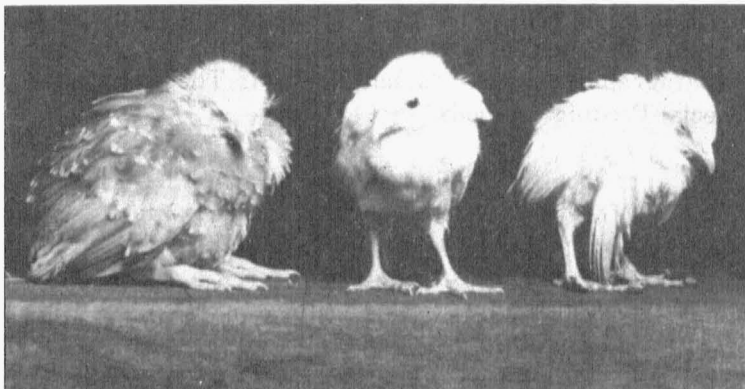


UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
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Coccidiosis in Chickens and Other Birds

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A group of chicks affected with coccidiosis. A microscopic examination of the droppings of each one of these birds showed the coccidia in large numbers.

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SUMMARY

1. Coccidiosis causes heavy losses annually in young chicks in Missouri.

2. The parasite which causes the disease lives over in the soil from one year to the next.

3. Contaminated soil and unclean brooder houses are probably the most common sources of infection. Adult birds, pigeons, sparrows, and soiled shoes of persons walking over contaminated grounds may also serve as carriers.

4. Bloody droppings are a sure sign of coccidiosis. If this indication is not present a microscopic examination of the droppings will usually show the parasites.

5. Clean grounds and sanitation will aid in the control of the disease. A three-year-rotation of grounds should be practiced.

6. If coccidiosis appears, put the birds on a diet high in milk and supplement it with one of the sulfonamids. See specific directions in later paragraphs headed: "What To Do If The Disease Appears" and "Special Feeding Methods."

Coccidiosis in Chickens and Other Birds

A. J. DURANT AND H. C. MCDUGLE

Coccidiosis is one of the most common diseases of young chicks. Oftentimes birds that survive an attack become chronic carriers and spreaders. Occasionally an acute outbreak may occur in susceptible adult flocks. The disease is often disastrous to flocks of young turkeys, and may at times cause losses in pigeons, geese, and ducks. Wild birds are susceptible, especially when raised in confinement. Heavy losses have been reported in flocks of quail and pheasants on game farms in Missouri.

The disease is most prevalent in the spring and summer (Figure 4). There are more chicks of susceptible age at that time; and the warm, damp spring weather develops the coccidia from the resting form into the infectious stage.

Unless an early diagnosis is made and treatment is provided heavy losses may occur.

CAUSE

Coccidiosis is a disease caused by a very small animal parasite that can be seen only with the aid of a microscope (Figure 2). The parasite is of the genus *Eimeria* and develops in the inner lining of the intestine, causing irritation and inflammation of varying degrees. Although there are several species of coccidia in poultry, *Eimeria tenella* of the ceca and *Eimeria necatrix* of the middle portion of the small intestine are most common.

THE NATURE OR LIFE CYCLE OF THE PARASITE

The life cycle of this parasite is direct, that is from bird to bird, yet it is very complicated. The non-infectious resistant stage (Figure 2) is passed out with the droppings. However, under favorable conditions of temperature and moisture, this egg-like form changes in a few days and becomes infectious. Birds feeding over soil or droppings containing this incubated stage are likely to develop coccidiosis.

Bloody droppings are associated with coccidiosis, yet some species of coccidia do not produce this symptom. Blood in the droppings is

caused by acute and extensive invasion of the lining of the small intestine or ceca.

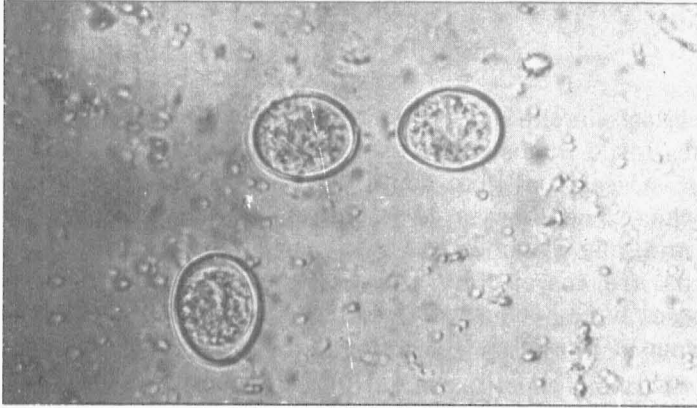


Fig. 2.—A photo-micrograph showing the resting or resistant stage of the parasite causing coccidiosis. The three oocysts (resistant or resting stage) are enlarged 700 times their natural size.

SOURCES OF INFECTION

Contaminated soil and dirty brooder houses are probably the most common sources of infection, though the disease may be carried to a flock on clean grounds or into clean brooder houses on soiled shoes of persons who have walked over contaminated ground. It may also be carried by pigeons, sparrows, or by flies, especially if sour milk is fed. In sheltered areas the parasite lives over from one year to the next so that the disease is likely to occur year after year on the same ground. Adult birds may carry the disease to clean grounds.

Chicks should not be allowed to run in orchards or fields that have been fertilized with chicken manure within the last two years. The disease is not, to our knowledge, transmitted through the eggs from a carrier hen to the baby chicks.

It should be emphasized that it is quite common for coccidiosis to occur not only in brooder houses in the spring before the chicks have been out of the house, but also in battery brooding plants.

SYMPTOMS IN YOUNG CHICKS

In very young chicks seven days to three weeks old the first indication of coccidiosis is usually an inclination to gather close to the stove as if chilled, or blood may appear in droppings. The symp-

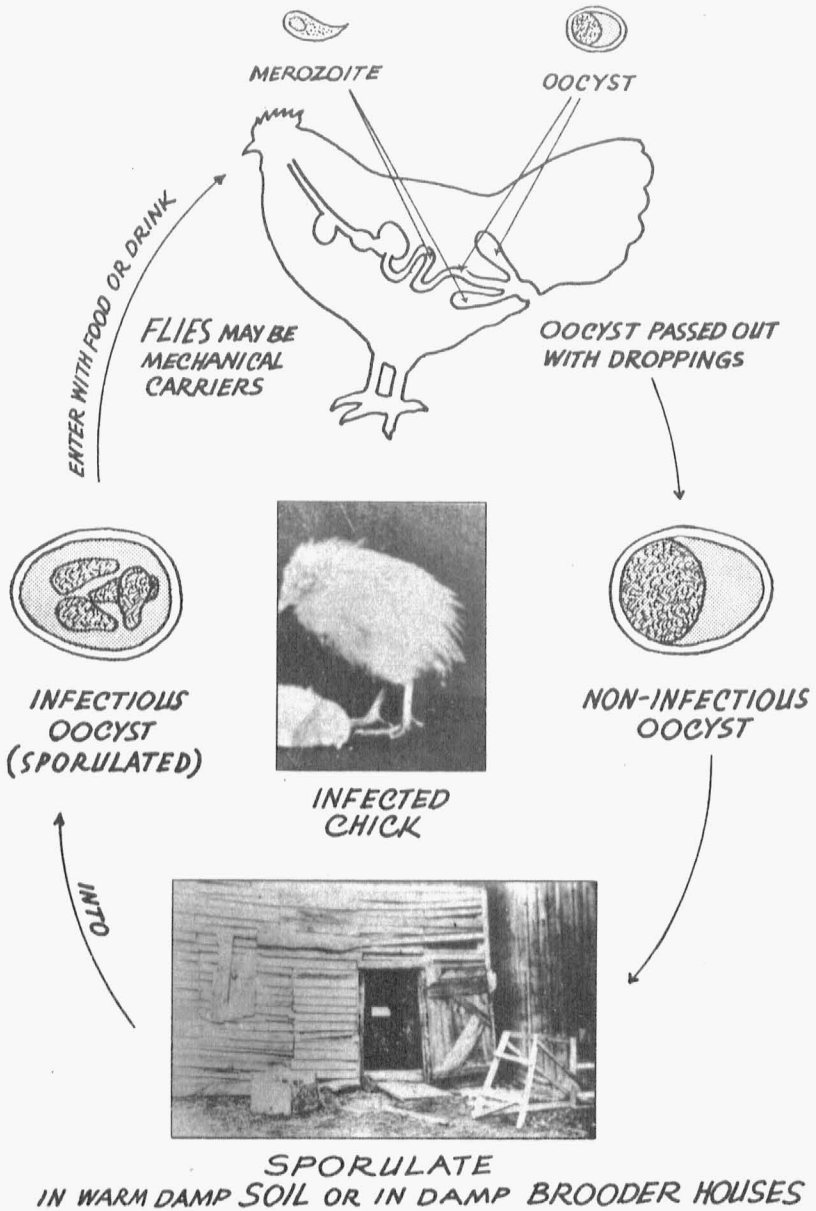


Fig. 3.—A simple life cycle of coccidiosis in fowls.

toms in slightly older chicks (4 to 8 weeks) are roughened, dirty plumage, droopiness, unthriftiness, loss of appetite, and gradual loss of flesh (Figure 1). Occasionally, especially in male White Leghorns, a shrunken bluish color of the comb, with sometimes a like discoloration of the abdomen and legs may be evident. Blood may or may not appear in the droppings of these older chicks. The disease may spread rapidly through the brood until 50 or 75 per cent are showing signs of the disease. The symptoms may not be so pronounced in still older chicks (2 or 3 months old) and bloody diarrhea may not be present. They usually appear slightly droopy, have ruffled soiled plumage, accompanied by a white or watery diarrhea, and may develop paralysis of the legs. In chicks ten days to two weeks old the course of the disease is very rapid. In general, the older the bird the longer it lives after becoming infected.

It sometimes happens that birds affected with a slow or chronic form of coccidiosis will develop a condition of the head resembling roup, and this is probably a form of malnutrition brought on by the disease. In cases of this sort it can be distinguished from ordinary roup by the character of the swelling around the eyes and by the fact that there will be a lack of odor, as is found in "swell head" roup.

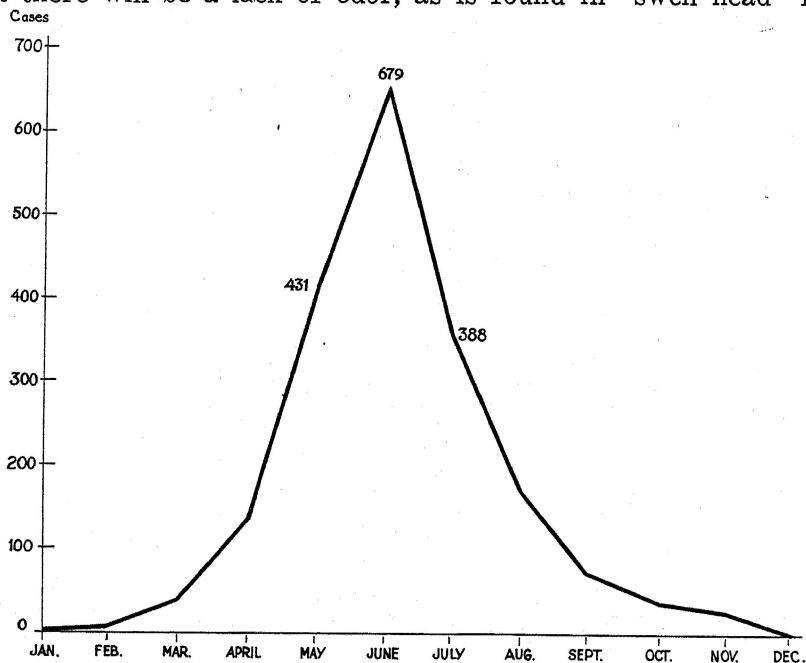


Fig. 4.—Chart showing the seasonal variation of coccidiosis in chickens. These data were compiled from autopsy records on 2118 chickens during the period 1932-1947 inclusive.

GROWN BIRDS MAY BE AFFECTED

Occasionally adult birds will develop acute coccidiosis as seen in chicks 4 to 8 weeks of age. However, the chronic type is most common and sick birds may live for weeks. This form of coccidiosis usually occurs most frequently during the fall, in pullets or cockerels that have passed through an attack of coccidiosis in the spring.

CHANGES IN ORGANS OF AFFECTED BIRDS

The intestines are usually affected and the most constant changes are found in the ceca (blind pouches) and in the small intestines. In young chicks in which a bloody diarrhea is a marked symptom the blind pouches or the small intestines contain a mass of bloody material and the walls of these organs are severely inflamed. Both ceca are usually affected. In the more chronic form the pouches may be distended and filled with a hardened yellowish-white mass, in the center of which is a cheesy material of a dirty yellowish color (Figure 5).

The changes occurring in the small intestines depend on the species of coccidia that is present, as some produce a more severe type of the disease than others. In general, *E. tenella*, *E. maxima*

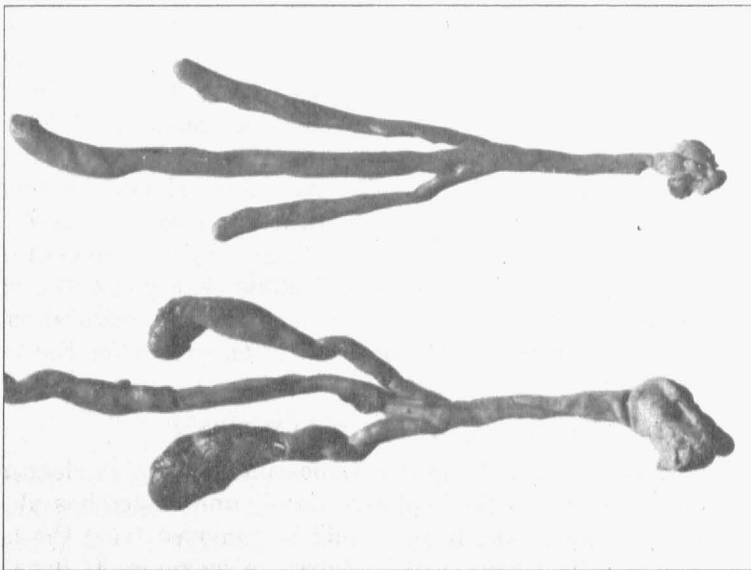


Fig. 5.—(Upper) The blind pouches and adjacent parts of the intestines of a normal bird. (Lower) Diseased pouches of a bird, showing distension caused by cheesy core contained in the pouches. This is more often seen in the chronic form of the disease.

and *E. necatrix* are the ones that cause the occurrence of blood either in the droppings or in the intestinal contents. The intestinal lining may show an exudate that is either blood-tinged or contains flecks of blood. In some cases sections of the small intestines will be dotted with hemorrhages which show through the outer wall. In other cases thickening of the wall with collections of exudates in the lumen actually produce a stoppage in sections two or three inches in length. The presence of blood depends, of course, on the stage at which a post mortem examination is held and on the species of coccidia involved. In some cases blood will not be present and in others there will be severe hemorrhage and clots of blood inside the intestine. The walls of the small intestine or ceca are greatly thickened.

In mature fowls the changes are not as marked as in younger birds and a chronic inflammation of the intestine is usually the only gross change observed. It is not possible to make an accurate diagnosis without a microscopic examination of the contents of the intestines or the droppings, though in general birds from flocks which were affected when young may be suspected of suffering from the chronic form of coccidiosis, if the symptoms described for adult birds are observed.

CLEAN GROUNDS AND SANITATION AID IN CONTROL

Movable brooder houses should be thoroughly cleaned and disinfected, using a can of high-test lye to each 12 gallons of cold water. The house should then be moved to clean grounds from 50 to 75 yards away from the other poultry houses and runs. Select any available slope that is well drained. An effort should be made to have a range on which a three-year rotation can be practiced. This will mean that three sites will be needed, moving the brooder house to one of the sites each year, which will allow each plot to be vacant for two seasons. Trees which are present on the range should be trimmed to allow plenty of sunlight under them during the course of the day.

MANAGEMENT OF OLD RUNS

If the runs are limited and it is impossible to furnish clean range each year, the ground should be plowed deeply and seeded heavily with wheat. The droppings and litter should be removed from the houses and the floor and litter kept clean and dry. A warm moist deep litter in the house speeds the development of coccidiosis even though the chicks are not running on the ground, and not infrequently outbreaks of coccidiosis occur in battery brooding plants.

WHAT TO DO IF THE DISEASE APPEARS

Coccidiosis may sometimes invade a flock even under the best conditions of sanitation and it has appeared in brooder houses on clean range where every possible preventive measure has been taken. This, however, should not be taken to mean that sanitation should not be practiced since in most cases clean ranges solve the problem of coccidiosis. If chickens are placed in unsanitary houses or on ranges where the disease has appeared the previous year, coccidiosis is almost certain to make its appearance in the young stock.

A special feeding method was devised some years ago by Dr. J. R. Beach of the California Experiment Station. This was simply the use of a high percentage of milk in the diet of sick birds. This recommendation has long been followed in Missouri and has been quite successful, particularly when the houses have been kept clean and the birds have been kept warm and dry. Even though the intestinal tract is badly damaged the milk helps sustain body weight until the chicks build up resistance.

Sulfonamids are also used in the control of this disease and best results have been obtained by supplementing the milk diet with either sulfaguanidine in the case of cecal coccidiosis or sulfamerazine in the case of coccidiosis of the small intestine.

An early diagnosis is of great value in controlling the disease. In outbreaks of coccidiosis particularly, and for a general practice it is well to put the feeders and waterers up on wire frames. The frames should be of sufficient width and depth to enclose any water, mash, or droppings near the feeders or waterers. Birds have a tendency to pick up spilled feed from the floor and if infective droppings are present other birds may become infected. A moist area around the waterer is an ideal place for incubation of the non-infectious stage of the coccidia.

The treatment of adult birds is the same as for chicks. If only a few adult birds are kept for egg production, one of the special milk diets can be used and in addition one of the sulfonamids can be given by way of mouth as an individual treatment.

When using liquid milk, it is probably best to feed it early in the morning and late in the evening unless the house is well screened since milk has a tendency to attract flies and they are the intermediate host of one of the tape worms of poultry.

SPECIAL FEEDING METHODS

There are two systems of feeding which are successful in the control of this disease and it depends on the poultryman's situation as to which one may be applied most economically.

Ration 1 is recommended as the most reliable in general, and consists in feeding mash containing 40 per cent of dried milk.

A reliable and successful formula consists of: 20 pounds of bran, 20 pounds of shorts, 20 pounds of yellow corn meal, 40 pounds of dried milk (either dried skim milk or dried buttermilk), 4 pounds of bone meal, 1 pound of table salt, and one pint of high grade cod liver oil.

Keep this mash before the chicks constantly, with an abundance of greens, and allow plenty of water but feed no grain.

Ration 2 consists in supplying the chicks with sour milk or buttermilk constantly, adding 2 tablespoons of cod liver oil to each 3 quarts of milk, removing the mash and water, and giving an abundant supply of greens. A small amount of grain should be fed in the morning and a somewhat larger amount at night. The chicks should have full crops of grain when they go to roost. Allow no other feed during the feeding treatment.

Ration 2 is one which may be used if the farmer has an abundance of liquid milk, either fresh skim milk, sour milk, or buttermilk. Best results may be expected in using liquid milk if the same kind is used each day, though this is not necessary, and changes can be made with comparative safety.

CONTINUE SPECIAL RATION 7 TO 10 DAYS

Continue one of these methods of feeding for seven to ten days or until the condition of the flock has decidedly improved. Then gradually replace the special ration until the chicks are again on a normal ration. If the disease reappears the flock should be put back on one of the suggested rations for sick birds. After a brood has passed through the disease it is not likely to be troubled with it any further that season, except for occasional chronic cases after the birds are grown. In most cases birds have acquired an immunity to the disease after one attack.

TREATING TURKEYS AND OTHER BIRDS

In general, the recommendations for the control of coccidiosis in chickens will apply to other birds. These measures have been successfully applied to wild turkeys and pheasants in confinement in State Game Parks in Missouri, in a number of instances.

In applying the milk treatment to birds other than chickens add dried milk to the feed until the total milk content is 40 per cent. Example: For a feed containing 10 per cent milk add 50 pounds of

dried milk to 100 pounds of the feed, plus 1 pint of high grade cod liver oil.

Where there is doubt as to the diagnosis consult your local veterinarian or send live affected birds by prepaid express to the Veterinary Department of the Missouri Agricultural Experiment Station at Columbia.

There are various remedies and medicines on the market for the prevention and cure of coccidiosis, but carefully controlled experimental trials with drugs have shown that only a few of them are useful.

No measure is successful in the control of coccidiosis unless careful attention is given to sanitation. A three-year rotation for the prevention of coccidiosis, as previously described should be carried out in preference to any other method of prevention and this system can be carried out on most Missouri farms.