

Coccidiosis in Chickens

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Coccidiosis is a disease caused by a protozoan parasite of the genus *Eimeria*. There are seven species that cause disease in chickens: *E. tenella*, *E. acervulina*, *E. brunetti*, *E. maxima*, *E. mitis*, *E. necatrix* and *E. praecox*. These protozoa live and multiply in the cells of the intestinal tract causing damage to the cells lining the intestines. The global impact of coccidia has been estimated at more than \$3 billion dollars annually from production losses and costs associated with prevention and treatment.

Transmission and Spread

Coccidia spread from an infected chicken to other chickens via oocysts. These oocysts are thick-walled structures which are passed out in the feces (droppings). Oocysts become infective (sporulated) after a few days and may survive for long periods depending on many environmental factors such as temperature and moisture. Birds become infected when they consume these sporulated oocysts. Once ingested the oocyst is broken down in the gizzard releasing the sporozoite form of the coccidia, which enter into the cells lining the intestines. Inside the cells the sporozoites multiply and the cell ruptures, releasing these additional sporozoites to infect surrounding intestinal cells. This cycle may be repeated multiple times before new oocysts are finally created and released in the feces.

The oocysts are shed by infected and recovered birds and may contaminate feed, water, soil and litter in the chicken house. They can also be spread from one premise to another by mechanical carriers such as contaminated feed, equipment, clothing, etc. Wild birds are not a source of infection since the species that infect wild birds do not affect chickens.

Chickens may be infected with multiple species of coccidia at the same time.

Signs and Lesions of Infection

Signs of coccidiosis may include decreased feed and water consumption, decreased egg production, pigmentation loss, weight loss, slow growth and poor feed conversion, bloody diarrhea, and high mortality. A high number of sick birds (morbidity) may be present with a variable number of bird deaths. Coccidiosis affects younger birds usually 3-6 weeks of age before they develop immunity; however, it can affect older birds. The severity of infection depends on the health of the bird and the number of oocysts ingested. Chickens will usually develop immunity quickly, thus self-limiting the infection. However, immunity to one species will not prevent infection with another species; there is no cross-protective immunity.

Eimeria acervulina is the coccidia species most frequently found in North America and causes lesions mainly in the first section of the small intestines (the duodenal loop). Lesions are usually whitish round plaques; in heavy infections, the plaques may overlap.

Eimeria tenella is the best known poultry coccidian species because of its pathogenicity. Most of the mortality occurs between days 5 and 6 after infection. *E. tenella* is the only species found in the ceca, where it causes extensive tissue damage, bleeding and disruption of the cecal glands. Cecal cores, which are accumulations of clotted blood, tissue debris and oocysts, may be found in the droppings.

Eimeria brunetti accounts for about 10%-20% of coccidial infections found in the United States. This species is found in the ileum region of the small intestines but in severe cases may extend into the ceca. During early infection, small pinpoint hemorrhages are seen in the ileal region. In heavy infections, the lining may be eroded and damaged. Infection can be found at any age.

Eimeria mitis can also be found in the lower intestine and causes small, indistinct lesions that may be overlooked. This species can affect weight gain and bird pigmentation. Although this species and its effects may resemble that of *E. brunetti*, the oocysts produced by *E. mitis* are smaller and more round.

Eimeria maxima lives in the middle section of the small intestines, below the duodenum and past the yolk sack diverticulum. This species can cause birds to be thin and pale with roughening of the feathers and lack of appetite. The intestinal wall becomes thickened and a yellow-orange mucus/fluid is present. This coccidian produces a large easily recognizable oocyst that has a distinctive yellowish color.

Eimeria necatrix affects the middle section of the small intestine, but oocysts are found only in the ceca. It is mostly diagnosed in older birds, usually between 9-14 weeks old. This species can cause pigmentation loss, weight loss, high numbers of sick birds and severe mortality. The intestine is often swollen to twice the normal size and filled with blood and fluid. White plaques or small red pinpoint hemorrhages may be seen. In dead birds the intestinal lining may have a "salt and pepper" appearance from the lesions. This species, along with *E. tenella*, causes the greatest mortality in birds.

Eimeria praecox causes severe water loss in infected birds due to diarrhea. Mucus is usually present in the feces. This coccidian species is found in the duodenum of the small intestines and usually does not cause any prominent lesions.

Diagnosis

Infections from coccidia can be readily diagnosed by observation of the oocysts in feces from live birds or in intestinal scrapings from dead birds. The locations of lesions present in the intestinal tract

and their appearance will help in determining which species of coccidia is present. It is possible to have birds infected with more than one coccidian species so variable lesions may be present. Clinical signs in the flock, age of the birds, mortality and morbidity may also be of assistance in determining if coccidia are present.

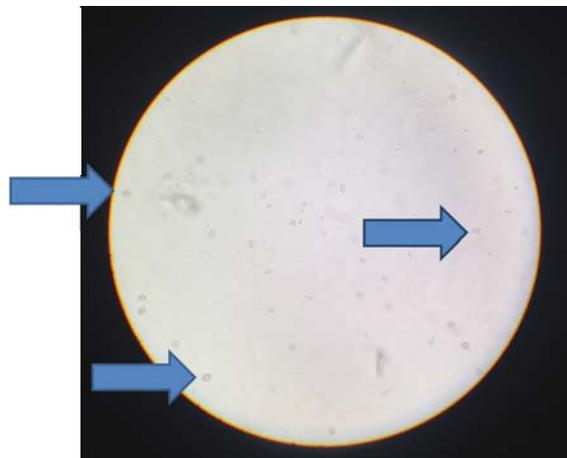


Figure 1. Coccidia oocysts (arrows) seen through a microscope.

Prevention and Treatment

Coccidia are commonly found everywhere, so it is not possible to completely eliminate or prevent infection through quarantine, disinfection or sanitation. This is especially true once an infection has already developed at a location. Oocysts are extremely resistant to common disinfectants, and it is not possible to completely sterilize a chicken house. Fortunately, preventative medications (anticoccidials) can be used to control infections. There are two types of medications used, coccidiostatic and coccidiocidal. Coccidiostatic medications stop the development of coccidia in the middle of the lifecycle. Coccidiocidal medications kill the coccidian. These medications are usually used in the feed. There are numerous anticoccidials available on the market, and few are effective against all species of coccidia. A coccidia vaccine is available commercially and can be given to chicks at one day of age. Most of these vaccines contain live sporulated oocysts of various coccidial species and are administered at low doses.

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