



# pork industry handbook

Michigan State University Extension

## Swine Coccidiosis

### Author:

Kent Schwartz, Iowa State University

### Reviewers:

Roger Billings, Lucerne Valley, California  
Steve Henry, Abilene, Kansas  
Richard Meyer, University of Illinois

### Introduction

Enteric diseases in pigs are manifested as diarrhea. Diarrhea is abnormal for pigs of any age and is accompanied by economic and productivity losses. Modern technology that emphasizes sanitation and proper environment has had a major impact in decreasing the occurrence of many enteric diseases in swine, yet diarrhea in all ages of pigs remains a major problem for swine producers.

The cause of diarrhea has an infectious (bacterial, viral, or parasitic) component, the severity of which may be related to other risk factors (sanitation, environment, or nutrition). In the past, enteric diseases were age-related, but modified production methods of age-segregation and early weaning allowed diseases once limited to the farrowing house to become a concern in the nursery or even grower-finisher. An understanding of the agents of disease and their interactions with the pig and its environment aids in developing treatment and control strategies. Coccidiosis is a major cause of diarrhea in suckling pigs and occasionally causes clinical enteric disease in swine post-weaning.

Coccidiosis is the disease caused by coccidia organisms. Pigs may be infected with coccidia with no discernible disease or clinical effect. Coccidiosis was first described in 1934, but was not considered important because no disease was associated with most infections. In the 1970's, the advent of continuous farrowing in confinement situations caused actual disease to occur and be recognized as both common and severe. Coccidia are potent and primary pathogens in suckling pigs. Several species have also been associated with severe outbreaks of enteritis in older pigs. Disease severity is directly related to the dose of offending organism ingested. Diagnostic surveys from the Southeastern states and portions of the Midwest indicate that baby pig diarrhea associated with coccidia accounts for 10% to 36% of the cases of baby pig diarrhea.

### Causative Organism

Coccidia are microscopic, one-celled (Protozoa) organisms that are obligatory intracellular parasites. Most coccidia are host

species-specific and infect only their natural host. Coccidia in swine belong to either the genus *Eimeria* or *Isospora*. They differ markedly from and are much more complex than bacteria and viruses commonly responsible for diarrhea. Of the nine species of coccidia known to exist in the U.S., eight have been classified in the genus *Eimeria*, a genus considered only potentially pathogenic in swine. The remaining species is in the genus *Isospora* (*Isospora suis*) and is a primary swine pathogen.

### Life Cycle

All coccidia have relatively complex life cycles with both asexual and sexual stages of multiplication occurring within the hosts. Infection occurs with the ingestion of sporulated oocysts (the infectious stage). Once in the pig's intestine, sporozoites are released from the oocysts (excystation), invade the cells lining the intestinal tract and give rise to the production and release of large numbers of invasive merozoites. Additional generations or cycles of infection occur so that there is potential involvement and destruction of many of the pig's intestinal cells (enterocytes). Large numbers of macrogametes (female) and lesser numbers of microgametes (male) stages form during this process. The microgametes are released and fertilize the macrogametes resulting in the formation of another new oocyst. Shortly thereafter, the oocysts are released into the intestinal tract and pass out with the feces. The time required from ingestion of a sporulated oocyst to the formation and release of a new oocyst, (*Isospora suis*), is approximately 5 days. Oocysts are shed for approximately 7 days before the infestation subsides.

Newly shed oocysts, however, are not infectious. To infect another pig, they must undergo further development (sporogony) outside the host. This process requires oxygen (air) and takes about four days but under ideal conditions of 95° F (37° C) temperature and 80% to 85% humidity the process can be as short as 12 hours. Outside the host, the sporulated oocysts are extremely resistant to environmental conditions and disinfection. Consequently, oocysts may remain viable for months until they are ingested by another susceptible pig and the cycle

is then repeated. The numbers of oocysts can easily build up in the environment. Ingestion of low numbers of oocysts may not cause clinical disease but does generate large numbers of oocysts to be present in the environment.

With subsequent farrowings, piglets may suffer severe consequences as a result of the ingestion of large numbers of oocysts left in the environment. The newborn pig is the most susceptible to severe disease. Pigs that are 1 to 2 days old develop much more severe disease than do pigs inoculated with an identical number of oocysts at 2 to 4 weeks of age.

There is a tendency for coccidiosis to be more severe during the summer and early fall because these warm and humid seasons favor oocyst survival and maturation.

## Clinical Signs

Coccidiosis in suckling piglets causes diarrhea (scours). Although possible as early as three days of age, in most cases diarrhea will become apparent between 7 to 10 days. The feces are usually fluid and ranges in color from yellow to a light gray-green. The diarrhea will generally persist 4 to 7 days. The severity of the disease and amount of dehydration depends on the number of sporulated oocysts ingested and the presence of other potential enteric pathogens. In severe cases, considerable dehydration may occur with death losses running from 10% to 50% or higher. Often, there is considerable variation in severity of signs within and between litters because of the relative numbers of oocysts that a particular pig(s) have ingested.

Coccidiosis occurs infrequently in postweaned swine and is due to *Eimeria* sp. Piglets weaned into unsanitary nurseries with previous oocyst contamination can develop mild diarrhea and ill-thrift as a result of infestation. Several reports of disease in older pigs and breeding swine are the result of very naïve pigs (never previously exposed) being exposed to heavily contaminated premises, usually concrete feeding floors or pasture lots. In these situations, pigs may develop fulminating diarrhea with blood in the feces.

## Diagnosis

Diarrhea in nursing pigs 5 to 14 days of age that does not respond to antibiotic therapy is suggestive of coccidiosis. It is unwise to assume or guess a diagnosis in cases of baby pig diarrhea. Data from veterinary diagnostic laboratories indicate prevalence of coccidiosis similar to that of enteropathogenic *Escherichia coli*, transmissible gastroenteritis (TGE), rotaviruses, *Clostridium* spp., and *Strongyloides ransomi*. The clinical signs and diarrhea caused by these agents can be indistinguishable to the casual observer. Often, it is necessary to sacrifice several live piglets to obtain a firm and accurate diagnosis rather than relying on the examination of dead piglets.

The most useful and definitive technique for diagnosis of coccidiosis due to *Isospora suis* is necropsy and histopathologic examination of appropriate intestinal tissues. Gross examination often reveals lesions located in the terminal half of the small intestine. Lesions include, in increasing severity, the presence of excess mucus, fibrinous exudate, thickening of the intestinal wall, or necrotic exudate in the lumen of the small intestine. Depending upon stage and severity, these gross lesions can be confused with those of a viral enteritis in early stages or *Clostridium perfringens* type C in more advanced stages.

Impression smears of intestinal mucosa from acutely affected pigs may demonstrate immature stages of coccidia. More reliably, histopathology of multiple sections of intestine taken from acutely affected pigs will reveal the presence of the different developmental stages of coccidia within intestinal sections. A thorough diagnostic investigation also helps rule out the presence of other infectious causes of diarrhea.

The demonstration of oocysts in the feces is useful in confirming a diagnosis of coccidiosis. Oocysts are shed in large numbers for a relatively short period of time during the first day or two of the diarrhea, and may not be present at the time of examination. Interpretation of fecal flotation also is hindered by the milk products present in feces of suckling pigs.

Diagnosis of coccidiosis in post-weaned pigs should be done with care. Fecal flotation will often demonstrate *Eimeria* spp. in asymptomatic infections. Necropsy and histopathology are usually warranted before initiating expensive treatments.

## Treatment

Once the piglets have diarrhea, the damage to their intestinal tract has already occurred and specific treatment at that time is of little value. There is presently no federally licensed or approved coccidiostat for swine although several treatments have been demonstrated efficacious for *Isospora suis* in other countries. If bacterial coinfections are present, certain antimicrobials may be an aid in decreasing the severity of disease. Coccidiostats for prevention of *Isospora suis* have not been demonstrated of value in the U.S. Since most clinical infections are the result of ingestion of oocysts from previously contaminated surfaces in the farrowing area, medication of sows is of little value. Several coccidiostats are of benefit in control of *Eimeria* infections in older pigs. Again, *Eimeria* is rarely pathologically significant and therapy should be carefully considered.

Consultation with your local veterinarian is recommended if coccidiosis is suspected.

## Prevention and Control

Since the oocysts are resistant to most disinfectants, the prevention of a build up of oocysts from previous litters is essential. Oocysts are shed in high numbers from piglets in the feces and sporulate on the ground or floor of the farrowing area. Therefore, special efforts must be made to clean and maintain hygienic conditions in the farrowing area. Because a minimum of 2 to 5 days is generally required for the oocysts to become infective, manure removal and separation from the piglets can be helpful. More importantly, proper cleaning between each farrowing is absolutely necessary for control of coccidiosis. All organic material should be removed by powerwashing with hot water or steam. Oocysts resist most disinfectants but the use of 5% to 10% solution of soapy ammonia or 50% bleach can be partially effective. In some cases, painting the flooring, divider boards, and mats with a sealant or paint has been effective in breaking the cycle of infection.

Since adult swine are the most likely source of new infections, pregnant sows and gilts should be washed prior to entering the farrowing area with special attention to the teats and underside. Feeding coccidiostats to sows is of dubious efficacy and of questionable economic value.