



United States  
Department of  
Agriculture

Animal and  
Plant Health  
Inspection  
Service

Veterinary  
Services

# Cryptosporidium parvum Outbreak

Hundreds, possibly thousands, of Milwaukee residents became ill during an outbreak of Cryptosporidium parvum during March and April of 1993. The source of the outbreak was probably the public water supply which is drawn from Lake Michigan. Several contributing factors may have allowed the parasite to enter and survive in the treatment system:

- Milwaukee, unlike most coastal towns, uses surface water instead of ground water for its public water supply. (Cryptosporidium contamination generally is not a problem in ground water.)
- The Milwaukee area has various environmental sources that could have contributed to the contamination of run-off water: dairy farms, wildlife, and human sewage.
- Spring thaw and recent rains produced a heavy influx of run-off water into Lake Michigan, the source of Milwaukee's water.
- In one of the Milwaukee's three water purification plants, the type of filtering system had recently been changed, and, when checked after the onset of the problem, the filtering process was not functioning at full efficiency. (The implicated plant was shut down.)

## 1. What is Cryptosporidium?

Cryptosporidium is a protozoan of the subclass of coccidia that includes Eimeria and Isospora. It was first recognized as a pathogen in cattle in 1971 and the first human cases were identified in 1976.

## 2. Is Cryptosporidium species-specific?

Each of the six currently recognized species of cryptosporidia infect different hosts. C. parvum infects mammals, including bovines and humans. C. muris infects mice and has recently been found in the abomasum of cattle. Other species infect avians and reptiles.

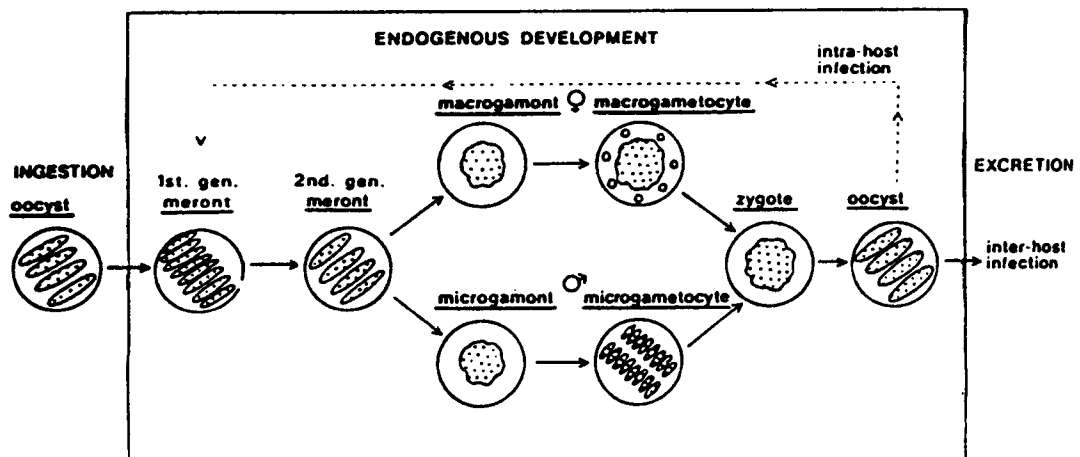
## 3. What is the source of Cryptosporidium parvum?

There is a large reservoir for C. parvum including domestic and wild animals, rodents, and water. Press reports have suggested that dairy farms are a primary source of the C. parvum outbreak in Milwaukee. There have been other documented water-borne outbreaks, often without a known source of contamination.

## 4. What is the prevalence of Cryptosporidium in healthy dairy calves?

A USDA:APHIS:VS study estimated that on any given day, 22 percent of preweaned dairy calves, and as many as 50 percent of dairy calves in the 1- to 3-week age

Figure 1. Life Cycle of Cryptosporidium parvum.\*



\*Modified from an illustration in O'Donoghue, P.J. "Cryptosporidium infections in man, animals, birds, and fish." Australian Veterinary Journal, 1985;62:256.

group, are shedding Cryptosporidium. It is estimated that the parasite is present on nearly 90 percent of dairy farms. Although oocysts are shed in greater numbers during the diarrheic phase, the organism has been found in normal feces.

**5. Can Cryptosporidium multiply in the environment?**

No, reproduction takes place in the intestinal tract. However, the oocyst is very hardy in the environment (may or may not be destroyed by freezing and drying) and is resistant to most disinfectants. See Figure 1 on page 1 for information on the parasite's life cycle.

**6. Can Cryptosporidium cause disease in cattle by itself or is it a secondary disease agent?**

Although mixed infections are quite common (since many organisms affect the same age group of calves), Cryptosporidium can cause clinical diarrhea in calves in the absence of other pathogens.

**7. How is C. parvum diagnosed in dairy animals and what are the clinical signs?**

In calves, the predominant sign of infection is diarrhea which may be bloody. Symptoms persist for about 8 days and clinical recovery is the usual outcome. The organism can be found by intestinal biopsy and oocysts can be found on fecal examination. In diarrheic animals, the flotation method is usually adequate to identify oocysts (found in the plane immediately under the coverslip) but they may be confused with yeast. More sensitive tests include acid fast stains and monoclonal antibody tests.

**8. How do you treat cryptosporidiosis in calves?**

There is no specific anticryptosporidial treatment currently available, so treatment is limited to supportive care for diarrhea and dehydration.

**9. Can cryptosporidiosis be controlled on the farm?**

Control of C. parvum is difficult because it is immediately infective upon shedding, unlike other coccidia, and is resistant to most disinfectants. It is resistant to chlorine, and because it is so small, it can pass through many water filter systems (including municipalities). However, hygienic management practices in the calf facilities will reduce the pathogen load.

**10. How do humans contract Cryptosporidium?**

As mentioned, the three major sources of cryptosporidial contamination are farm animals, human sewage, and wildlife. Transmission can occur through water supplies and animal- or person-to-person contact. Human cases have been documented worldwide.

**11. How does Cryptosporidium affect humans?**

The incubation period in humans ranges from 5 to 28 days and is most commonly 7 to 10 days. Symptoms in humans can be mild to severe diarrhea, abdominal cramps, vomiting, and fever. Symptoms are usually self-limiting, lasting about two weeks in immunocompetent patients, but can last six months and be fatal in immunocompromised patients. Both adults and children are susceptible, although the disease is more common in children.

**12. How are human patients diagnosed and treated?**

Diagnosis in humans is by fecal examination or intestinal biopsy. Cryptosporidiosis is not a reportable disease in humans. As in animals, treatment is limited to supportive care, since there are no specific anticryptosporidial medications currently available.

**13. What is the best way to prevent the spread of Cryptosporidium in humans?**

Since transmission is by the fecal-oral route, careful hygiene is the best method of controlling spread. Personnel in day-care centers and food handlers should take particular precautions. During outbreaks, it is advisable to boil water for drinking and washing foods.

**14. Are bovine producers and practitioners at higher risk?**

One source of infection is animal feces, so producers and practitioners should take particular care of their personal hygiene after contact with animal feces, especially from diarrheic calves. Immunocompromised persons should avoid animal contact.

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