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Pathology of Combined Infection of Capillariasis, Ascariasis and Caecal Coccidiosis in Aseel Chicken Flock

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ABSTRACT

Two Aseel carcasses from a backyard poultry farm were brought for post-mortem examination to the Department of Veterinary Pathology, Veterinary College and Research Institute, Udumalpet with the clinical history of emaciation, loss of appetite, prostration and death. On necropsy, birds were severely emaciated with prominent keel bone and crop revealed severe mucosal thickening with deposition of raised grey coloured pseudo membranes. Gizzard and small intestines contained numerous thread like worms with varying degrees of obstruction. Caecum showed serosal congestion and lumen contained caecal core with severe mucosal congestion. Microscopically, the crop revealed severe parakeratosis, hyperkeratosis and diphtheritic membrane formation with *Capillaria annulata* worms. Small intestine revealed desquamation of villus epithelium, fusion of villus, congestion, severe mononuclear cell infiltration in lamina propria and presence of cut sections of *Ascaridia galli*. In addition, caecum revealed villus atrophy, necrosis of submucosal glands and haemorrhagic typhlitis with severe mononuclear cell infiltration in the lamina propria and sub mucosa. Caecal crypt epithelium revealed desquamation, severe goblet cell hyperplasia with various developmental stages of *Eimeria sp.* The present study underlines the pathological features of combined infection of Capillariasis, Ascariasis and Coccidiosis in Aseel chicken of Tiruppur district of Tamil Nadu.

HIGHLIGHTS:

- Combined infection of Capillariasis, Ascariasis, and Caecal Coccidiosis act synergistically to cause severe enteritis and significant mortality.
- In backyard chickens, contaminated litter and soil facilitate the transmission of multiple pathogen

Keywords: Aseel chicken, Pathology, Capillariasis, Ascariasis, Coccidiosis

Aseel is an Indian breed of game chicken known for its martial qualities (aggressive fighting abilities), pugnacity, and majestic gait and is distributed in much of India, particularly in the states of Tamil Nadu, Andhra Pradesh, Chhattisgarh and Odisha. Indigenous breeds are believed to be resistant to most of the bacterial and viral infections. However, these birds are commonly reared as small scale to meet the household meat demands and cockerels as fighting birds in extensive system of management. So, these birds are frequently prone for parasitic infestation particularly helminthiasis and coccidiosis because of its feeding habits.

Helminthic infections are considered to bean important problem in backyard poultry especially in humid tropical climatic conditions (Deshpande *et al.,* 2001). Owing to their scavenging habits, the backyard chickens seek food in the superficial layers of the soil, that usually have variety of insects and earthworms which serve as

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intermediate hosts for helminth parasites (Biggaard *et al.,* 1997). The occurrence of gastrointestinal parasites was common during summer and rainy season (Sreedevi *et al*., 2016). Among the helminths, the *Ascaridia galli (A. galli)* is a common gastro-intestinal nematode has been recorded in free-range backyard poultry as well as in broilers and layers kept in intensive deep litter systems (Yousaf *et al.,* 2024). Young age, coccidiosis and deficiency of vitamin A and protein can precipitate the disease occurrence. The adult Ascarid worms lives in the lumen of small intestine and initiates petechial to ecchymotic hemorrhages and enteritis of varying degrees (haemorrhagic and necrotic). Microscopically, blunting and stunting of villi, necrosis, desquamation of the mucosal lining epithelium, infiltration of inflammatory cells in the lamina propria and goblet cell hypertrophy and hyperplasia (Soujanya *et al*., 2022).

Capillariasis is a disease often contracted by chickens reared in free range environments. Infections are caused by different species of *Capillaria* often occupying distinct anatomical locations (crop, oesophagus, small intestine, cecum) within the infected host. Mild to moderate signs of infection include emaciation, diarrhoea, listlessness and death in severe cases. *Capillaria contorta* (*C. contorta*) and *C. annulata* invade the crop and esophagus, causes thickening and inflammation of the mucus membranes. *C. bursata, C. caudinflata* and *C. obsignata* targets the lower intestinal tract, causing inflammation, hemorrhage and erosion of the intestinal mucosa. High numbers of Capillaria worms can be fatal to the affected chicken (Soulsby, 1982; McDougald *et al.,* 2003). *C. annulata* causes marked inflammation and thickening of crop mucosa with distension of submucosal glands. Roughened and macerated crop mucosa in heavy infestations with masses of worms in sloughed mucosal tissues were also observed (McDougald *et al*., 2003).

Coccidiosis is an important intestinal protozoan disease, caused by *Eimeria* sp. and characterized by blood-tinged diarrhoea, ruffled feathers, weakness and emaciation. Intestinal coccidiosis is mainly caused by *Eimeria necatrix*, *E. acervulina* and *E. maxima* whereas *E. tenella* and *E. brunetti*are responsible for caecal and rectal coccidiosis, respectively. *Eimeria tenella* and *E. necatrix* are considered to be the most pathogenic and important species in poultry. Speciation of *Eimeria* can be done by nature and location of lesions caused during their multiplication phase, since different species tend to develop in different parts of the intestine in birds (Long *et al*., 1976; Latchumikanthan *et al*., 2021). Grossly, ballooned caeca, white necrotic foci in serosa, haemorrhagic typhlitis, watery ingesta mixed with mucus and blood and on opening, semi liquid bloody mass were observed. Histopathologically, caecum revealed destruction of different layers of the caecum with various developmental stages of *Eimeria sp.* in mucosal and crypt epithelium (Namratha *et al*., 2019). The present study reports a combined infection of Capillariasis, Ascariasis and Caecal Coccidiosis in Aseel chickens.

MATERIALS AND METHODS

Two Aseel chicken carcasses of differing ages (2–6 months) were brought for post-mortem examination from a backyard farm during the month of November' 2025 to the Department of Veterinary Pathology, Veterinary College and Research Institute, Udumalpet with the clinical history of emaciation, loss of appetite, prostration and death. The farm had a flock strength of 60 birds and were maintained in extensive system of management. Necropsy was performed as per the standard procedure and gross lesions were recorded. The crop and intestinal contents and representative tissue samples from the crop and intestines were collected in 10% neutral buffered formalin. Wet mount was prepared from crop and intestinal contents for microscopical examination and crop and intestinal contents with worms were submitted for morphological identification. The tissues were processed as per standard histological technique and the sections were cut at 3-5µ thickness then stained by Haematoxylin and Eosin staining technique (Bancroft *et al*., 1992).

RESULTS AND DISCUSSION

The incidence was recorded during an autumn season with unexpected rainfall in backyard Aseel chicken flock. The mortality was seen in all age groups and the severity was more in young birds.

On necropsy examination, the bird was severely emaciated with prominent keel bone (Fig. 1). Crop was empty and the mucosa was severely thickened with formation raised grey coloured pseudo membranes (Fig. 2). Gizzard contained many thread like worms (Fig. 3) and were admixed with gizzard contents. Grossly, the intestines showed dilatation with serosal congestion. On opening, the small intestines contained numerous thread like worms with varying

Fig. 1: Aseel chicken: Breast muscle showing severe emaciation

Fig. 2: Crop showing thickened mucosa with formation of grey coloured pseudo membranes

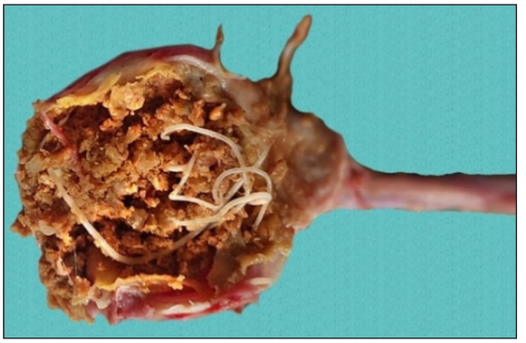

Fig. 3: Gizzard showing many cream coloured *A. galli*

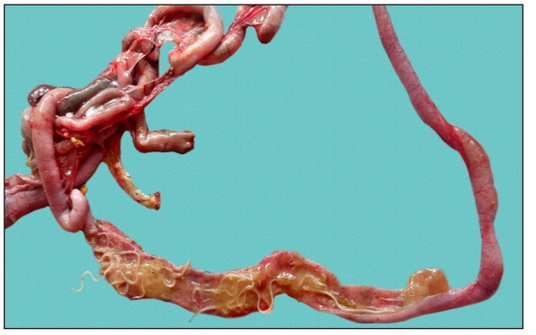

Fig. 4: Small intestine showing numerous cream coloured *A. galli.*

Fig. 5: Caecum showing severe serosal congestion

Fig. 6: Caecum revealed caecal core with severe mucosal congestion

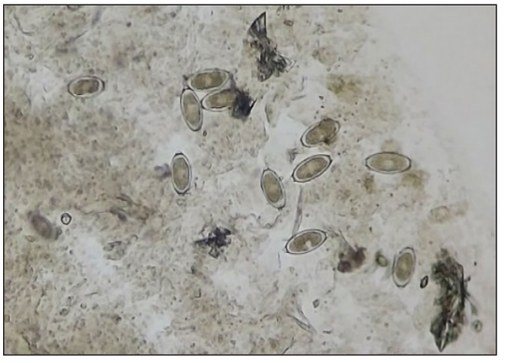

Fig. 7: Crop mucosal scraping revealed many eggs of *Capillaria sp.*

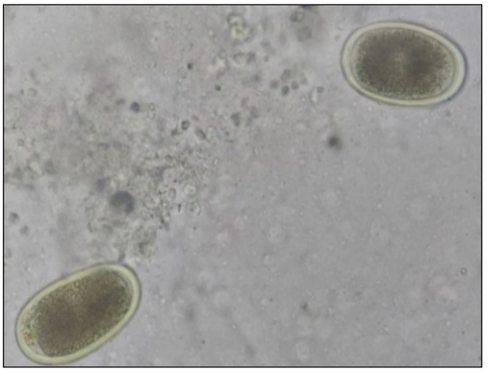

Fig. 8: Small intestinal contents revealed eggs **of** *A.galli*

Fig. 9: Caecal contents revealed numerous oocysts of *Eimeria sp.*

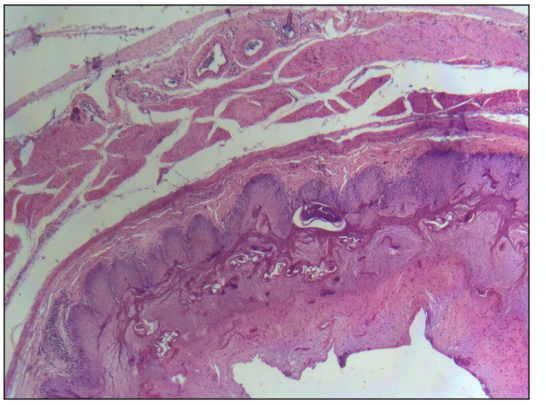

Fig. 10: Crop revealed severe acanthosis with cut section of *Capillaria* worm and its eggs. H&E x40

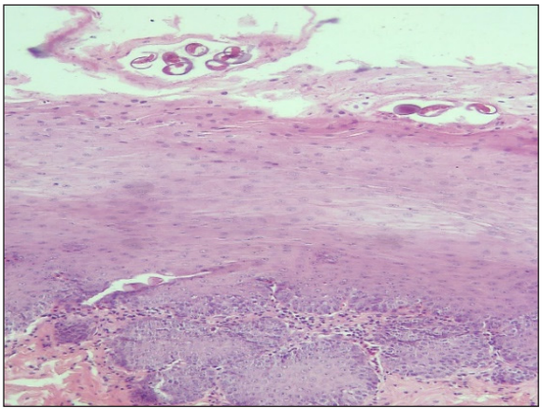

Fig. 11: Crop mucosa showing severe parakeratosis and sloughed mucosa containing eggs of *Capillaria*. H&E x100

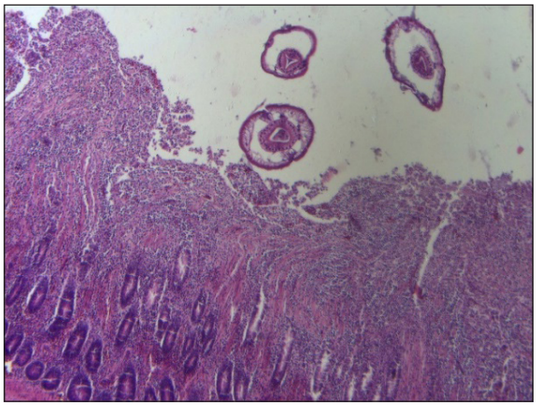

Fig. 12: Small intestine showing desquamation, fusion of villus with severe mononuclear cell infiltration in lamina propria and presence of many cut sections of *A. galli.* H&E x100

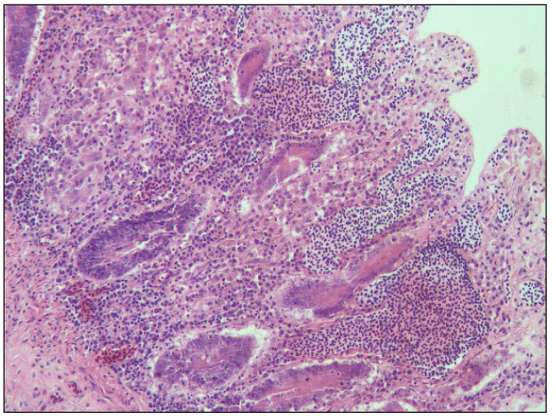

Fig. 13: Caecum showing haemorrhagic typhlitis with flooding of RBC's in the lamina propria and severe mononuclear cell infiltration. H&E x100

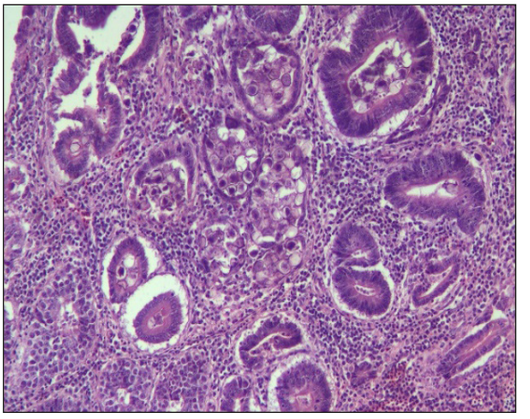

Fig. 14: Caecum showing acute typhlitis and necrosis of crypts with various developmental stages of *Eimeria sp.* in crypt epithelium. H&E x100

degrees of luminal obstruction and mucosal congestion (Fig. 4). Caecum showed serosal congestion (Fig. 5) and on incision, lumen contained caecal core with severe mucosal congestion (Fig. 6).

On wet film examination, the crop contents revealed numerous eggs of *C. annulata* (Fig. 7), intestinal contents revealed eggs of *A. galli* (Fig. 8) and caecal contents revealed numerous oocysts of *Eimeria sp.* (Fig. 9). Worms in crop and intestinal contents were identified as *C. annulata* and *A. galli* respectively.

On histopathological examination, the crop revealed severe acanthosis, parakeratosis and diphtheritic membrane formation with lymphocytic aggregations in lamina propria and submucosa. *C. annulata* worms and eggs were deeply embedded within the diphtheritic membrane and also in the sloughed mucosa (Fig. 10 & 11). Small intestine revealed desquamation, fusion of villus, congestion, severe mononuclear cell infiltration in lamina propria and presence of cut sections of *A. galli* (Fig. 12). Segments of intestine showed numerous cut sections of immature worms of *A. galli*. In addition, caecum revealed villus atrophy, necrosis of submucosal glands and haemorrhagic typhlitis with severe infiltration of mononuclear cells in the lamina propria and sub mucosa (Fig. 13). Caecal crypts showed the lesions, ranging from mild congestion to complete necrosis. Crypt epithelium revealed severe degenerative changes including desquamation, goblet cell hyperplasia with various developmental stages of *Eimeria sp.* (Fig. 14). The coccidian oocysts entirely occupied the crypt epithelium with complete dissolution of crypts.

The native chickens are closely associated to rural households and the production system is mostly small scale in a free-range environment. A major problem in free range chicken farming isendoparasitic infestation particularly nematodes, cestodes and coccidial infestations. They cause reduced weight gain and egg production and severe infection causes significant deaths in young birds.

In the present study, the incidence was recorded in a backyard Aseel chicken flock during an autumn season with unexpected rainfall. The mortality was seen in all age groups and the severity was more in young birds. These findings were in contrary to the findings of Sreedevi *et al.* (2016) who observed the highest incidence in summer and rainy season. The affected birds were infested more than one type of endoparasites. Many studies reported that, in tropical countries the chickens are usually infested with multiple helminth species (Poulsen *et al.,* 2001; Mukaratirwa *et al*., 2001). Wet film examination of crop contents revealed eggs of *C. annulata*, intestinal contents revealed eggs of *A. galli* and caecum revealed numerous oocysts of *Eimeria sp.* (Muthusamy *et al.,* 2020). The worms in crop, gizzard and intestine were identified as *C. annulata* and *A. galli.* Soujanya *et al*., 2022 observed the elongated cream coloured *A. galli* in proventriculus, gizzard and intestine contents of backyard chicken. Heavy infestations the worm can occupy the anterior part of GI tract.

On necropsy, the bird was severely emaciated with prominent keel bone and crop mucosa revealed severe thickening with raised grey coloured pseudo membranes (McDougald *et al.,* 2003.). Gizzard and small intestines contained numerous whitish thread like worms with varying degrees of luminal obstruction (Latchumikanthan *et al.,* 2021; Soujanya *et al*., 2022). Caecum showed serosal congestion and lumen contained caecal core with severe mucosal congestion. Microscopically, the crop mucosa revealed severe acanthosis, parakeratosis and diphtheritic membrane formation with lymphocytic aggregation in lamina propria and submucosa. Worms and eggs of *C. annulata* were deeply embedded within the diphtheritic membrane and also in sloughed mucosa (McDougald *et al*., 2003). Small intestine revealed desquamation, fusion of villus, congestion, severe mononuclear cell infiltration in lamina propria and presence of cut sections of *A. galli* also observed in the mucosal area (Soujanya *et al*., 2022). Caecum revealed villus atrophy, necrosis of submucosal glands and haemorrhagic enteritis with severe infiltration of mononuclear cells in the lamina propria and sub mucosa. In addition, caecal crypts showed the lesions, varying from mild congestion to complete necrosis. Crypt epithelium revealed severe degenerative changes including desquamation, goblet cell hyperplasia with various developmental stages of *Eimeria sp.* (Namratha *et al*., 2019). The coccidian oocysts completely replaced the crypt epithelium with complete dissolution of crypts (Singh *et al*., 2023). The combined infestations of helminth with coccidiosis could enhance their role in production losses (Nnadi and George, 2010).

CONCLUSION

The present study underlines the pathological features of combined infection of intestinal coccidiosis, capillariasis and ascariasis in Aseel chicken. The study found that the combined infection of helminthiasis and caecal coccidiosis induce severe gastro-intestinal damage and lead to death.

GENERATIVE AI DECLARATION

The author(s) confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript, and no images were manipulated using AI. The authors developed and verified all scientific content, data analysis, interpretation of results, and conclusions. The authors take full responsibility for the accuracy, integrity, and originality of the work presented, and no AI tool was listed as an author.

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