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Concurrent parasitic infection with *Amoebotaenia* sp., *Heterakis gallinarum* and *Eimeria tenella* in a desi chicken flock

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Abstract

The current study investigated a desi chicken farm in Tamil Nadu, with 40 numbers of six-month-old chickens. The birds were lethargic, off-feeding with diarrhoea, and their mortality rate was 37.5%. Necropsy examination revealed that the lumen had many tiny tapeworms and that the duodenal mucosa was haemorrhagic. The caecal lumen contained haemorrhagic contents with small roundworms. The intestinal contents were examined using sedimentation and flotation methods, and a histopathological examination was performed on the caecum. Nematode eggs and coccidial oocysts were discovered in the birds on necropsy examination. The tapeworms from the duodenum were identified as *Amoebotaenia* sp., while the caecal contents contained thick, smooth-shelled eggs and adult worms of *Heterakis gallinarum*, confirmed through microscopic examination. Additionally, unsporulated coccidial oocysts were detected in the caecal contents. The presence of haemorrhagic caecal contents, typical lesions and micrometric measurements of the oocysts indicated caecal coccidiosis caused by *Eimeria tenella*. Histopathological examination of the caecum revealed various developmental stages of *E. tenella*, including schizonts and oocysts, within the epithelial and subepithelial layers. This study confirmed the current infection of *Amoebotaenia* sp., *H. gallinarum* and *E. tenella* parasites, which caused mortality in desi chickens. The flock was treated with 0.2% sulphadimidine in drinking water for three days to address endoparasites and coccidiosis and to deworm using 30 mg/kg body weight of mebendazole to reduce the mortality.

Keywords: Desi chicken, *Amoebotaenia* sp., *H. gallinarum*, Coccidiosis, Histopathology

1. Introduction

Desi chicken plays a significant role in the rural economy of India, particularly in enhancing the livelihoods of resource-poor and marginalized communities. This indigenous poultry farming is a low-investment, high-return enterprise that provides a steady income, nutritional security, and employment opportunities, especially for women and landless families. The adaptability of desi chicken to local environment and their minimal infrastructure requirements make them an ideal choice for rural households ^[1]. It supports poverty reduction and enhances food security by providing a regular supply of eggs and meat, which are rich in protein ^[2, 3]. Efforts to improve the production performance of desi chickens through better husbandry, feeding, and genetic enhancements can further boost their economic impact ^[4]. Innovations in poultry science hold promise for enhancing the productivity and sustainability of backyard poultry systems ^[2].

The impact of infectious diseases on desi chicken farming is significant, leading to economic losses and reduced productivity. Various viral and parasitic diseases, such as Newcastle disease, Infectious Bursal Disease (IBD), and coccidiosis, pose serious threats to the health of desi chickens. These diseases not only increase mortality rates but also hinder the growth of the poultry sector, particularly in rural areas where desi chickens are commonly raised ^[5, 6, 7]. Among endoparasites, the impact of ascariasis, cestodiasis, and coccidiosis on desi chicken farming is significant, leading to reduced productivity and economic losses. These parasitic infections affect the health of chickens, resulting in symptoms such as weight loss, decreased

egg production, and increased mortality rates. *Ascaridia galli* is the most common gastrointestinal helminth in chickens, with infection rates reaching up to 51.6% in various studies [8]. Common cestodes include *Raillietina* spp., which were found in 21.6% of examined chickens [9]. Cestodiasis can lead to poor weight gain and digestive issues, further compounding the economic burden on farmers [10]. Coccidiosis is highly prevalent, affecting over 81% of poultry farms, with *Eimeria* spp. being the most common [10].

Concurrent parasitic infections are extremely common in desi chickens, especially those raised in backyard or free-range systems. This is primarily due to their scavenging behavior and constant exposure to contaminated environments, including soil, litter, and intermediate hosts [11]. Enhanced poultry management methods have led to a decrease in the prevalence of parasitic illnesses. However, the prevalence of intermediate hosts, such as beetles, ants, and houseflies, which thrive on chicken litter, facilitates the transmission of various helminths as they frequent poultry pens for foraging or feeding. This study reports a concurrent infection of *Amoebotaenia* sp., *H. gallinarum*, and *Eimeria* spp. in desi chickens from Tamil Nadu.

Materials and Methods

The current study was conducted on a desi chicken farm containing 40 six-month-old desi chickens, maintained in a backyard system in Amyagaram village, Kallakurichi district, Tamil Nadu. The history included lethargy, anorexia, diarrhoea in some birds and mortality of fifteen birds over a span of ten days. The carcasses were produced for necropsy examination to the Department of Veterinary Pathology, Veterinary College and Research Institute, Salem. A detailed necropsy examination was conducted, and the findings were documented. Cestodes and nematodes that were retrieved during necropsy, preserved in 70% ethyl alcohol, and identified using standard morphological keys [12]. The intestinal contents were analysed using sedimentation and flotation techniques according to Bowman and Lynn [13] for helminth eggs and coccidian oocysts. Additionally, segments of the caecum were preserved in 10% neutral buffered formalin for histopathological analysis [14].

Results and Discussion

In the present study, necropsy findings revealed emaciated poultry carcasses, with haemorrhagic mucosa in the duodenum (Fig. 1) and caecum. The duodenal lumen contained haemorrhagic contents with minute white-coloured flakes. The caecal lumen contained haemorrhagic contents along with small roundworms measuring less than 0.7 to 1.3 cm in length. The duodenal worms were identified as *Amoebotaenia* sp. (Fig. 2), as the worm was flattened, segmented, roughly triangular, and on average measured 712.35 μm x 270.68 μm long, the rostellum was armed, had single set of genitalia with regularly alternating genital pores as described by Soulsby [12]. Microscopic examination of the caecal contents revealed eggs with thick, smooth shells that measured 66.5 μm x 37.54 μm that were confirmed to be the eggs of *H. gallinarum* (Fig. 3), as described by Soulsby [12]. The investigation of caecal scrapings confirmed the presence of unsporulated oocysts of coccidian parasites (Fig. 3). The oocysts were ovoid in shape with smooth walls measuring 20.40 μm by 18.94 μm which lacked a micropyle. The presence of lesions in the caecum, haemorrhagic contents, and micrometric measures of oocysts indicate the presence of caecal coccidiosis attributed to *E. tenella*, as specified by Soulsby. The histopathological examination of the caecum

revealed various developing stages of *E. tenella*, including schizonts and oocysts inside the epithelium and sub-epithelium of the caecum (Fig. 4).



Fig 1: Haemorrhagic mucosa in the duodenum of desi chicken

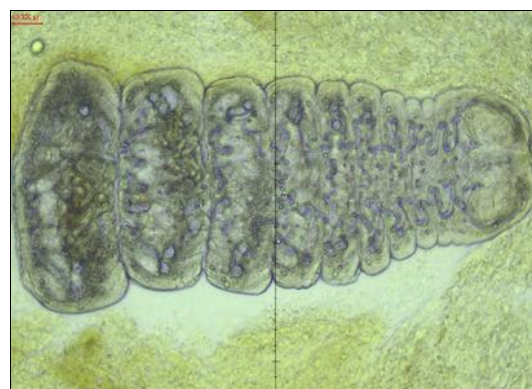


Fig 2: *Amoebotaenia* sp. identified in duodenal contents

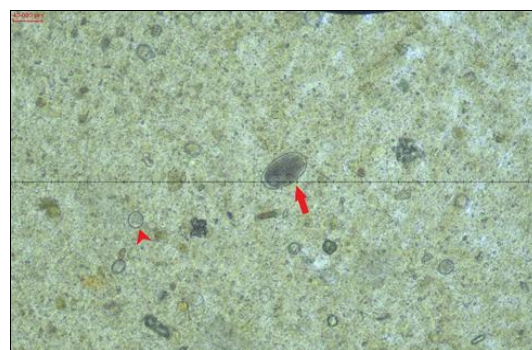


Fig 3: Presence of thick, smooth shelled, eggs of *H. gallinarum* (arrow) and unsporulated oocysts (arrow head) of *E. tenella* in caecal contents (x 100)

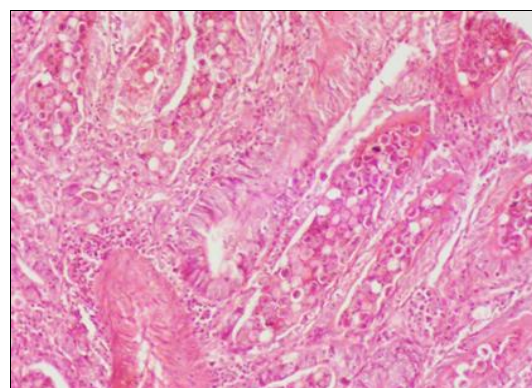


Fig 4: Presence of various developmental stages of *E. tenella* in caecal epithelium (x 100)

The current study reports a mortality rate of 37.5% and identified the presence of *Amoebotaenia* sp., *H. gallinarum*, and *E. tenella* infections in desi chicken. Annapurna *et al.* [15] documented a prevalence of 39.87% for *Eimeria* spp. and 14.79% for roundworms, including *Ascaridia galli*, *H. gallinarum*, and *Capillaria* sp., in desi birds from Andhra Pradesh. A study from Kashmir Valley indicated that the frequency of *Amoebotaenia sphenoides* in free-ranging hens was 6.69%, accompanied by notable histological abnormalities such as mucosal disintegration and mononuclear cell infiltration [16]. Nayebyzadeh *et al.* [17] observed that 42% of local hens were infected with *H. gallinarum*, showing a significant prevalence of this nematode in the surrounding region. Chickens infected with *H. gallinarum* exhibited significant caecal inflammation, characterised by wall degradation and the presence of diminutive white nematodes. The infection may result in significant health complications, including mortality, especially in juvenile birds, with documented fatality rates as high as 7.62% in some areas [18, 19]. High morbidity and moderate mortality (7.5%) from intestinal coccidiosis caused by *E. necatrix* in 12-week-old desi chickens raised in a deep litter system in Perambalur district, Tamil Nadu, has been documented by Saravanajayam *et al.* [5]. Tongkamsai *et al.* [20] documented the prevalence of *Eimeria* spp. in Thailand, with *E. tenella* and *E. praecox* being the most widespread species at 40%, followed by *E. acervulina*, *E. brunetti*, and *E. mitis* at 20%. Mixed-species infections were identified in 50% of the samples. In this study, the higher mortality percentage recorded could be attributed to the concurrent infection of *Amoebotaenia* sp., *H. gallinarum*, and *E. tenella* in desi chickens.

Preventive measures for endoparasite infection and coccidiosis in desi chickens include adherence to hygiene, pharmacotherapy and management protocols. To lower the mortality rate, the birds were treated with 0.2% sulphadimidine in drinking water for three days and advised to deworm with mebendazole at the dose rate of 30 mg/kg body weight [21]. Chicken raised in deep litter and semi-intensive systems is more susceptible to coccidian illnesses due to high humidity and warmth during the rainy season and the presence of infective parasite stages on the ground, making birds more vulnerable to parasitic infections. It is essential to regularly clean and disinfect farms to stop the spread of *Eimeria* spp. This involves the elimination of waste and the use of disinfectants that specifically target oocysts.

Conclusion

This study documented a combined infection of *Amoebotaenia* sp., *H. gallinarum*, and *E. tenella* in native chickens raised in a backyard system. Therefore, it can be inferred that the regular administration of anti-coccidial drugs (coccidiostats) and deworming is crucial for hens raised in a backyard system, in conjunction with maintaining cleanliness on the farm grounds.

Conflict of Interest

Not available

Financial Support

Not available

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