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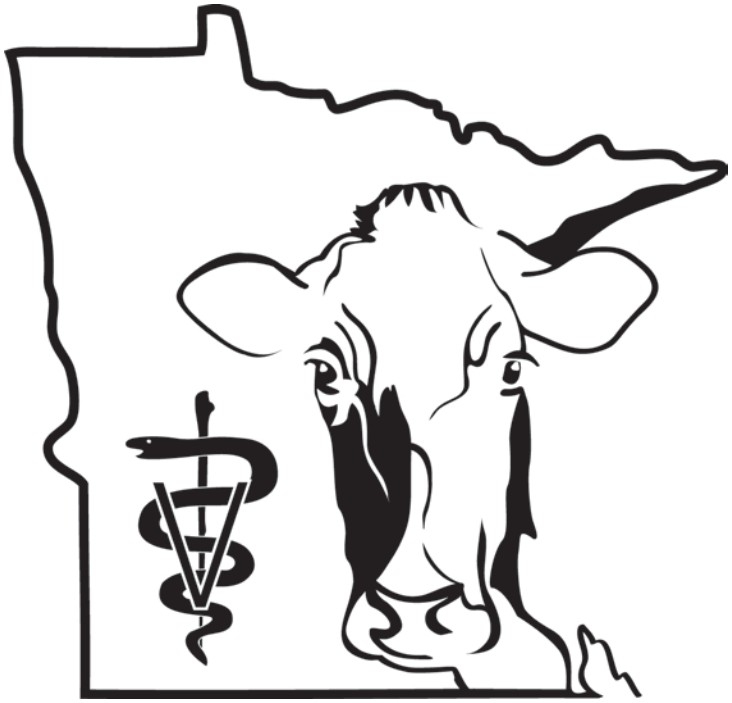

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**What you see is not always what you get: suggestions for the control of *Cryptosporidium parvum* infection in calves.**

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Calf diarrhea is one of the most troublesome problems affecting the dairy farmer. The protozoan parasite *Cryptosporidium parvum* was first reported as a cause of calf diarrhea in 1971. Since that time, *C. parvum* has been increasingly recognized as a common cause of diarrhea in calves and other animals, including humans. The National Dairy Heifer Evaluation Project found that on any given day, 22% of preweaned calves were shedding *C. parvum*, and the parasite was found on more than 90% of the farms surveyed. *C. parvum* is now the most commonly identified agent of calf diarrhea among both dairy and beef calves in the United States.

*Cryptosporidium parvum* infection is spread when animals or humans ingest the oocyst stage of the parasite, which is shed in the feces of infected animals. Very large numbers of *C. parvum* oocysts are shed by infected calves, as many as 10 million per gram of feces. As few as 100 oocysts can infect a calf, thus it is easy to see how infection can quickly spread among calves on a farm. The oocysts are killed by thorough drying, or temperatures exceeding 160°F. However, the oocysts are very resistant to disinfectants and as long as they are kept moist, may survive on the ground or in buildings for many months. Thus, calves may become infected even though they are in pens that have not held sick calves for a long time. While adult cows do not develop clinical cryptosporidiosis, they may be carriers of the parasite. Other mammals, including deer, rodents, dogs, cats, and humans can also harbor *C. parvum*, thus providing a potential reservoir of infection.

Treatment for cryptosporidiosis is limited to supportive therapy, mainly fluid and electrolyte replacement to combat the effects of diarrhea. Although a large number of drugs have been tested for use against *C. parvum*, none are presently available that have proved to be effective. We have developed an oral vaccine that when given to calves within several hours of birth, provided specific protection against experimental challenge with *C. parvum*. However, when we field tested this vaccine in a large dairy with heavy *C. parvum* infection, the vaccine was not effective. The difference in these results is most likely due to uncontrolled early exposure to *C. parvum* (within hours of birth) during the field trial. In contrast, during the experimental trials, calves were not exposed to *C. parvum* until one week of age. These results suggest that successful control of cryptosporidiosis in the field will require that immunity in the calf be generated rapidly (within the first days of life). We are presently working on new vaccines that will provide faster protection to calves in the field.

Many non-specific remedies such as antibiotics or treatments for *Coccidia*, a related parasite, have been reported to "cure" cryptosporidiosis in calves. It is important to remember that cryptosporidiosis is a sporadic problem on many farms, worsening at times, and almost disappearing at other times without treatment. We conducted a trial several years ago in a Minnesota beef operation that illustrates this last point. In 1994, the farmer lost 30 of 160 calves to cryptosporidial diarrhea. We did a double blind vaccine trial on 205 calves born spring of 1995. Half of the calves received vaccine and half received placebo shortly after birth, and all calves were monitored for diarrhea and shedding of *C. parvum*. At the end of the study, only 7 calves had shed *C. parvum*, and no calves died from diarrheal disease. Thus, comparing the two years; in 1994, 30 of 160 calves died with diarrheal disease, and in 1995 none of 205 died. One interpretation of these results would be that the vaccine was hugely successful in preventing the spread of cryptosporidial disease in this herd. However, when we decoded the data, we found that while 5 of 102 calves receiving vaccine were positive for *C. parvum*, only 2 of 103 calves receiving placebo were positive for the parasite. Thus, in appears that there was simply a low incidence of infection with *C. parvum* in this herd this particular year. It is likely that this was due to the care taken by the owner to avoid cross-contaminating calves when he took fecal samples for the study. The precautions he took (some of which are described in the next paragraph) resulted in a much cleaner calving environment, and reduced calf to calf transmission of disease. These same measures can be effective in reducing *C. parvum* infection in any setting, and are much more effective than the use of unproven, and even dangerous, off-label use of treatments reported to "cure" cryptosporidiosis.

Control of cryptosporidiosis depends on minimizing exposure of calves to *C. parvum*. To accomplish this, the dairy farmer must pay strict attention to hygiene in the management of sick calves. Specifically, sick calves should be housed apart from other calves, preferably in a separate building. Keeping sick calves in a stall next to well calves is a guaranteed way to spread disease. People caring for calves should always take care of well calves first, before treating or handling sick calves. It is also important to keep separate boots and coveralls for use when caring for sick calves, and to change out and wash thoroughly when finished with the sick calves. This will minimize spread of *C. parvum* to other calves as well as humans, especially small children or the elderly. In addition to these hygienic measures, good management practices such as ensuring that all calves receive adequate colostrum, and providing warm and dry conditions for young calves will increase the resistance of calves to other disease-causing organisms. This is important because most calves will not die as a direct result of cryptosporidiosis, but they may die if already weakened by stress or other infections.

To summarize, to reduce neonatal diarrhea due to cryptosporidiosis as well as other pathogens dairy farmers should:

1. Provide clean dry areas for cows to calve.
2. Feed clean colostrum using a bottle and nipple that has been thoroughly cleaned with hot water and detergent.
3. Provide clean, dry pens for calves and allow pens to dry thoroughly between calves.
4. Feed and care for sick calves last! Contaminated nipples, bottles, and pails easily spread disease.

In conclusion, research is continuing in order to develop specific treatments and vaccines for cryptosporidiosis in calves. Presently, the best prescription for controlling *C. parvum* in dairy calves is the use of sound management practices and careful attention to hygiene when handling infected animals.