

Concurrent *Heterakis* and *Capillaria* Infection in Aseel Chicken (*Gallus gallus domesticus*): Diagnosis, Treatment, and Outcome

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Abstract

*Endoparasitism is among the important causes of reduced productivity of indigenous chickens. A seven-month-old Aseel chicken was presented for post-mortem examination. At necropsy, markedly dilated caecum with numerous adult nematodes of *Heterakis* sp. was noticed. Faecal examination revealed the presence of two different types of eggs, viz., *Heterakis* species and *Capillaria* species eggs. Concurrent *Heterakis gallinarum* and *Capillaria* sp. infection in Aseel chicken, treatment and outcome is reported.*

Keywords: Aseel Chicken, *Capillaria* spp, Concurrent Infection, *Heterakis* spp, Nematode

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Introduction

There has been an apparent increase in backyard chicken in India over the past two decades. *Heterakis* spp such as *H.gallinarum*, *H.dispar* and *H.isolonche* are predominant in poultry (Norton, 2003), in which *Heterakis gallinarum* is the most common. *Heterakis gallinarum* is a caecal pinworm of poultry and is involved in the transmission of the protozoan parasite *Histomonas meleagridis* which causes Histomoniasis (Das *et al.*, 2021). Cage-free organic layers were shown to harbor, mostly subclinically, the nematodes *Ascaridia galli* (88%), *Heterakis gallinarum* (98%), and *Capillaria* spp (75.3%) (Kaufmann *et al.*, 2011). The adult *Heterakis* sp. worms are found in the lumen of the caecum of birds. Male worms measure 4-13 mm in length with a distinct spicule and a preanal sucker with a chitinous rim. Female worms measure 8-15mm long with a narrow-pointed tail (Marchiondo *et al.*, 2019). The eggs of *Heterakis* sp. worms have a thick-walled, mamillated shell and measure about 55 to 60 by 40 to 55 μm . Ingestion of eggs shed in the faeces by the definitive hosts and ingestion of earthworms by chicken is the mode of transmission.

Capillaria are hair-like worms that are present in the digestive tract of birds. The *Capillaria* species are located throughout the intestinal tract. *C.annulata* and *C.contorta* are found in the crop and esophagus respectively. Whereas, *C. caudinflata*, *C. bursata* and *C.obsignata* parasitize the small intestine and *C. anatis* is found in the caeca. The worms measure about 7-18 mm in length, 0.05 mm wide, and are hair-like in appearance. Earthworms act as intermediate hosts and some are transmitted directly from bird to bird. However, mixed infection was more frequent (70.39 %) and cestodes were the common parasites in all infected birds (Bandi *et al.*,2020).

This article describes the concurrent infection of *Heterakis* and *Capillaria* species worms, their parasitological characteristics, treatment, and outcome in Aseel chicken.

Materials and Methods

A total of 30 numbers of Aseel chickens were reared in a backyard system. Among these birds, acute mortality was reported in five birds over the last three days. All the sick birds were reported to be dull, and depressed, with less feed intake and diarrhea. A seven months old Aseel chicken was presented for necropsy at Veterinary Clinical Complex, Veterinary College and Research Institute, Udumalpet, Tamil Nadu. The nematode worms present in the caecum were collected and examined macroscopically, then preserved in 10% formalin for microscopic examination. The caecal (faecal) content was processed using the salt floatation method as described in Soulsby (1982) to identify the parasitic eggs. As per the Soulsby method, the worms in the 10% formalin were processed and examined under a microscope for species identification.

Results and Discussion

At necropsy, the caecum was markedly dilated (**Fig.1**) with thickened hyperemic walls, ulcerated mucosa, lumen contained caseous necrotic materials, and numerous adult thin slender whitish nematode worms (**Fig.2**). Microscopical examination of the caecal contents revealed the presence of numerous eggs of two different types. They were identified with their characteristic features as *Heterakis* sp. (**Fig.3**) and *Capillaria* sp. (**Fig.4**). The worms in the caecum were identified as adult *Heterakis* sp. and measured 5.0 - 12.5 mm in length. Female worms measured about 8-12.5mm with narrow pointed tails and esophagus ends in a well-developed bulb containing a valvular apparatus (**Fig. 5&6**).

Based on the morphological characteristic of subequal, dissimilar spicules, i. e. the right one being extensively longer than the left one (**Fig.7**), identified as male *Heterakis* sp. and measured a range of 5.0 - 11.5mm in length.

These findings were agreed with those of *H. gallinarum* (Marchiondo *et al.*, 2019). Other morphological features of male and female heterakid worms and eggs also coincided with those of *H. gallinarum*. In the village, chickens are raised mainly under the free-range (scavenging) with partial or no housing and this predisposes the chicken to disease and parasitic infections, especially helminths. The adult worms of *H. gallinarum*, *H. dispar*, and *H. isolonche* have nearly identical morphologies and are differentiated based on the shape of the spicules in the male (Park and Shin, 2010).

The prevalence rate of *H. gallinarum* in hens reared in closed production systems is considerably higher, about 50% (Papini and Elio, 2008). The most important role of *H. gallinarum* is its capability of transferring the protozoan

Histomonas meleagridis to fowls. Infections with *Capillaria* spp. can be highly pathogenic for birds in deep-litter systems or in free-range systems where big numbers of infective eggs may build up in the litter or in the soil (Permin *et al.*, 1998). Infections with intestinal worms including *H. gallinarum* might cause losses of 10-20% due to impaired feed conversion, reduced growth, and egg production, and increasing mortality (Schou and Permin, 2003). *Capillaria* infections are usually spread by dust particles present in the feces from the cages that have been contaminated with droppings and urine (Marques *et al.*, 2007). Areas with high humidity are more suitable for the development of *Capillaria* sp. eggs (Qamar *et al.*, 2017).



Fig.1: Dilated caecum showing numerous worms in lumen



Fig.2: Caecum: Lumen contained caseous material and thin slender nematode worms



Fig.3: *Heterakis gallinarum* egg: Thick, smooth shelled ellipsoidal

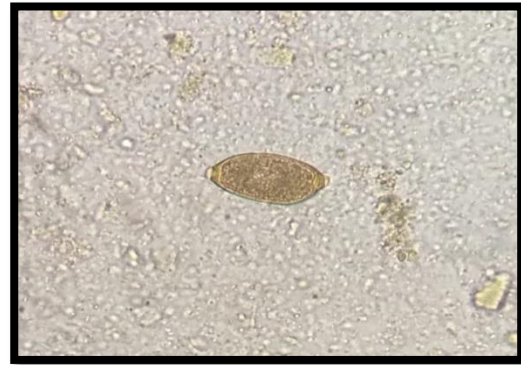


Fig.4: *Capillaria* sp. egg: Barrel shaped, clear plugs on each pole, reticulate pattern on the shell surface



Fig.5: *Heterakis* sp. worm: Female - Esophagus ends in well-developed bulb containing a valvular apparatus.



Fig.6: *Heterakis* sp. worm: Female - Bulb containing a valvular apparatus



Fig.:7 *Heterakis* sp. worm: Male - Sub equal spicules

Recommendation and Follow Up

Farmer was advised with proper management methods and to treat the birds with fenbendazole @ 10 mg/kg daily for 5 days. There was no mortality noticed after the completion of the treatment. The parasites of economic importance should be investigated and control strategies initiated to improve the health and productivity of indigenous chickens.

Conflict of Interests

There is no conflict of interest.

Contribution of Authors

During the writing of the manuscript, all of the authors contributed equally. They read the final manuscript and gave it their approval for publishing.

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