Short Communication

A REPORT ON MIXED INFECTIONS OF *ACUARIA HAMULOSA*, *HETERAKIS GALLINARUM* AND *HOLOMENOPON LEUCOXANTHUM* IN NATIVE DUCKS OF CAUVERY DELTA REGION OF TAMIL NADU

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ABSTRACT

Post mortem examination of two duck carcasses revealed the presence of worms in the gizzard and caecum. The worms from gizzard were identified as Acuaria hamulosa and caecal worm were identified as Heterakis gallinarum based on the morphological features. In addition, lice were collected from the feathers and identified as Holomenopon leucoxanthum. This study reports the occurrence of Acuaria hamulosa, Heterakis gallinarum and Holomenopon leucoxanthum in native ducks from Cauvery delta region of Tamil Nadu.

Keywords: *Acuaria, Cheilospirura*, Ducks, *Heterakis, Holomenopon*, Nematode

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INTRODUCTION

Duck is an indigenous poultry species that has traditionally been raised by marginal farmers in India to supplement their income. Duck populations are primarily found in the Eastern, North-eastern and Southern states of our country. In India, duck farming is primarily done by small marginal and nomadic farmers, with a seasonal aspect. The agro-climatic condition of Tamil Nadu provides an ideal environment for rearing ducks along side of the agricultural basins. They are raised to produce many eggs and meat due to their rapid growth rate, meat quality, less maintenance cost and efficient feed conversion (Borah *et al*., 2018). They also provide an efficient source of animal protein in the form of eggs and meat to humans. However, production can be diminished due to parasite, viral and bacterial diseases (Ojok, 1993). According to Rabbi *et al*. (2006), poultry species are primarily affected with endo and ecto-parasites causing production loss. Intestinal helminths can have a significant impact on the quality and quantity of meat produced, as well as the health and productivity of poultry birds (Soulsby, 1982; Shinde *et al*., 2009). Ducks can graze on snails and fish in the abundant water resources (Gagendran

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and Karthikeyan, 2011). Geographical status, subtropical climate, waterlogged and low regions of the country are ideal settings for duck rearing, but these variables also promote parasite growth, multiplication, development, survival and spread (Farjana *et al*., 2008). Further, lice infestation has a negative impact on duck growth and production due to the severe irritation and disease transmission. Lice are well-adapted as external parasites, and they are typically more of a nuisance than a threat to their host (Soulsby, 1982; Jeyathilakan *et al*., 2016). This article explores the occurrence of *Acuaria hamulosa, Heterakis gallinarum* and *Holomenopon leucoxanthum* from native ducks of Cauvery delta region of Tamil Nadu.

MATERIALS AND METHODS

Two dead kuttanad ducks (6 months old females) were presented to the Department of Veterinary Pathology, Veterinary College and Research Institute, Orathanadu, Tamil Nadu Veterinary and Animal Sciences University for post-mortem examination, by a nomadic duck farmer with the history of anorexia and dullness for the past 4 days. Seven ducks in the flock had already died with the same symptoms. Physical examination of the ducks revealed the presence of lice over the feathers. The lice were collected in 70 % alcohol for morphological identification. Systematic necropsy examination was performed. Internal examination revealed the presence of white, sturdy worms in the gizzard of a duck and thin worms in the lumen of caeca of another duck. Parasites were collected and preserved in 70% ethanol. Further, the parasites were processed with ascending grades of alcohol and cleared in lactophenol. Parasites were mounted in DPX and examined under low power microscopy (Soulsby, 1982).

RESULTS AND DISCUSSION

The worms collected from the gizzard were identified as *Acuaria hamulosa* based on standard morphological characters. A total of 5 worms were collected, with a mean length of 11.2 ± 0.8 mm. The worms exhibited a cylindrical body (Fig. 1) with two triangular lips and two cuticular cordons (Fig. 2) extending towards the posterior extremity. The esophagus was muscular and glandular, leading into the intestine. Male specimens measured 9.5–10.8 mm and possessed two unequal and morphologically distinct spicules at the posterior end, while females measured 11.0–12.2 mm and had a sharp tail end (Fig. 5). The mid portion of the female worm featured a uterus, which contained numerous eggs (Fig.3). The eggs of *Acuaria hamulosa* were small, oval shaped with larva (Fig. 4) with the egg size of 42 x 25 µm in micrometry. The nematodes found in the caecum were identified as *Heterakis gallinarum*. A total of 15 worms were recovered, consisting of 4 males and 11 females. The worms had a robust, whitish body with distinct transverse ridges and a mean length of 9.7 ± 0.6 mm. The anterior end featured three round lips, which were not connected by lateral lobes (Fig. 6). The esophagus was relatively long and ended in a posterior bulb accompanied by a valvular apparatus (Fig. 7). Males measured 7.8–9.4

mm, while females were longer, measuring 9.8–12.2 mm The vulva was positioned near the midpoint of the body, and the uterus was didelphic with eggs (Fig. 8). A precloacal chitinous-rimmed sucker and ventrally positioned caudal alae were observed. Spicules were unequal in size but similar in shape (Fig. 9). The tail end of female was pointed with narrow end (Fig. 10).

The lice from the feathers were identified as *Holomenopon leucoxanthum* (Fig. 11). The body is broad with the head being conical in shape. Minute setae are present on the head and lateral margins and the triangular ocular flecks are prominent behind the eyes. The ventrum shows a yellowish-brown skeleton supporting sharp mandibles adapted for chewing. Antennae are monomorphic and four-segmented. The prothorax is large and expanded with lateral spines and submarginal setae. Legs are short, thick and pale, bearing scattered fine setae and equipped with two claws at the terminal end. The abdomen is broadly oval with clearly demarcated sternal plates.

Acuaria hamulosa (Syn: Cheilospirura hamulosa), commonly referred to as the 'gizzard worm', is a spirurid nematode that parasitises the ventriculus of various passerines, columbiformes and free-ranging gallinaceous birds (Urquhart et al., 1994; Menezes *et al.*, 2003; Vijayalingam *et al*., 2023). The duck parasitised with *A. hamulosa* showed no clinical indications and no yellowish or soft nodules, as previously observed in chickens and ring-necked pheasants by Alicata (1947), Fatihu *et al.* (1991) and Menezes *et al.* (2003). According to Menezes *et al*. (2003), *A. hamulosa* may trigger complications in chickens, including granulomas, nodules, severe anaemia and mortality. The morphological features observed was in accordance with the previous researchers (Soulsby, 1982; Vijayalingam *et al.*, 2023). The report may have been influenced by the fact that the birds studied were free ranging nomadic ducks with access to a wide range of feeds, including intermediate hosts like grasshoppers, beetles and weevils (Soulsby, 1982).

The parasite *Heterakis gallinarum* is known to affect the health and productivity of poultry, with being particularly significant due to its common occurrence in the caeca of various avian species, including chicken and ducks. As observed in this case, *H. gallinarum* was found in the caeca of one of the ducks, supporting previous reports that highlight its role as a common parasitic infection in poultry (Lund *et al.*, 1970; Cupo and Beckstead, 2019). Heavy worm burdens can lead to significant clinical manifestations, including petechial hemorrhages and bloody exudates on the caecal mucosa, as noted by Lund *et al*. (1970). Further more, the presence of these nematodes in backyard and nomadic farming systems, as in the current case, often exacerbates the parasitic burden due to poor body conditions in the flock (Soulsby, 1982). The global prevalence of *H. gallinarum* varies based on multiple factors such as climate, feed quality and husbandry practices. In this case, the ducks were managed under nomadic farming conditions, which likely increased their exposure to parasite laden environments.

Factors like high stocking density and rotational access to pasture are known to facilitate the transmission of gastrointestinal parasites (Vijayalingam *et al*., 2020, Jaiswal *et al*., 2020). Additionally, elevated rainfall, which increases humidity, can heighten the risk of parasitic infestation. Such conditions may have contributed to the rapid spread and increased worm burden observed in this flock. In this case, the infection resulted in the deaths of multiple ducks, highlighting the importance of managing parasitic infections even in seemingly low-risk backyard or nomadic systems. Reports of mixed infections, such as the concurrent natural parasitism by *Dispharynx spiralis* and *Heterakis gallinarum* in backyard poultry (Sreenivasa Murthy and Panda, 2016), further highlight the burden of these parasites on poultry health and production, which is similar to our study.

The genus *Holomenopon* is comprised up of around 135 different species. *Holomenopon leucoxanthum* exists in the avian order Anseriformes, particularly in waterfowls.The morphological features in our study, were consistent with the descriptions provided by Laksminarayana (1979), Soulsby (1982) and Ahmad *et al.* (2014). The presence of *H. leucoxanthum* in these ducks is significant as it has not been previously reported in Tamil Nadu. Although *H. leucoxanthum* has been recorded in other parts of India, such as Uttar Pradesh (Ahmad *et al*., 2014), this marks the first report of this species on domestic ducks (*Anas platyrhynchos*) in Tamil Nadu.The association between *H. leucoxanthum* and wet-feather in ducks has been previously reported by Humphreys (1956). Lice infestations and helminthic infections in birds, particularly in economically important species like ducks, can have significant impacts on flock health. Given the high mobility of nomadic duck farming, such infections can easily spread within and between flocks, emphasizing the importance of routine examination and parasite management.

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CONFLICT OF INTEREST

There is no conflict of interest.

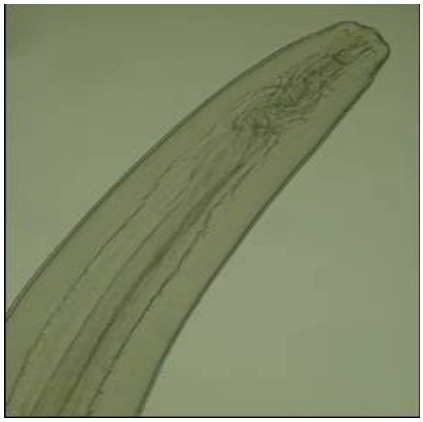

Fig. 1. Anterior end of *Acuaria hamulosa* with cordons x100

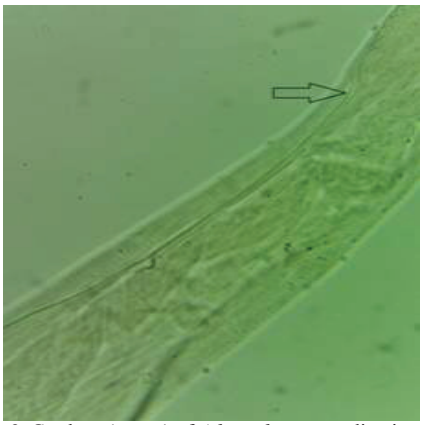

Fig. 2. Cordons (arrow) of *A.hamulosa* extending in mid portion x100

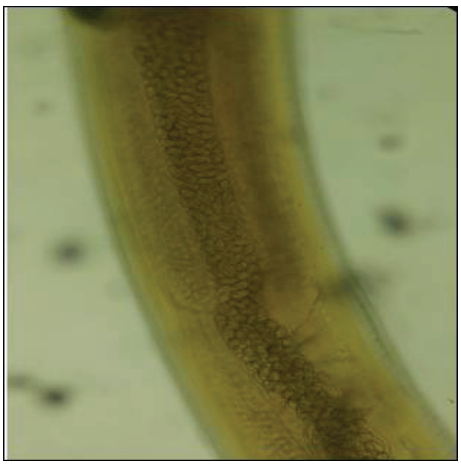

Fig. 3. Uterus with eggs - *A.hamulosa* x100

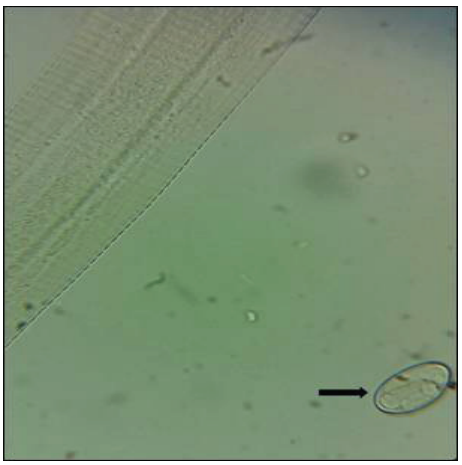

Fig. 4. Egg with larva (arrow)- *A.hamulosa* x100

Fig. 5. Posterior end of *A.hamulosa* - Female x100

Fig. 6. Anterior end of *Heterakis gallinarum* with lips (arrow) x100

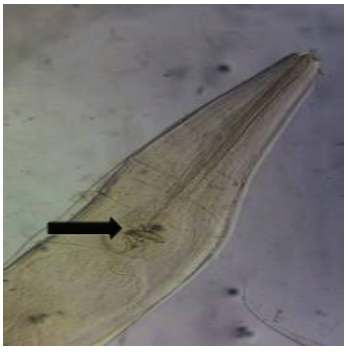

Fig. 7. Esophagus with posterior bulb and valvular apparatus (arrow) -*H. gallinarum* x 100

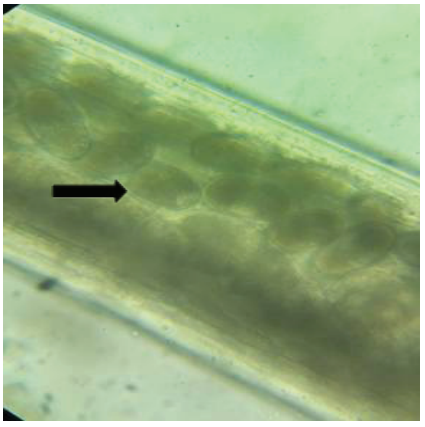

Fig. 8. Uterus with eggs (arrow)-*H. gallinarum* x100

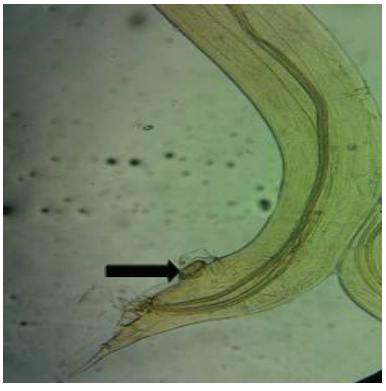

Fig. 9. Posterior end of *H. gallinarum* with precloacal sucker (arrow) and spicules- Male x100

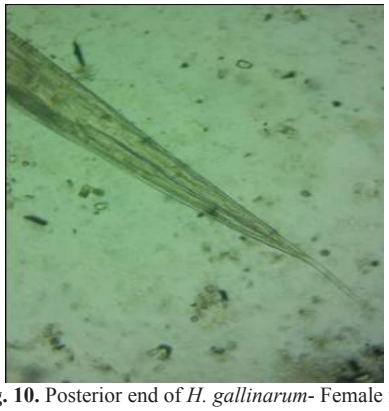

Fig. 10. Posterior end of *H. gallinarum*- Female x100

Fig. 11. Lice- *Holomenopon leucoxanthum* x40

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