



Understanding

Coccidiosis and its causes

Whitepaper
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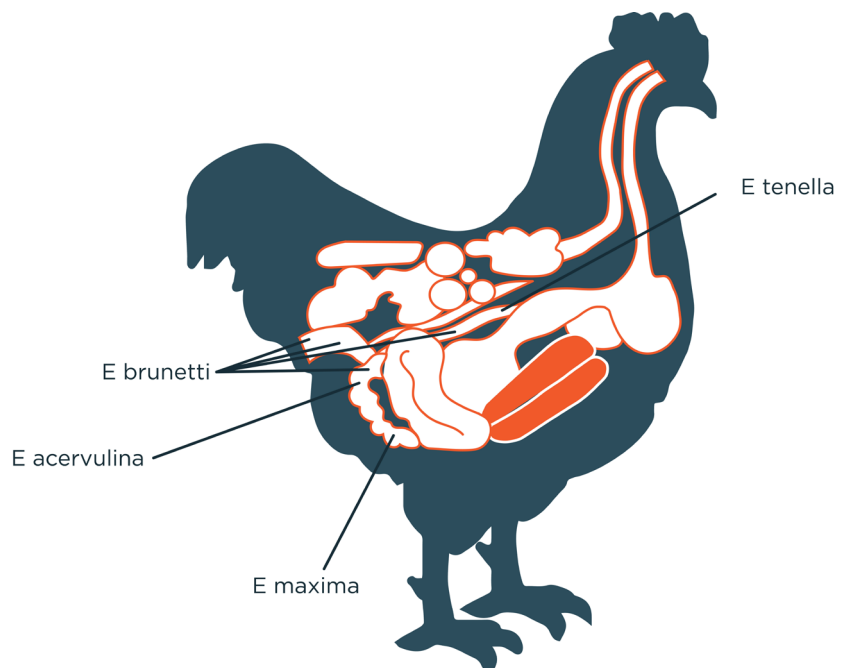
The Eimeria parasite: a constant threat in the poultry shed

It is well recognised that coccidiosis is a disease that can significantly compromise the productivity and welfare of a poultry flock (and other livestock). Coccidiosis is caused by Eimeria species parasites that are commonly observed in the intestinal tract of mammals and birds. The warm, damp environment of poultry sheds are the ideal conditions for Eimeria to sporulate in, and therefore it is a constant threat. If it is not kept under control, it will inevitably lead to economic losses. We have already written about Preventing Coccidiosis using botanicals to enhance gut health and disrupt the reproduction of the parasite. In this whitepaper, we will focus more on this prevalent parasite itself.

Eimeria

There are seven species of Eimeria known to infect chickens, four of which are most commonly found in poultry sheds. Each species will develop in different parts of the gut:

- **E tenella** - infections are found only in the ceca and can be recognised by accumulation of blood in the ceca and by bloody droppings.
- **E acervulina** - the most common cause of infection. Lesions include numerous whitish, oval or transverse patches in the upper half of the small intestine, which may be easily distinguished on gross examination.
- **E brunetti** - found in the lower small intestine, rectum, ceca, and cloaca. In moderate infections, the mucosa is pale and disrupted but lacking in discrete foci, and may be thickened. In severe infections, coagulative necrosis and sloughing of the mucosa occurs throughout most of the small intestine.
- **E maxima** - develops in the small intestine, where it causes dilatation and thickening of the wall; petechial hemorrhage; and a reddish, orange, or pink viscous mucous exudate and fluid. The exterior of the midgut often has numerous whitish pinpoint foci, and the area may appear engorged.



Reproduction cycle



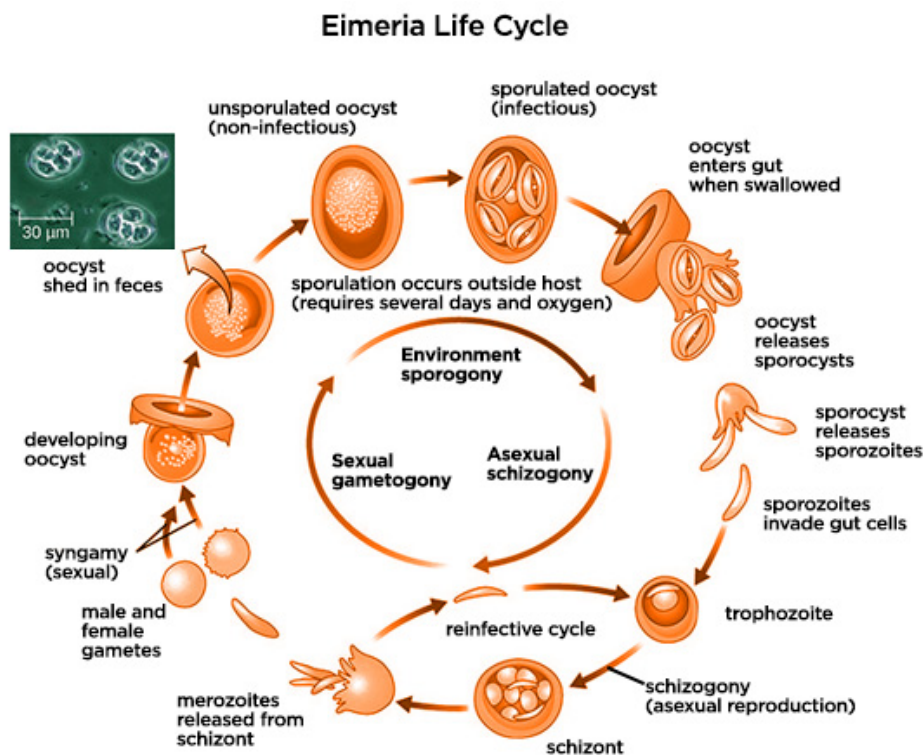
Depending on the Eimeria species, the coccidian lifecycle takes approximately five to eight days to complete.

- Unsporulated oocysts are shed in the faeces in the litter.
- Oocysts sporulate (become infective) in the presence of adequate moisture, oxygen and temperature and are ingested by the birds from ground and litter pecking.
- A sporulated oocyst has a strong outer wall, similar to the shell of an egg, protecting the parasite within from almost anything.
- Once in the bird they attach themselves to cells on the gut wall and reproduce in several cycles.
- Once these cycles are complete, oocysts are excreted back into the litter, where they go through maturation (sporulation) and can once again be ingested by birds.
- And so the cycle begins again.

With each successive cycle, the number of oocysts in the environment increases. This cycle of ingestion, reproduction and shedding can severely damage the gut wall, hampering the absorption of nutrients. As the coccidiosis parasites build up, birds will become distressed, stop absorbing nutrients and become sick.

As each reproduction cycle lasts for five-to-eight days, a coccidiosis problem will often become apparent around 21-28 days - by this time, a third cycle will have taken place and the parasite will have populated in sufficient numbers to damage the gut.

Oocysts are extremely environmentally resistant and can survive up to one year in dry, cool environments - they will sporulate as soon as they have access to warmth, moisture and oxygen.





Symptoms and diagnosis

First signs of an outbreak of coccidiosis can be watery faeces or mucus (the bird is either not eating, or its ability to digest food is compromised); a drop in feed intake may occur next, along with rapid weight loss, droopiness and ruffled feathers. Depending on the species of *Eimeria*, sometimes pink exudate will be visible in the droppings – this is cellular sloughing from the infected gut. Farmers suspecting coccidiosis will progress to post-mortem examination of the gut in sample birds from the flock.

It is important to take a proper sample of birds if investigating a coccidiosis threat – there may be more than one type of coccidiosis present in the flock. Different species of *Eimeria* (parasites that cause coccidiosis) will create differing lesions in different parts of the gut so identification is through post-mortem lesion scoring. The location in the gut, the appearance of the lesions, and the size of the oocysts are used in determining the species present.

Affected intestinal tract wall



Healthy intestinal tract wall

Lesion scoring

The most widely used scoring system is the Johnson and Reid Scoring System which assigns scores to lesions specific to each species. Generally, scores of 0 or 1 are assigned when gross lesions are absent or light, while scores of 3 or 4 are assigned when the gross lesions are severe.

Lesion scores are useful for:

- Identifying the coccidial species involved
- Assessing the severity of coccidial development and the treatment required for 1) the flock and 2) turnaround procedures
- Assessing the effectiveness of previous treatments
- Establishing a link between the parasite manifestation observed on the farm and in production

A diagnosis of clinical coccidiosis is warranted if oocysts, merozoites, or schizonts are seen microscopically and if lesions are severe. Subclinical coccidial infections may be present but unimportant, and poor performance could be due to other flock disorders. If lesion scores are 3 or 4, this denotes a severe infestation and the oocysts will have penetrated the concrete floor. A treatment, such as [SmiteKokziDes](#), will be required to disinfect the concrete to destroy the oocyst.



Immunity

Eimeria is always present in the poultry shed, so rather than completely eliminating it, efforts are normally focused on keeping it under control. The good news is that birds can build immunity to coccidiosis, but only if they are exposed gradually to low levels of the disease. This gives the bird time to build an effective immunity. However, this immunity is species-specific and does not protect the bird against infection by other types of Eimeria. Vaccinations have been used on a limited scale for the last 50 years. In the UK, these have mainly been used in breeder and laying flocks rather than broilers, as the cost and scale of vaccination relative to the shorter life span of broilers currently makes it unviable.

Most broiler chickens are prophylactically fed an ionophor (a coccidiostat) to inhibit the development of the parasite, allowing the bird to build up an immunity to coccidiosis. However, there is ongoing concern that birds could develop immunity to ionophores, and some countries, for example the US, are now regarding ionophores as antibiotics and banning their routine use. There is quite a lot of debate about whether an ionophore is an antibiotic, but in the US, vaccination of broilers as an alternative control regime for coccidiosis is rising rapidly.

Looking forward

Further research into controlling coccidiosis is essential in order to better understand the mechanism of how birds respond to Eimeria. Given that it is impossible to completely remove coccidial oocysts from a farm environment, and that chicken constitutes one third of the global meat consumption, learning how to better control coccidiosis is an important part of future global food security.

Read our guide on how to manage coccidiosis with phyto-genic supplements, as an effective alternative to vaccination or antibiotics.