

CRYPTOSPORIDIOSIS IN NEW ZEALAND CALVES

Cryptosporidium parvum (*C. parvum*) is a protozoan parasite closely related to coccidia (refer TB VM-1) and is a common cause of calf scours in New Zealand either alone or with other pathogenic bacteria or viruses. *C. parvum* is zoonotic. Good hygiene is important to reduce the risk of ingesting oocysts excreted by infected calves.

Prevalence

A New Zealand laboratory survey in 2018 showed cryptosporidia oocysts were present in 47% of faecal samples from scouring calves up to 1 week of age, similar to Rotavirus (50% of samples).¹ A national survey of 97 farms showed that *C. parvum* was present on 18% of farms where healthy calves sampled were 1 – 5 days old, and 52% of farms where calves sampled were 9 – 21 days old (Figure 1).²

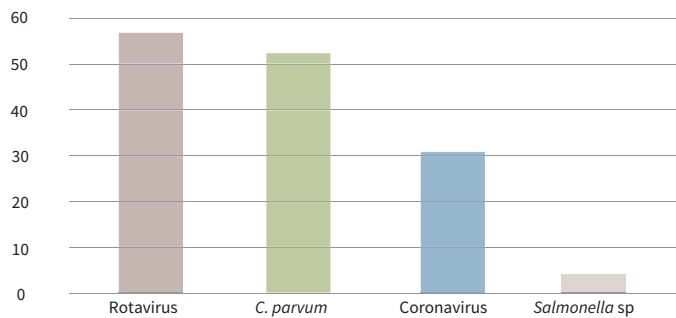


Figure 1. Farm level prevalence of enteropathogens in faecal samples from calves aged 9 - 21 days (n=797) on 97 dairy farms throughout NZ.

Life Cycle

C. parvum has a rapid, direct life cycle and infection occurs when viable sporulated oocysts in the environment are ingested by young calves under one month of age. The oocysts excyst (break open) in the gut releasing four infective parasites (sporozoites). These sporozoites penetrate the cells lining the small intestine and undergo at least two stages of asexual reproduction, then differentiate into sexual forms (gametes) which fuse to form a zygote which develops into a diploid oocyst. The oocysts continue to mature on the gut wall and are shed in the faeces as sporulated infective oocysts for 10 - 12 days.

The life cycle is completed in 3 - 4 days. Autoinfection can also occur, as some oocysts excyst without leaving the host, releasing sporozoites into the gut lumen which immediately reinfect gut cells.

Cryptosporidium oocysts are infective as soon as they pass into the environment and infection of calves in confined environments soon reaches a high level. Oocysts can also survive for many months in cool / moist conditions.

Symptoms

C. parvum typically causes scours in calves from a few days to 3 weeks of age.⁴ Clinical symptoms in calves normally occur 3 - 7 days after infection and include a profuse watery diarrhoea, inappetence, gastrointestinal discomfort and a mild fever.

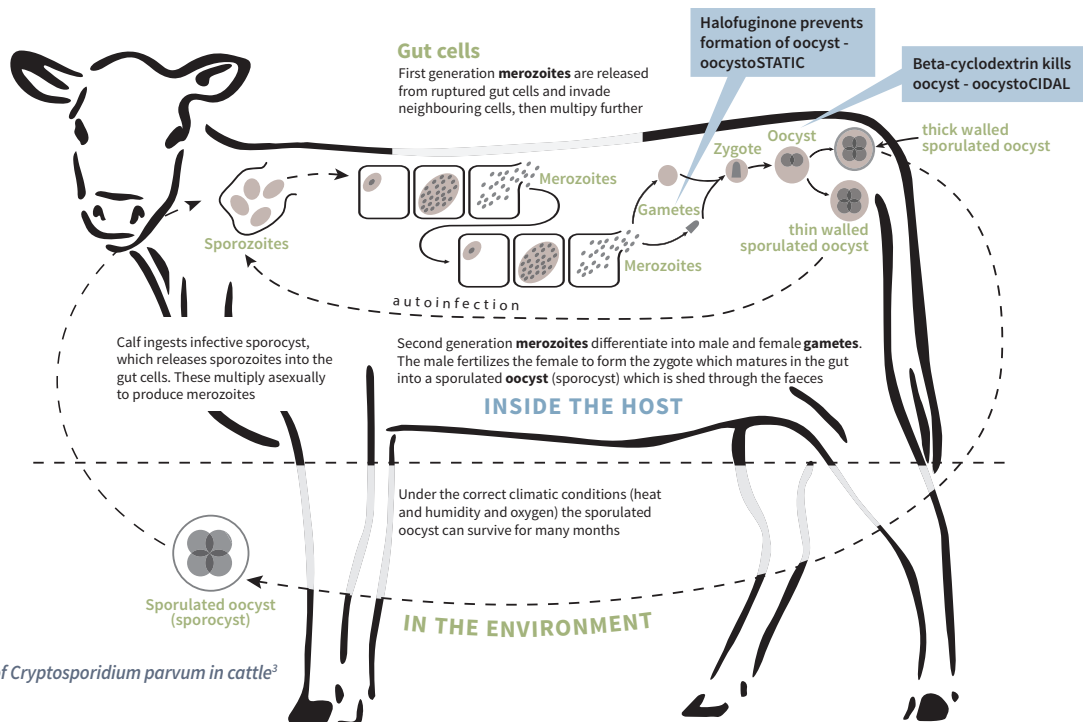


Figure 2. Life cycle of *Cryptosporidium parvum* in cattle³

Severe infections may lead to dehydration. Mortality rates are usually low but increase if there are other bacteria or viruses involved, or if the dehydration is not corrected promptly. The onset of clinical signs coincides with the shedding of oocysts in the faeces, and this often continues after the clinical signs have disappeared.

Diagnosis

A presumptive diagnosis of cryptosporidium infection can be made via faecal samples tested by ELISA at a laboratory or using farm-side test strips. A positive result should be interpreted alongside other clinical symptoms. A definitive diagnosis can be made by histology of post mortem samples.¹

Prevention

Adequate colostrum uptake of antibodies is important to reduce the risk of cryptosporidiosis in calves. Calves should be fed 15% body weight of 'gold' colostrum during the first 6 to 12 hours of life. Provide colostrum in 2 - 3L increments, as otherwise the abomasum capacity of newborn calves will likely be exceeded. Day 2 - 4 transition milk should be fed for local gut protection for at least 4 days but as long as possible.

Good pen hygiene, including separation of scouring calves, is also important to reduce the spread of infection.

Treatment

Treatment is primarily aimed at providing energy and fluids. Pain relief using NSAIDs such as Melovem is important to reduce gastrointestinal discomfort and get calves drinking sooner.

Two types of products are commercially available to aid recovery for calves with cryptosporidiosis, and reduce the risk of other calves becoming infected by reducing excretion of oocysts.⁵

1. Halofuginone lactate is oocystostatic – it prevents the formation of oocysts but the exact way it works is unknown. Treatment with halofuginone decreases the intensity of diarrhoea and faecal oocyst count⁶ but does not delay the onset of diarrhoea or reduce the risk of infection amongst calves reared together in a highly contaminated environment.⁷

2. Beta-cyclodextrin is a carbohydrate that is not digested or absorbed in mammals. It is oocystocidal – when in direct contact with oocysts, there is rapid loss of infectivity of oocysts.⁸ There are two potential modes of action:

- i an interaction between beta-cyclodextrin and bile salts (cofactors that aid the excystment of oocysts) and
- ii beta-cyclodextrin may alter the domains of the gut cell membranes to which oocysts attach before they release the infective stages inside the oocyst.⁹

Summary and take home messages

Cryptosporidiosis is an important disease that has a damaging effect on the gastrointestinal tract of young calves in New Zealand.

- *C. parvum* is common on NZ farms. The oocysts are infective to both calves and people
- The life cycle of *C. parvum* can be rapid so outbreaks can occur very quickly
- Adequate colostrum intake and hygienic calf rearing are crucial to prevent and contain outbreaks of cryptosporidiosis
- Treatment of scours in calves must focus on fluid and electrolyte therapy, along with NSAID pain relief
- Beta-cyclodextrin can be used to aid in the prevention and treatment of cryptosporidiosis by significantly reducing pathogenicity of infective oocysts

References

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⁶Pavel Klein. Preventive and therapeutic efficacy of halofuginone-lactate against Cryptosporidium parvum in spontaneously infected calves: a centralised, randomised, double-blind, placebo-controlled study. Vet J, 177(3), 429-31, 2008

⁷De Waele V, Speybroeck N, Berkvens D, Mulcahy G, Murphy T M. Control of cryptosporidiosis in neonatal calves: use of halofuginone lactate in two different calf rearing systems. Preventative Vet Medicine, 96, 143-151, 2010

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⁹<https://www.pvd.co.nz/vet-pages/beta-cyclodextrin>

Beta-cyclodextrin is an active ingredient in NZ registered vet medicines Exagen and Kryptade, ACVM Registration numbers A09536 and A09621

Melovem 30 is a restricted vet medicine, ACVM Registration no. A11562