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Coccidiosis in Goats: An overview of pathogenesis, clinical impact & management strategies.

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Abstract

Coccidiosis in Goats is one the most common and economically important diseases, especially in kids up to the age of 6 months. Lambs mainly pick the infection through suckling or licking of the soiled dams mostly during the onset of monsoon. Along with diarrhoea being the most common sign, there may be anemia, fever, inappetence and loss of weight leading to mortality causing severe economic losses. This is a general review of affection of coccidiosis in goats, symptoms, diagnosis, treatment & management. Proper management and sanitation in the stall and surroundings would lead to prevention of infections in susceptible kids.

Keywords: Goat, Coccidiosis, *Eimeria* spp., Intestinal protozoa, Oocysts, Prevalence, , Small ruminants, Gastrointestinal parasitism.

Introduction

It is a highly contagious intestinal disease of goat kids within 6 months of age causing diarrhoea, ill-thrift, enteritis and even death (Chartier & Paraud, 2012). Species of Eimeria affecting goat involves E.christenseni, E.arloingi, E.ninakolyakimovae, E.hirci etc (Ali *et al*., 2025). The most pathogenic among these is considered as E.ninakolyakimovae (Taylor *et al*., 2007). Infection prevails in the flock throughout the year mainly on the onset of rainy season (Roh *et al*., 2023). In India, it was estimated that it causes huge economic loss and is a major threat to the goat industry (Mohamed *et al*., 2023). Hence it is very pertinent to know the details of the disease for wide awareness among the farming community to curb the menace of the disease (Dai *et al*., 1991).

Aetiology

Most common and pathogenic species of Eimeria causing coccidiosis is considered to be E.ninakolyakimovae (Ali *et al*., 2025). This affects various type of cells but mainly infects the endothelial and epithelial cell types. The posterior parts of the small intestine, caecum and colon are often seen to be affected (Chartier & Paraud, 2012).

Developmental Cycle & Pathogenesis

The sporozoites from the oocyst are liberated in the lumen of small intestine of kids (Taylor *et al*., 2007). These penetrate and enter the endothelial cells lining the villi (Pradhan *et al*., 2024). After that in the cells they develop to the first generation schizonts. Then after about 11-12 days, there is formation of second generation schizonts (Chartier & Paraud, 2012). After maturation these contain several merozoites which are released at about after 19 days of infection. Then gametocytes are formed (Dai *et al*., 1991). These again enter the epithelial cells and gradually there is enlargement of villus to form a papillomatous growth (Pradhan *et al*., 2024). The gametogonous phase of the life cycle is responsible for thickening of caecum and colon (Chartier & Paraud, 2012). Clinical signs usually are not observed under the infection of atleast 50,000 oocyst (Taylor *et al*., 2007). The Prepatent period of the protozoa involves the duration of 15-20 days.

Clinical signs and symptoms

The kids are mainly seen having severe diarrhea having watery or bloody stools with or without mucus. This happens for more than one week (Mohamed *et al*., 2023). This is then preceded by severe constipation. Stool is often seen as foetid and strong smelling (Ali *et al*., 2025). The animal will be eating normally but wont gain weight (Dai *et al*., 1991). Kids may exhibit abdominal discomfort therefore they mostly prefer to lie down (Chartier & Paraud, 2012). Gradually there is loss of appetite leading to malnutrition, lethargy, depression & dullness (Roh *et al*., 2023).

Post mortem lesions

Main pm lesions seen in goat is in the intestinal tract, caecum and colon (Akgül & Akgül, 2021). Intestine becomes oedematous, with pin point hemorrhages, congestion and severe inflammation is seen followed by excess mucus secretion on the mucosal (Mohamed *et al*., 2023). There are pin head size cyst present superficially or deep scattered throughout the small intestine (Ali *et al*., 2025). These white pin head cyst are seen raised as greyish papillomatous plaques (Taylor *et al*., 2007). These sometimes coalease to cover up to 6mm in diameter (Ali *et al*., 2025). These thickened areas contains early gametocytic stages (Yakhchali & Zarei, 2008).

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Diagnosis

Diagnosing coccidiosis can be challenging often complicated by the brief period in which high oocyst counts occur, which does not always align with the duration of clinical symptoms .Reliable diagnosis will incorporate multiple factors, including epidemiological data (e.g., age of affected animals, number affected, mortality rates) and the clinical signs observed (haemorrhagic diarrhea ,dehydration, weakness, anemia ,depression ,Blood stains in faeces and mucus, anorexia) (Ali *et al*., 2025)

It is advised to collect five samples per 20 affected animals collected and also samples from seemingly healthy individuals (Dai *et al*., 1991). Threshold value indicating a clinical coccidiosis in small ruminants could be around 50,000–100,000 opg(oocysts per gram) whatever the Eimeria species involved (Ghimire *et al*., 2022).

Gross pathology shows chronic inflammation and thickening of the caecum and large intestine, mucosal haemorrhages, and white foci in the small intestine (Roh *et al*., 2023). Histopathological analysis may reveal mucosal surface loss, villous atrophy, and numerous oocysts and gamonts in mucosal scrapings (Akgül & Akgül, 2021).

Key differential diagnoses include other causes of diarrhoea in growing lambs and kids, such as parasitic gastroenteritis, nematodirosis, and nutritional deficiencies (Ghimire *et al*., 2022).

Coproscopic (fecal) examinations should, allow for the identification of the most pathogenic Eimeria species present (Pradhan *et al*., 2024). Techniques such as the McMaster method using sodium chloride (NaCl) or magnesium sulfate ($MgSO_4$), along with a flotation cover slip, can be used (Taylor *et al*., 2007).

Identifying Eimeria species requires examining the morphological features of the oocysts, usually after they have sporulated (Ali *et al*., 2025). Sporulation can be achieved by keeping the fecal matter at room temperature for 2 to 3 days, or by diluting it in a 2% potassium dichromate solution and incubating it at 25 °C. (Mohamed *et al*., 2023)

Key diagnostic features of the oocyst includes the presence of a polar cap, micropyle, coloration, the appearance of the oocyst wall, and the presence of oocyst and sporocyst residues. (Ali *et al*., 2025)

Treatment-

The lambing and kidding grounds must as clean and dry in case of outbreaks in the herds, the infected animals should be isolated and given the anticoccidial drugs (Taylor *et al*., 2007).

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Antimicrobials-

Sulfonamides in the feed at level of 25 to 35mg/kg Bwt for at least 1 5 days are effective in goats (Roh *et al*., 2023). Sulfadimidine @55g/tonne is also effective in goats (Chartier & Paraud, 2012). Ionophores like Monensin (Rumensin)-approved for 7-10 day of life cycle .an effective coccidiostat and growth promotant @16g/tonne of feed (Daugschies & Najdrowski, 2005). Medicate kids with Lasaloacid(Bovatec)-approved for 7- 10 days of life cycle 2weeks before lambing (Ghimire *et al*., 2022). Decoquinate(Decox) effective for zero-1 6 day of life cycle 0.5 mg/kg B.W (Taylor *et al*., 2007). Diclozuril adose 1 mg/kg a mixed with sulfonamide and chlorlet racycline have give protection in lambs (Kanyari *et al*., 2009). Toltazuril(20mg/kg Bwt) is effective in 2 week old affected goat coccidiosis (Chartier & Paraud, 2012). Also the use of Amprolium in feed to treat the disease 100 mg/kg BW for 21 days has also been found effective (Pradhan *et al*., 2024).

Prevention and control

Use of prophylactic anticoccidial like Decoquinate, Amprolium etc (Kanyari *et al*., 2009). To ensure optimal rearing conditions, pens should be managed to avoid overcrowding, and kids should be grouped according to age and maintained within these consistent groups (Akgül & Akgül, 2021). An all-in/all-out management system is highly recommended (Roh *et al*., 2023). To reduce the risk of fecal contamination, feed and water troughs should be elevated off the ground (Dai *et al*., 1991). When rearing kids on grass, stocking density must be carefully controlled, and feeding and watering stations should be placed in well-drained locations (Roh *et al*., 2023). Shelters must be kept clean, with dry, well-bedded flooring (Akgül & Akgül, 2021). Additionally, pasture grass should be maintained at a longer length to promote gradual, low-level exposure, allowing kids to build immunity (Pradhan *et al*., 2024).

There is no commercially developed vaccine in India till now (Dai *et al*., 1991). Development of effective vaccine against the organism is complicated due to complex life cycle, strain variation, need of gut antigen (Pradhan *et al*., 2024).

Conclusion

Goat coccidiosis has been a constant threat to the young goats and farmers. Present ongoing research of development of live attenuated vaccine, or subunit vaccines that targets sporozoite or merozoite are going on (Akgül & Akgül, 2021). Proper detection, effective treatment with proper prophylactic management and practices will lead to control of the disease (Dai *et al*., 1991). Farmers should be educated on the disease and about its prevention

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and management to control further economic losses faced by the disease (Ghimire *et al*., 2022).

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