generally young, rapidly growing unweaned or newly weaned lambs on lush pasture or grain.

Before the sheep have time to adjust to a new ration, the bacterium *Clostridium perfringens* build up when there is a sudden change to low-fibre/high-carbohydrate, such as a feedlot/grower ration where the food is high in starch, and the bacterium can use the starch as a substrate. The fact that the starch is the bacterium’s preferred substrate is the link to the disease and lush pasture/high grain diets and animals with high growth rates.

Older sheep can also be affected by pulpy kidney, and are most at risk just after they have gone onto good feed off poor feed.

The pungent smelling annual weed, Stinkwort (*Dittrichia graveolens*), may predispose sheep to the disease due to the barbed hairs on the plant which damage the intestine and enable increased toxin absorption.

**Diagnosis**

Post mortem signs from pulpy kidney are not as specifically diagnostic as other ailments such as fly strike or bloat. It is important to examine the contents of the gut as soon after death as possible as the carcase decomposes quickly (within a few hours).

On post-mortem, hemorrhages will be found under the skin as well as on the heart and kidney; there may be straw coloured or blood-tinged fluid with jelly-like clots in the sac around the heart; the small intestines will tear easily and their contents are sparse and creamy; the carcase decomposes within a few hours of death; the kidneys usually decompose more rapidly than the other organs and become dark and jelly-like (“pulpy kidney”), however animals can die from the disease without the kidneys becoming pulpy.
Enterotoxaemia/Pulpy Kidney

Treatment
There is no specific treatment for an animal affected by pulpy kidney. A veterinarian may be able to prescribe treatment for a valuable animal however the prognosis if often poor. Early cases may be treated with analgesics, probiotics, oral electrolytes solutions and antisera that neutralize the toxins produced by the bacteria. Cases that can be treated are very rare due to the aggressive nature of the disease, many animals are often found dead in the paddock.

Prevention
Enterotoxaemia or pulpy kidney can be prevented in large by maintaining a sheep vaccination program. For sheep and goats there are multiple vaccines available that induce immunity to the toxins generated by Clostridium perfringens types C and D. Because tetanus is also an important disease to prevent in sheep and goats, many commercial vaccines protect against the bacteria involved; Clostridia.

Several vaccines are available in various combinations;
- With tetanus and cheesy gland (CLA) vaccine (3-in-1 vaccine)
- With other clostridial vaccines such as that for tetanus, black leg, black disease and malignant oedema (6-in-1 vaccine)
- With selenium and vitamin B12 (or both)
- With moxidectin (in an injectable form) to treat worms.

Sheep not previously vaccinated should be vaccinated at least twice, four to six weeks apart, and then boosted annually. This schedule assists in achieving long-term high-level immunity. Generally, two annual booster vaccinations will protect sheep for life.

Keeping ewes well vaccinated is the best way to protect newborn lambs against the disease, as the antibodies to the bacterial toxins are transferred to the newborns in the colostrum. The lambs from unvaccinated, poor ewes or lambs which are born in sub optimal conditions, orphaned or large litters are at risk of not receiving adequate immunity through colostrum.

Smart feeding strategies will also limit the potential for this disease to affect a flock. Since the bacterium proliferate in the intestine in response to a large ingestion of a starch rich ration, careful introduction of these feedstuffs should be implemented as well as ensuring the vaccination program is up to date.

When feeding high-risk feeds, the allowance should be divided into as many feedings as is feasible. It is also advisable to provide roughages such as hay or straw, as this will limit the potential for overeating on high-risk feeds.