Review Article

A Review on Poultry Coccidiosis

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ABSTRACT

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 haemorrhagic enteritis, loss of blood and death. This paper gives a glimpse on the brief review on epidemiology, transmission, clinical signs, diagnosis, control and economic losses due to coccidiosis in poultry.

Keywords
Coccidiosis, poultry

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Coccidiosis

Definition
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 trypsic 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. necatrich), 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).

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