

# Cow - Calf Session

Dr. Douglas Armstrong, *Presiding*

## Cryptosporidiosis in Calves: Epidemiologic Questions, Diagnosis and Management

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*Cryptosporidium* is a protozoan parasite of the suborder Eimeriorina which inhabits the microvillous border of intestinal enterocytes of calves,<sup>1</sup> lambs<sup>2</sup> and other animals and which has a life cycle pattern similar to that of other coccidia.<sup>3</sup> Cryptosporidia have been recognized histologically in intestinal sections (Fig 1) and by Giemsa-stained ileal and fecal smears (Fig 2), in field outbreaks of calf diarrhea. Recently, fecal flotation was used to detect oocysts in feces (Fig 3).<sup>4</sup> They most often are in the presence of other enteric pathogens but some recent reports have attributed outbreaks solely to cryptosporidia.<sup>5 6 7 8</sup>

Experimental transmission using infected feces or ileal scrapings has resulted in reproduction of diarrheal disease and oocyst shedding.<sup>1</sup> This transmission has not only been produced between calves but among many species<sup>9</sup> including avian, rodent and ruminant, and man to animal transmission has been produced.<sup>10</sup>

It is logical to assume that natural transmission is by the fecal-oral route but this has not been proven as yet. At Caldwell, we've worked with a commercial, 360 cow dairy where essentially all calves get cryptosporidiosis.<sup>4</sup> Over 1600 fecal samples, from dry cows and fresh cows at this dairy, examined by fecal flotation over a two year period have been negative for oocysts. On the same dairy, four calves delivered into plastic bags, fed colostrum and reared in brand new plywood boxes in the calf house, have contracted cryptosporidiosis though not in direct contact with other calves. Finally, a cesarean section was performed on a cow from this dairy; the calf was colostrum-deprived and raised

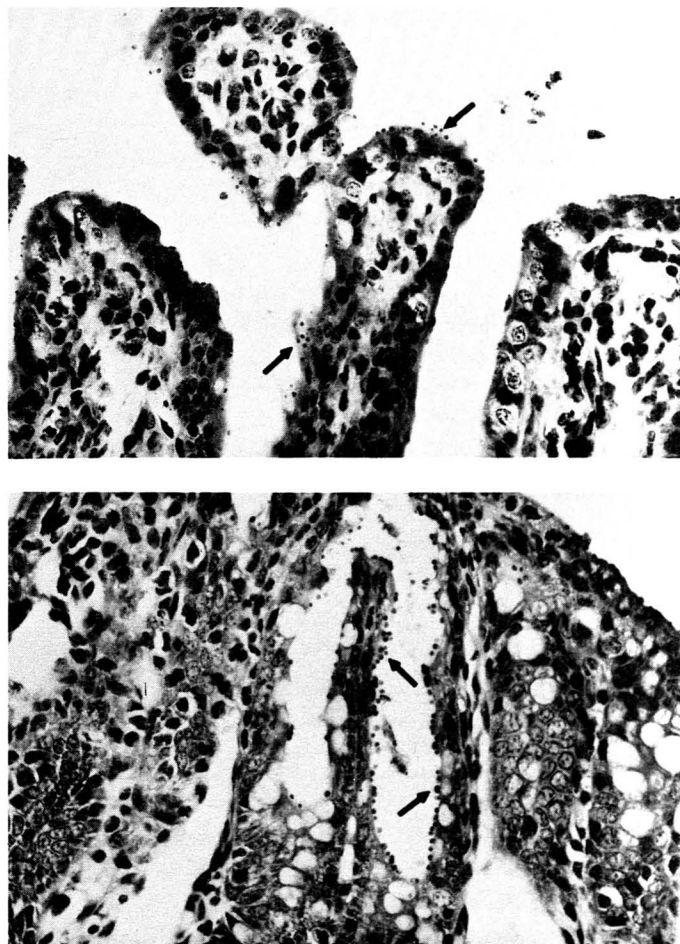


Figure 1. A. Cryptosporidial life cycle stages in the microvillus border of villi; arrows. X320 H&E

B. Similar forms in colonic glands; arrow. X320 H&E

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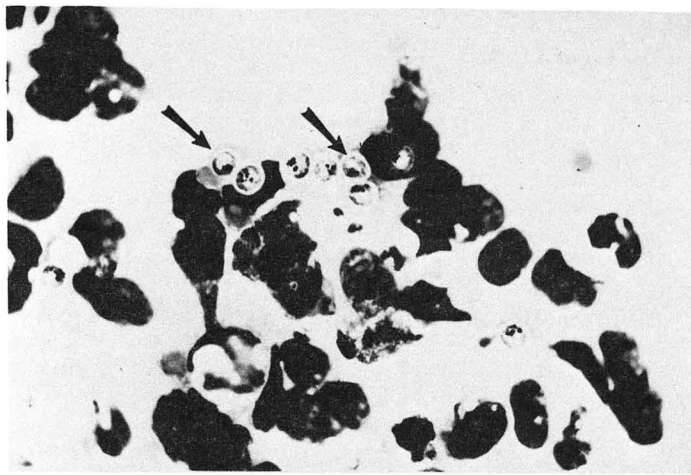


Figure 2. Giemsa-stained ileal smear. Cryptosporidial oocysts associated with epithelial cells in a smear made several hours after death. Note the halo around the oocysts. The internal dots are usually deep red. X1280.

in a brand new barn on artificial milk. The calf developed diarrhea and shed cryptosporidial oocysts at 14 days of age, approximately one week later than the natural cases on this dairy<sup>4</sup>. Unfortunately, two calves with cryptosporidiosis had been placed in the same barn, 20 feet away from the test calf when it was 7 days old. Flies were numerous and it could easily be argued that they carried oocysts to the test calf which developed the disease a week later.

Diagnosis of cryptosporidiosis should not be difficult. Based on recent work,<sup>1 6 7</sup> veterinarians should have a high degree of suspicion in calves (and lambs) that develop enteritis during the second week of life.<sup>4</sup> Watery yellow diarrhea is usual; modest fever is present; appetite remains fair to good.<sup>5 8</sup> Fecal flotation or sedimentation of samples from several to many calves when they are 10-14 days old, should reveal large numbers of uniform, spherical, 4 to 6 micron, thin-walled forms with a single prominent internal dot, (Fig. 3).<sup>4</sup> Cecal contents taken from calves at necropsy yield high numbers of oocysts too. Giemsa-stained fecal smears or ileal imprints can be diagnostic (Fig 2), but practitioners in general are more accustomed to fecal flotation.

**It is important to make the diagnosis of cryptosporidiosis and for that matter, any etiologic factor associated with calf diarrhea. Only then can informed preventive or management decisions be made. Too long has the quick-draw, antibiotic strategy been used. Diarrhea syndromes which have defied this strategy have made veterinarians look bad on more than a few occasions. In fact, the use of certain antibiotics orally can be fatal to calves that might otherwise have recovered!**<sup>11</sup>

Knowing the *Cryptosporidium* is at least a part of a given diarrhea problem allows you to predict that newborn calves

will continue to develop a diarrhea syndrome with a predictable course and outcome, despite antibiotic preventive and therapeutic measures. In my Idaho experience, a well-managed calf raising operation will not be seriously affected by the presence of *Cryptosporidium* alone. Colostrum management must be excellent, housing should be relatively sanitary, and nutrition adequate for the size of calf and climatic conditions. The presence of other enteric pathogens may require appropriate action to cope with them.

A few suggestions made in the literature, on management of cryptosporidiosis have been limited to treatment and have apparently been based upon the relationship of this organism to coccidia. However, an efficacious medication has not been identified in a controlled studies. On a dairy

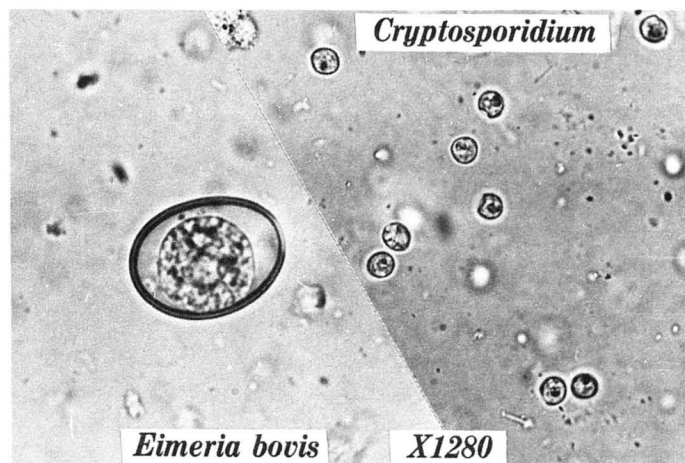


Figure 3. Unstained oocysts of *Cryptosporidia* and *Eimeria* for size comparison. Note the prominent internal dot and occasional indented form. Sugar flotation. X1280.

where essentially all calves have cryptosporidiosis we gave lasalocid sodium (Bovatec, Hoffman-LaRoache, Nutley, NJ) at doses 1.5 mg/Kg and 3 mg/Kg twice daily for 7 days to 6 calves and 7 calves respectively beginning on day 1 post partum. Six mg/Kg twice in one day was fatal to one calf. No difference was detected in clinical course or pattern of oocyst shedding between test calves and 12 untreated calves. Similar protocols, aimed at prevention, were followed for therapeutic doses of potentiated sulfadimethoxine (Hoffman-LaRoache, Nutley, NJ), sulfamethazine (American Cyanamid, Princeton, NJ), sulfaquinoxaline (S.Q., Merck, Rahway, NJ), and trimethoprim-sulfa (Tribrissen, Burroughs-Wellcome, Research Triangle Park, NC). No efficacy was detected.

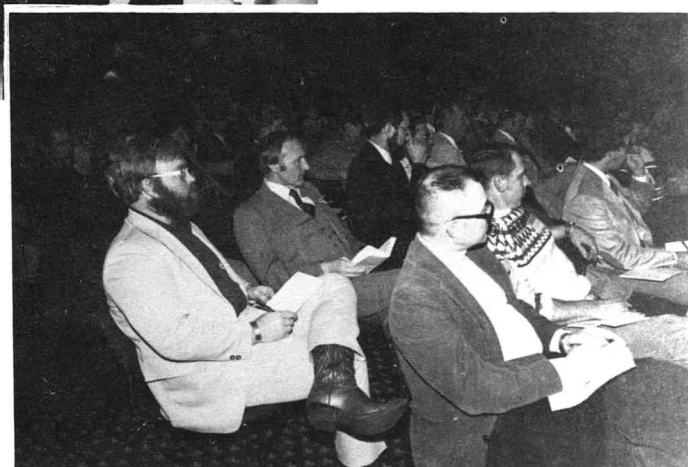
**In summary, *Cryptosporidium* is a common parasite of newborn calves and appears to cause a modest diarrhea**

syndrome in the second week of life. Diagnosis can be made by fecal flotation. No known medication will prevent or treat this apparently self-limiting infection but good management, prevention of secondary problems and diagnosis of concurrent viral or bacterial infections are important. Epidemiological questions remain.

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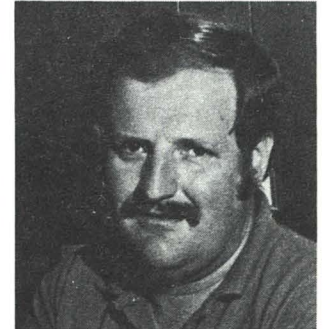
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