

## **Battling Protozoal Infections**

### Diagnosis and Treatment of Giardiasis and Coccidiosis in the Domesticated Chinchilla

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#### **Introduction:**

Giardiasis and Coccidiosis are the most prevalent protozoal infections in the United States. They plague all species of animals. Unfortunately, in smaller animals these infections can be much less forgiving than in larger species. A protozoal infection in the chinchilla can be a death sentence if not properly treated.

#### **GIARDIASIS**

##### **What are Giardia?**

Giardia are microscopic protozoan parasites that affect the intestinal tract of the chinchilla, alternating between a free-swimming form which inhabits the intestines, attaching to the intestinal lining and a cyst form which is passed in feces or contaminated water sources. Although studies have led to the belief that giardia is a normal inhabitant of the chinchilla's gastrointestinal tract (Schaeffer and Donnelly, 2004), stress, overcrowding, and unsanitary conditions can cause giardia to proliferate.

##### **The Life Cycle of Giardia**

Dormant giardia cysts enter the chinchilla's digestive tract through drinking contaminated water or the ingestion of feces from an infected animal, including itself. The acidic environment in the stomach breaks down the cyst, allowing the swimming trophozoite to emerge. The trophozoites have whiplike flagellae to propel themselves through the intestinal lumen and a sucking mouthpart to attach themselves to the intestinal epithelium for feeding. Reproduction occurs in the chinchilla's intestines by binary fission (splitting into two). As the organisms move towards the colon, many will become cysts remaining dormant and protected while they are shed in the feces, repeating the cycle when they are ingested once again.

#### **COCCIDIOSIS**

##### **What are Coccidia?**

Coccidia are single-celled organisms that attack cells in the intestines of chinchillas. Infection is caused by the ingestion of a coccidia oocyst. Due to the rapid multiplication of coccidia, thousands of intestinal cells can be destroyed by the ingestion of a single oocyst. Because chinchillas are coprophagous animals (they ingest feces) the spread of coccidiosis happens rapidly in a herd.

##### **The Life Cycle of Coccidia**

Once a mature oocyst is ingested the oocyst breaks open in the intestines and begins reproduction inside the host, releasing sporozoites. Each sporozoite attaches itself to an intestinal cell and begins to reproduce in the cell. Eventually, the infected intestinal cell fills with what are now called merozoites, and bursts. Each one of the merozoites now seeks out a new intestinal cell and the process repeats itself exponentially.

<b>GIARDIASIS, Cont..</b>	<b>COCCIDIOSIS, Cont..</b>
<p><b>What happens to the host?</b>  <b>Signs/Symptoms of Giardiasis</b>  Some animals may be asymptomatic (not showing any signs of infection) if they are healthy and only low levels of giardia are present. However, the chinchilla may become clinical in times of stress which causes the immune system to be suppressed.</p> <p>As the giardia reproduce and attach to the intestinal wall, they cause the intestinal walls to become inflamed and the absorptive capabilities of the intestines are compromised. This causes the nutrients to move through the intestinal tract at such a rate that soft stools or diarrhea occur, often with an offensive odor. Formed stools may also be larger than normal and have a shiny appearance. Chinchillas with giardiasis tend to have chronic diarrhea or soft stools, sometimes showing improvement, only to occur again a week or two later. Over time giardia can cause a slowed growth rate in young animals or weight loss. In severe cases, it can result in dehydration which can be fatal if left untreated.</p> <p>The incubation period of giardia is approximately 1-2 weeks, which is the length of time it takes from initial ingestion of the cysts to the observation of clinical signs of giardiasis. By the time a chinchilla is showing signs of an active giardia infection, it is likely already shedding giardia cysts in the stool, which can be transmitted to other chinchillas who come into oral contact with the feces or reinfect the original host.</p> <p><b>Treatment</b>  Giardia is most commonly diagnosed by the presence of cysts in a fecal flotation test. Fresh fecal samples can also be examined in a fecal smear test for trophozoites.</p>	<p><b>What happens to the host?</b>  <b>Signs / Symptoms of Coccidiosis</b>  As the intestinal cells are destroyed in large numbers, the host will begin to show signs of infection. If a healthy animal is carrying coccidia, infections can happen following stress, such as a show or a move, weather changes, overcrowding and weaning.</p> <p>The number one indicator that a chinchilla is infected with coccidia is soft stool, many times accompanied by a foul odor. As the organisms multiply, symptoms will worsen and a bloody watery diarrhea will be noticeable. Sometimes the stool will be slightly yellow in color with mucus streaking present in the stool. Diarrhea in chinchillas will cause severe dehydration in a very short period of time and eventually death.</p> <p><b>Treatment</b>  The onset of illness is approximately 13 days after ingestion of an oocyst or stressful event. Most likely, by the time you notice a problem, all the chinchillas caged near and under that animal have been infected, but won't show signs for another 13 days. At this point, coccidiosis is now running through your herd like "wild fire". With this in mind, treatment of the entire herd is warranted.</p> <p>The most common medications used to treat coccidia infections are coccidiostats. The medication is not able to kill the organism; rather, it inhibits its reproduction. This allows the chinchilla's immune system to kick in and eliminate the infection. There is good news in that recovered animals seem to develop an immunity or partial resistance to the particular coccidia protozoa they were exposed to, so re-infection is uncommon.</p>

<b>GIARDIASIS, Cont..</b>	<b>COCCIDIOSIS, Cont..</b>
<p>Metronidazole or fenbendazole, both oral medications, are commonly used for treatment of giardia in chinchillas, although neither is 100% effective and sometimes repeat treatments are required.</p> <p><b>Prevention</b> The most important part of managing giardiasis is preventing reinfection by disinfecting cage equipment, replacing wood items, and overall good animal husbandry. Disinfectants containing quaternary ammonium, such as Lysol® I.C. Quaternary Disinfectant Cleaner, are most effective against giardia. Chlorine bleach is only moderately effective. Giardia also cannot tolerate excessive heat thus a combination of a disinfectant and steam cleaning should eradicate any living giardia in the environment. Providing fresh water filtered by reverse osmosis or a filter rated for 5 microns or smaller can also prevent infection in your animals through the drinking water.</p>	<p>Herd treatments usually consist of a medication that can be dosed through drinking water, such as sulfadimethoxine (Albon®) or sulfamethazine sodium 12.5% (Sulmet®). Animals that are exhibiting severe symptoms should be dosed orally with a sulfa-based antibiotic, such as SMZ-TMP.</p> <p><b>Prevention</b> Coccidiosis cannot be prevented; however, the spread of coccidia oocysts to your other animals can be prevented through good housekeeping and proper quarantine procedures. Coccidia are resistant to many different types of disinfectants and are even resistant to freezing. The most effective disinfectant is heat, through steam cleaning or immersion in boiling water.</p>
<p><b>Quarantine!</b> As a general rule, all new animals should be subjected to a 30 day quarantine, as well as animals that have left the premises for any other reason (show, veterinary visit, etc.). During this period, you should constantly be monitoring your animal(s), looking for anything out of the ordinary. Not only will you be able to identify and eliminate the spread of protozoal infections, you will also be able to eliminate other commonly contracted illnesses such as fungus and bacterial infections. Your quarantine area should be in a separate room from your herd animals and you should always practice good hand washing to avoid cross contamination.</p> <p><b>Lastly, make sure you have a well-qualified exotic veterinarian at your disposal...</b> The symptoms of giardiasis and coccidiosis are very similar, so it is important to conduct fecal tests to determine which protozoan you are dealing with. It is also important to have an experienced veterinarian to work with. Many times fecal tests will produce negative results, even though the animal is infected. The protozoa are not shed in every single feces passed, so a negative test isn't a guarantee your animal isn't infected. A diagnosis from an experienced veterinarian may need to be made based on symptoms alone.</p> <p><b>References</b> Schaeffer DO. Donnelly TM. Disease Problems of Guinea Pigs and Chinchillas. In: Ferrets, Rabbits and Rodents: Clinical Medicine and Surgery, 2nd ed. Quesenberry KE, Carpenter JW (eds.). Philadelphia: Saunders, 2004.</p>	