



## ORIGINAL ARTICLE



## Coccidiosis infection in Rabbits and its control

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### Abstract

Coccidiosis is regarded as an important disease for overall health and performance in modern rabbit production. It decreases voluntary feed intake, digestibility and reproductive performance of rabbit. It is caused by intracellular protozoon parasites of the genus *Eimeria* in with high mortality rate. Anti-coccidials along with strict hygienic measures is the only control option.

**Key words:** *Eimeria*, Rabbit, Husbandry practices etc.

Rabbits (*Oryctolagus cuniculus*) are considered as a potential source of animal protein due to its high nutritious value, calcium, phosphorus, and linoleic acid, with low fat and cholesterol contents (Nistor *et al.*, 2013). In addition, they can be used for wool production, as laboratory animals and as pets for hobby purposes (Al-Mathal, 2008). Rabbits are highly susceptible to many microbial and parasitic diseases that significantly affect their production. Among the parasitic diseases coccidiosis is one of the most important and widely distributed parasitic diseases in rabbits (Hamid *et al.*, 2019). It is caused by intracellular protozoon parasites of the genus *Eimeria* in which mortality rate may go high particularly during and after rainy season (Singla *et al.*, 2000). There are 15 *Eimeria* spp. that affect the intestinal tract and one species (*E. stidea*) affecting the liver and bile duct (Li and Ooi, 2009). *E. intestinalis*, *E. magna*, *E. piriformis*, *E. perforans*, *E. media*, *E. agnotsa*, *E. exigua*, *E. flavescens*, *E. irresidua*, *E. coecicola*, *E. vej dovskyi*, *E. roobroucki*, *E. oryctolagi*, *E. nagpurensis*, and *E. matsubayashi* invade the small intestine (Soulsby, 1968). The highly pathogenic *Eimeria* spp. in

rabbits are *E. intestinalis* and *E. flavescens*, (Jithendran, 1995). Mixed infection with more than one *Eimeria* spp. is common (Jithendran and Bhat, 1996).

Infection usually occurs through ingestion of contaminated feed and water containing sporulated oocysts. Upon entering into the gut gastric and pancreatic juices acts on the oocysts wall leading to rupture and release of sporozoites, invading the intestinal epithelial cells. Sporozoites then pass via the mesenteric lymph nodes and hepatic portal circulation to the liver where they enter in bile duct becoming trophozoites followed by schizonts releasing merozoites (merogony stage) which form four generations in the asexual stage of the parasite (John *et al.*, 1999). Lastly, male (micro) and female (macro) gametocytes combine sexually (gametogony stage) to form zygotes that develop into non-sporulated oocysts. The non-sporulated oocysts pass in the bile and are shed in the faeces of the infected rabbits about 18 days after infection. Under favourable environmental conditions, sporulated oocysts are formed within three days (Gardiner *et al.*, 1998).

Almost all domestic breeds are highly susceptible to coccidiosis specially 1-4 months old (Bachene *et al.*, 2018). The rapid spread of infection is due direct and short life cycle of the parasite (García-Rubio *et al.*, 2017). Researchers found that the production of *E. flavescens* and *E. intestinalis* oocysts in suckling rabbits increases with age (Pakandl and Hlášková, 2007). More susceptibility in young rabbits may be due to reduced immunity resulting from weaning stress, feeding and reproductive status (Al-Mathal, 2008). Also, it was found that female rabbits were more infected than males (Faraj, 2017). The severity depends upon the number of ingested oocysts, age and the immune status of the animal (Miller and Fowler, 2003). In the early stage of infection with coccidiosis, sudden diarrhoea, or death may occur without any clinical signs.

Hepatic coccidiosis occurs mostly in chronic and subclinical form specifically in adults who are carriers (Pakandl, 2009). Affected animals show symptoms of anorexia, polydipsia, brown watery diarrhoea, dehydration, icteric membranes, poor feed conversion, growth retardation, wasting of the back and hindquarters, coarse hair, abdominal distension and death (Lakshmanan *et al.*, 2011; Al-Saeed *et al.*, 2017).

In Intestinal coccidiosis parasite colonizes distinct parts of the intestine and the mucosa at different depths (Pakandl, 2009). Intestinal coccidiosis is frequently observed in rabbits aged from one to five months old. Infection results in atrophied intestinal villi, malabsorption of nutrients, hypoproteinaemia, electrolyte imbalance etc. (Hana *et al.*, 2011). Affected rabbits suffer from weakness, gnashing teeth, dirty anus, weight loss, soft to watery haemorrhagic diarrhoea, dehydration, and thirst (Fioramonti *et al.*, 1982).

Laboratory diagnosis of hepatic and intestinal coccidiosis depends on the analysis of faeces of suspected rabbits. Serological diagnosis of *E. stiedae* using ELISA (Wei *et al.*, 2020) and molecular assays such as multiplex PCR assay for *E. stiedae* (Hassan *et al.* 2015) were also reported. It should be noted that the presence of oocysts in faecal samples does not confirm the presence of clinical disease. Development of

symptoms depends on the virulence and pathogenicity of the infecting *Eimeria* spp. (Pakandl, 2009).

## **Prevention and treatment**

### ***Management practices***

Unhygienic conditions and high stocking densities accelerates coccidiosis in rabbits (González-Redondo *et al.*, 2008). Chances of getting infected is more when kept in group rather than kept alone (Sharma *et al.*, 2016). Spread of coccidiosis in a rabbitry can be limited by proper hygiene and husbandry practices as well as strict biosecurity measures (Pakandl *et al.*, 2008; Schlolaut *et al.*, 2013). Attention to hutch sanitation is most important. The oocysts need at least 2 days in the environment to sporulate and become infective, and they thrive in damp conditions; therefore, regular cleaning of the hutch will remove these oocysts. As oocysts can survive for many months in the environment, deep-litter situations are not recommended and if the rabbits are kept in an hutch on the grass it should be moved regularly (Tehrani *et al.*, 2013). Stress of any sort such as overcrowding or poor nutrition make rabbits more susceptible to clinical disease, and any such stress factors must be reduced. The cage should be routinely disinfected with a solution that is lethal to oocysts such as ammonia (Becha and Devi, 2014).

### **Anticoccidial drugs and Vaccine**

Globally, synthetic anticoccidial drugs, either ionophores or synthetic chemicals, are used for the control of rabbit coccidiosis (Pakandl, 2009). Coccidiostats in rabbits prevent the developmental stages (schizogony and gamogony stages) of the parasite inside the host. Coccidiostats are usually added to the feed of animals, however, coccidiocidal drugs are added to water. Using 25 ppm toltrazuril/liter of drinking water for two days was successful in treating the clinical hepatic coccidiosis (Singla *et al.*, 2000), Diclazuril and sulfachlorpyridazine were also found effective in treating rabbit coccidiosis too (Ogolla *et al.*, 2018).

For vaccines oral or spray with live lines of *E. magna* oocysts (Licois, 2004), and *E. media* (Akpo *et al.*, 2012) provided satisfactory preliminary results. Though research for recombinant vaccines against coccidiosis in rabbits (Song *et al.*, 2010) is in pipeline, commercial vaccine is not available yet.

### **Conclusion**

Rabbit farming is a growing industry all over the world including India. Rabbit meat is in high demand due to good quality protein and low cholesterol content. Coccidiosis is a global challenge for rabbitries therefore it is important to minimise the occurrence of disease in young as it causes potential economic loss to farmers by reduced growth and mortality. Adults acts as carrier of disease therefore measures should be taken to avoid contamination with young once as per as possible. Good

husbandry practises along with prescribed dose of medication will surely help to control Coccidiosis in rabbits.

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