

Giardia

(*Giardia duodenalis*)

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Giardia is one of several protozoan parasites that affect dairy cattle. Of the traditionally accepted six species of Giardia, only one, *duodenalis*, is common in calves. Of the seven genotypes of this species, only one (Assemblage A) uses both livestock and humans as hosts. Of interest to us are two forms the parasite takes on as it goes through its life cycle. One form is a cyst. This egg-like structure is shed in an infected animal's feces. The other form is a soft body with a tail (trophozoite). This particular Giardia genotype may also cause infections in humans as well as livestock.

Transmission

Transmission from one calf to another is achieved by ingestion of a cyst. It is possible to be infected by as few as one to ten cysts.

The cysts most often come from the feces of infected heifers and cows. However, almost any source of fecal matter can serve as a means of infection. Contaminated water is the most common source. In this mode, the water source is usually determined to be contaminated with cysts.

Because these cysts are resistant to chlorine at low concentration levels, chlorinating systems for water do not destroy the cysts. Because the cysts are tiny, 6-10 microns, most water filters do not remove cysts from the water supply. Standing surface water, in addition, might be the source of cysts.

In addition, calf care personnel can carry the parasite from one calf to another by their feet, clothing and hands. An especially high-risk activity is handling water-feeding equipment. If a caregiver's hands are contaminated with cysts from calf manure, they can pass the cysts from water pail to water pail.

Also, it is possible for feed to be contaminated. With calves, fecal contamination of grain pails and feed troughs is common. Also, it is possible for both birds and insects to mechanically carry the pathogen from contaminated feces to grain and forage.

Cyst Shedding

The age of shedding in calves is most commonly between two and ten weeks. Calves shed both cysts and trophozoites. We are not concerned with trophozoite shedding because they

die soon after leaving the body. Diarrhea usually occurs in the three to eight week age interval.

Shedding continues at least one to two weeks in untreated animals. Shedding peaks most often in calves about five weeks of age. Cyst shedding is usually intermittent making accurate diagnosis difficult. Unfortunately, while diarrhea symptoms may end after a couple of weeks, these animals may continue to shed cysts at a declining rate for a longer period. Olson estimated the shedding period may exceed thirty weeks.

Cyst Survival in the Environment

Before being passed out of the host's body, some of the soft trophozoites develop a hard shell (excystation). This results in a cyst that is very well protected. Cysts are not affected by common disinfectants such as chlorine bleach. The most favorable environment for survival is water. Cysts survive one to three months in water although longer times might occur. Moist soil will protect cysts for several months, as well. The key to survival is moisture. On a dry surface in hot weather, nearly all cysts will be destroyed within one week.

Temperature is an essential survival element, also. Cyst survival declines rapidly as the temperature approaches freezing. Evidence shows that freezing destroys cysts. Like cryptosporidia oocysts, Giardia cysts cannot maintain their shell integrity through freeze-thaw cycles. Very high temperatures also destroy the cysts. Public health officials recommend boiling water for three minutes to destroy all cysts.

“*G. duodenalis* cysts on surfaces are susceptible to 5% sodium hypochlorite at a 1:30 dilution, as well as some other disinfectants including quaternary ammonium solutions.”(Iowa State: Giardiasis, 3)

Diarrhea

While many factors are involved in determining an infective dose of any pathogen, it has been estimated that as few as ten cysts may cause a Giardia infection in a susceptible calf. Thus, the infective dose for most calves probably is quite low. This is especially true for calves that have a weak immune system. This might be due to passive transfer failure from colostrum, not having enough to eat, having unclean or wet bedding, or any other source of stress.

Once inside the calf, the stomach acids weaken the cyst walls. After being released from the cyst, the parasites burrow into or attach to the intestinal walls. This incubation period for Giardia diarrhea (giardiasis) is typically about one week. The nature and severity of symptoms have been observed to vary widely from animal to animal. In addition, symptoms have a tendency to be cyclical, coming and going over a period of several

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weeks. For some heifers, this may be a self-limiting infection as they build resistance to the parasite. This phase may last as little as a few days to a few weeks. Unfortunately, somewhere between thirty to fifty percent of animals may develop a chronic infection lasting typically seven or more weeks.

Recovery and Treatment

The majority of heifers will recover spontaneously from giardiasis because they have a very strong immune system and the challenge is relatively low. The time for a heifer to develop immunity (humoral type) so that the infection is self-limiting may exceed one hundred days. Thus, a substantial minority is likely to develop chronic diarrhea that may last for seven or more weeks.

The most cost-effective methods of control once the parasite is identified among calves are excellent colostrum management and adequate nutrition. These best management practices create a strong immune system capable of fighting off the *Giardia* pathogen.

Nevertheless, some calves will develop an infection if the exposure level is sufficiently high. “Benzimidazoles (fenbendazole, albendazole) have been show to be effective in elimination of *Giardia* from confined and range calves.” (Olson, p4) Olson notes that, “Although these agents are highly effective, reinfection frequently occurs if the sources of environmental contamination are not eliminated.” **It is important to remember that cyst shedding does not stop when diarrhea symptoms end.**

One last note - This particular *Giardia* genotype may also cause infections in humans as well as livestock. Always wash your hands thoroughly after handling infected livestock.

References: Olson, M. E. “Zoonotic protozoan parasites in cattle: emerging issues” in Proceedings of 23rd Buiatrics Congress, Quebec, CA, 2004. Trout, J and Others, “*Giardia*” USDA EMSL Reports. O’Hanley R.M. and Others, “Duration of naturally acquired giardiasis and cryptosporidiosis in dairy calves and their association with diarrhea.) J. Am. Vet. Med. Assoc. 214 (391-396).

For a review of the basics on coccidiosis click [HERE](#) for Dr. Jim Quigley’s resource at www.calfnotes.com.