A Review on Poultry Coccidiosis

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Coccidiosis is a disease of universal importance in poultry production. The protozoan parasites of the genus *Eimeria* multiply in the intestinal tract and cause tissue damage, with resulting interruption of feeding and digestive processes or nutrient absorption, dehydration, blood loss, loss of skin pigmentation and increased susceptibility to other infectious agents (McDougald and Fitz-Coy, 2008).

**Distribution**

**Global scenario**

Coccidiosis in poultry was reported in various continents and countries of the world including China (Sun *et al.*, 2009), Ethiopia (Gari *et al.*, 2008), Europe (Williams *et al.*, 1996), Netherlands (Graat *et al.*, 1988), North and South America (Mattiello *et al.*, 2000) and Turkey (Akcay *et al.*, 2011).

**Indian Scenario**

Coccidiosis is an old parasitic disease, prevalent all over the country and has a...
significant impact on poultry production (Bera et al., 2010). Overall prevalence of coccidiosis in Jammu region of India was of 39.58 per cent and five *Eimeria* species have been identified in this region were *E. tenella*, *E. necatrix*, *E. maxima*, *E. acervulina* and *E. mitis* (Sharma et al., 2013).

**Tamil Nadu**

Aarthi et al., (2010) reported that *E. acervulina*, *E. brunetti* and *E. necatrix* were the most preponderant species of *Eimeria* found in Tamil Nadu.

Various *Eimeria* species including *E. acervulina*, *E. brunetti*, *E. maxima*, *E. necatrix*, *E. mitis* were isolated from various parts of Tamil Nadu, including Coimbatore, Cuddalore, Madurai, Namakkal, Udumalpet, Tirupur in chicken and lesion scoring was used to assess virulence and pathogenicity (Raman et al., 2011).

**Epidemiology**

**Agent**

Coccidiosis is an infectious disease caused by protozoan parasite of the genus *Eimeria* (Tyzzer, 1932). Coccidian are members of the phylum Apicomplexa, which is characterised by the presence of an apical complex in sporozoites. The most common apicomplexans in poultry belongs to the genus *Eimeria* (McDougald and Fitz-Coy, 2008). Seven *Eimeria* species, *E. acervulina*, *E. brunetti*, *E. maxima*, *E. mitis*, *E. necatrix*, *E. praecox* and *E. tenella* are now accepted (Shirley, 1986). *Eimeria tenella* and *E. necatrix* are the most pathogenic species, *E. acervulina*, *E. maxima* and *E. mivati* are common and slightly to moderately pathogenic, *E. brunetti* is uncommon but pathogenic when it does occur, *E. mitis*, *E. praecox* are relatively non-pathogenic species (Soulsby, 1982). Each species causes a separate disease, each exhibiting a characteristic degree of pathogenicity (Williams, 2005).

**Host**

Coccidiosis in chickens is caused by *E. acervulina*, *E. brunetti*, *E. maxima*, *E. mitis*, *E. mivati*, *E. praecox* and *E. tenella*. Chicken is the only natural host of these seven species of *Eimeria*. Reports of these species of *Eimeria* infecting other birds can be considered spurious. Cross-transmission of *Eimeria* spp. from chickens to other host species has been unsuccessful except for a few instances in which severely immunocompromised birds were used (McDougald and Fitz-Coy, 2008).

**Epidemiological measures of causal association**

**Age and breed**

Among commercial hybrids, layers are frequently more susceptible to coccidiosis than broilers but results vary (Williams and Catchpole, 2000). Coccidial pathogenicity is influenced by the bird of chicken, since differences in innate immunity occur (Smith et al., 2002).

Maximum prevalence of coccidiosis in chicken was reported during 41-50 days of age (Amare et al., 2012). Most of the *Eimeria* spp. affects birds between 3 and 18 weeks of age group (Sharma et al., 2013).

**Other predisposing factors**

Higher crude protein levels increase coccidial pathogenicity (Sharma et al., 1973) possibly because of increased tryptic activity in the host leads to more efficient excystation of oocysts in the intestine (Williams, 2005).
*Eimeria tenella* is more pathogenic in chickens fed wheat-based diets than those fed maize-based diets. Because wheat contains much higher amounts of soluble non-starch polysaccharides, which increases digesta viscosity, than does maize (Williams, 1992).

Immunosuppressive diseases such as MD (Rice and Reid, 1973) and IBD (McDougald et al., 1980) are increasing susceptibility of chickens to coccidiosis.

**Clinical signs**

Unlike bacteria and viruses, which potentially multiply infinitely until checked by immune responses or host’s death coccidian have a genetically fixed, self-limiting lifecycle (Tyzzer, 1929). The severity of coccidian infection depends on the age of birds, *Eimeria* species, number of sporulated oocysts ingested, immune status of the bird and environmental management (Hafez, 2008).

Coccidiosis in chicken is characterised by dysentery, enteritis, emaciation, drooping wings, poor growth, low production with high rate of mortality and morbidity (Awais et al., 2012). Pathophysiological effects of coccidiosis including poor weight gain and poor feed conversion efficiency, reduced feed and water intake, intestinal malabsorption, reduced nutrient digestion, villous atrophy, increased intestinal passage time, intestinal leakage of plasma proteins and increased intestinal acidity (Williams, 2005).

**Gross lesions**

Clinically the infection can be recognized by the accumulation of blood in the caeca and bloody droppings (*E. tenella*), small white spots usually intermingled with rounded, bright or dull red spots of various size (*E. necatrix*), numerous array of whitish transverse patches in the upper half of the small intestine (*E. acervulina* and *E. mivati*) and there is a catarrhal enteritis and thickening of the intestinal wall and extensive coagulative necrosis and sloughing of the mucosa throughout the entire intestine (*E. brunetti*) (McDougald and Fitz-coy, 2008).

**Diagnosis**

Coccidiosis can be best diagnosed from birds sacrificed for immediate necropsy. Diagnosis was based on zone of intestine parasitized, gross appearance of lesion, oocysts morphology, location of parasite in the host intestinal epithelium (Conway and Mckenzie, 2007).

**Microscopic examination**

Diagnostic characteristics which are of value include the clusters of the large schizonts of *E. necatrix* and *E. tenella*, the small round oocysts of *E. mitis*, or the large gametocytes of *E. maxima*. Presence of clusters of large schizonts in the midgut area is pathognomonic for *E. necatrix*, and a similar findings in the ceca indicates *E. tenella*. Oocysts associated with lesions in the duodenum are *E. acervulina*, *E. mivati*, or *E. praecox*, and oocysts associated with lesions in the lower gut are *E. mitis*, *E. mivati* or *E. brunetti* (McDougald and Fitz-Coy, 2008).

Dropping score may be used in the same manner as lesion score for a rapid and fairly reliable rating of the infection (McDougald et al., 1986). Species identification of coccidian is by morphological characteristics (Williams et al., 1996). Polymerase chain reaction was also used for detection of coccidial infections and species identification (Haug et al., 2008).

**Economic losses**

Coccidiosis remains one of the most expensive and common diseases of poultry
production. It costs chicken producers worldwide at least 3 million United States dollars annually (Dalloul and Lillehoj, 2006). Total loss due to coccidiosis in poultry in India has been found to be of Rs. 1.14 billion for the year 2003-04 (Bera et al., 2010).

References


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