RESEARCH ARTICLE

# Fatal Haemonchosis in Sheep: Incidence, Post-Mortem and Histopathological Investigation

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## Abstract

Haemonchosis, caused by the blood-feeding nematode *Haemonchus contortus*, continues to be a major health problem in sheep and goat, especially in tropical and subtropical regions. The present study investigated the incidence and histopathological changes associated with *H. contortus* infection in sheep under field conditions. A total of 60 sheep that died with a history of diarrhoea and progressive weakness were subjected to necropsy at Department of Veterinary Pathology of the College in Hyderabad during September 2025 to March 2026. Among them, 34 sheep were positive for *H. contortus.* Post-mortem examination of the affected sheep consistently revealed pale mucous membranes, mild ascites, watery blood, and worms in the abomasum. The abomasal mucosa showed congestion, petechial haemorrhages, and catarrhal inflammation. Microscopically, abomasal sections showed mucosal edema, haemorrhage, epithelial degeneration, and infiltration of inflammatory cells, predominantly eosinophils and lymphocytes. The recovered parasites were identified as *H. contortus* based on characteristic morphological features, including the "barber pole" appearance of female worms. This study confirms that acute haemonchosis can lead to severe anaemia and hypovolemic shock, resulting in sudden death. These findings highlight the importance of early diagnosis, routine monitoring, and strategic parasite control measures to reduce production losses in sheep.

**Keywords:** *Abomasitis, Anaemia, Gross Pathology, Haemonchosis, Histopathology, Sheep.*

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## Introduction

Gastrointestinal nematode infections continue to limit the productivity of small ruminants, especially in tropical and subtropical regions (Besier *et al*., 2016; Selemon, 2018). Among these parasites, one of the common gastrointestinal nematode is *H. contortus,* also called as the barber pole worm (Taylor *et al.,* 2016). This blood-sucking abomasal nematode has earned a global reputation as the principal cause of anaemia, hypoproteinemia, and mortality in small ruminants of all age groups across numerous countries (Emery *et al.,* 2016; Flay *et al.,* 2022). It is considered highly pathogenic due to its haematophagous nature and rapid multiplication, leading to severe economic losses in sheep farming (Regassa *et al*., 2024; Oliveira *et al.,* 2025). The parasite inhabits the abomasum, where it actively feeds on blood, resulting in progressive anaemia and systemic weakness.

The disease is more common in young animals, intensively grazed flocks, and animals under nutritional stress. Epidemiological studies indicate that prevalence varies with season, geographic location, and grazing practices. Peak infection rates are often reported during monsoon and post-monsoon periods due to optimal conditions for larval survival and transmission (Singh *et al.,* 2017). Continuous pasture contamination, increasing resistance to commonly used anthelmintics has emerged as a serious constraint in effective parasite control programs (Kaplan and Vidyashankar, 2012; Panta *et al.,* 2024). This has emphasized the need for integrated control strategies based on epidemiological understanding, early diagnosis, and improved managemental practices. Therefore, studies focusing on prevalence and pathological alterations are essential to design effective control programs and minimize production losses in sheep. Current study was designed to study the prevalence, gross and histopathological alterations in Haemonchosis of sheep.

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## Materials and Methods

In the study from September 2025 to March 2026, 60 sheep were submitted for postmortem examination to Department of Veterinary Pathology, College of Veterinary Science, Rajendranagar, Hyderabad (Telangana, India). Sheep were

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maintained under semi-intensive management system. The sheep developed diarrhoea, progressive weakness, and reduced feed intake over several days before death. No recent strategic deworming was reported and the animals had died suddenly.

A complete postmortem examination was performed as per the standard protocol (King *et al.,* 2013). Carcasses were examined externally for assessment of body condition, mucous membrane color, hydration status, and evidence of diarrhoea. Thoracic and abdominal cavities were examined for effusions. The gastrointestinal tract was removed and opened sequentially. The abomasum was incised along the greater curvature and its contents examined in a tray for parasite recovery. Representative tissue samples from the affected organs such as pieces of abomasum, intestine and lung were collected in 10% neutral buffered formalin for histopathological examination.

### Parasitological Examination

Faeces were collected in suitable containers in normal saline for identification of eggs. Faecal smears were prepared and examined under the microscope in low power (10X) for screening of eggs and confirmed under high power (40X) objective lens. Recovered worms were fixed in 10% neutral buffered formalin, processed with lactophenol to obtain maximum clearance and examined under a stereomicroscope. Morphological identification was done based on size, coloration, and structural characteristics of the worms (Soulsby, 1982).

### Histopathology

Formalin fixed tissue samples were dehydrated in graded alcohol, subsequently cleared in xylene, embedded in paraffin to form blocks. 5 µm thick sections were cut using a rotary microtome, mounted on a clean glass slide and stained with hematoxylin and eosin (Suvarna *et al.,* 2019) for microscopic examination.

## Results and Discussion

### Incidence

In present investigation, *H. contortus* infection was detected in 34 sheep out of 60, accounting for an overall prevalence of 56.67%. Sex-wise, the prevalence was lower in males at 41.18 % (14/34), whereas females showed a higher infection rate of 58.82% (20/34).

Recent global analysis indicated that *H. contortus* infection remains widespread, with an estimated pooled prevalence of around 37% in ruminants, although the rate varies depending on geographic region and management practices (Ma *et al.,* 2025). What makes haemonchosis particularly challenging is the intersection of several compounding factors including the parasite's extraordinary fecundity (up to 15,000 eggs per female worm per day), its short pre-patent period (~15 days), and rapid development of anthelmintic resistance across all major drug classes, and an ongoing geographical expansion facilitated by climate warming (Emery *et al.,* 2016; Adduci *et al.,* 2022). A local study conducted in Warangal, Telangana, India regarding Haemonchosis in small ruminants, documented a prevalence of 15.7% among post-mortem cases examined between 2022 and 2024, underscoring the continued burden of this infection in small ruminants (Chandravathi *et al.,* 2025). Present study showed significant difference in the prevalence of *H. contortus* between sexes. The higher susceptibility in females is likely due to peri-parturient relaxation of immunity associated with pregnancy and lactation (Brik *et al.,* 2019). Similar patterns of increased prevalence in females have been reported in studies conducted in Pakistan (Raza *et al.,* 2009), Ethiopia (Dagnachew *et al.,* 2011; Moges *et al.,* 2017), and Iran (Tehrani *et al.,* 2012).

### Clinical Findings

Each adult *H. contortus* worm consumes approximately 0.05 mL of whole blood per day, and a significant worm burden can collectively cause daily losses of 0.2-0.6 litres, equivalent to 18-54 g of haemoglobin per day (Adduci *et al.,* 2022; Flay *et al.,* 2022). In the present study, heavy infestation with Haemonchosis resulted in cumulative blood loss leading to severe anaemia and rapid clinical deterioration, with eventual mortality. Moreover, the diarrhoea, progressive weakness, and reduced feed intake over several days before death noted was consistent with established descriptions of Haemonchosis (Besier *et al.,* 2016; Taylor *et al.,* 2016; Flay *et al.,* 2022, Ma *et al.,* 2025).

### Gross Findings

Affected sheep showed soiling of the perineal region with faecal material (Fig. 1a), pale and anaemic conjunctival mucous membranes (Fig. 1b), and mild accumulation of straw-colored fluid in the abdominal cavity (Fig. 1c). Severely congested abomasum with petechial haemorrhages and numerous slender, reddish-white nematodes were attached to the mucosal lining (Fig. 1d). The worms showed a typical barber-pole appearance (Fig. 1e). Other lesions included pale kidneys, liver, and edematous lungs (Fig. 1f). The gross lesions observed in current study were in agreement with previous studies (Taylor *et al.,* 2016; Constable *et al.,* 2017; Chandravathi *et al.,* 2025). The accumulation of serous fluid is likely a consequence of hypoproteinemia caused by persistent blood loss, leading to reduced plasma protein levels (Besier *et al.,* 2016).

### Worm Identification

Microscopic examination of the worms revealed characteristic morphological features of *H. contortus*. Posterior end of male worms showed a well-developed copulatory bursa, characterized by an asymmetrical dorsal lobe and a Y-shaped dorsal ray (Fig. 2a). In females, the vulva was typically covered by a linguiform (tongue-shaped) flap and spiral arrangement of white ovaries was found around the blood-filled intestine (Fig. 2b). These observations were in accordance with

description of parasites given by Soulsby (1982) and Taylor *et al.* (2016).

### Egg Identification from Faecal Smear

Strongyle type, oval, thin-walled, smooth and transparent eggs measuring roughly 70-85 x 41-48 µm were revealed by microscopic analysis of the faecal smears. The eggs had a morula with 16-32 blastomeres and a clear space between the embryo and the shell which is characteristic of *H. contortus* eggs (Fig. 2c), consistent with description given by Soulsby (1982) and Taylor *et al.* (2016).

### Histopathological Findings

Histopathological examination revealed multiple significant pathological changes in abomasum, intestine and lungs. Abomasum revealed degeneration and desquamation of the mucosal epithelium, indicating loss of epithelial integrity (Fig. 3a), multifocal haemorrhages, edema and marked congestion within the lamina propria (Fig. 3b) with mononuclear cell infiltration, predominantly lymphocytes (Fig. 3c). Histopathological findings observed in intestine were marked degeneration and desquamation of intestinal epithelial cells (Fig. 4a, b), marked dilatation and congestion of submucosal blood capillaries (Fig. 4c), haemorrhage in lamina propria (Fig. 4d), and inflammatory cell infiltration in the mucosa of intestine (Fig. 4e). Microscopic examination of lungs revealed edema, congested capillaries, emphysema and infiltration of inflammatory cells (Fig. 5).




**Fig. 1:** Gross lesions observed in sheep affected with *Haemonchus contortus*. (**a**) Perineal soiling consistent with diarrhoea; (**b**) Marked pallor of conjunctival mucosa; (**c**) Mild accumulation of straw-colored fluid in abdominal cavity (ascites); (**d**) Congested abomasum with petechial haemorrhages and slender round worms attached to the mucosa; (**e**) Slender reddish white round worms with barber pole appearance; (**f**) Edematous lungs




**Fig.2: (a)** Posterior end of male *H. contortus* with Y shaped dorsal ray and well-developed copulatory bursa; **(b)** Posterior end of female *H. Contortus* with vulval flap; **(c)** *H. Contortus* eggs in faecal smear

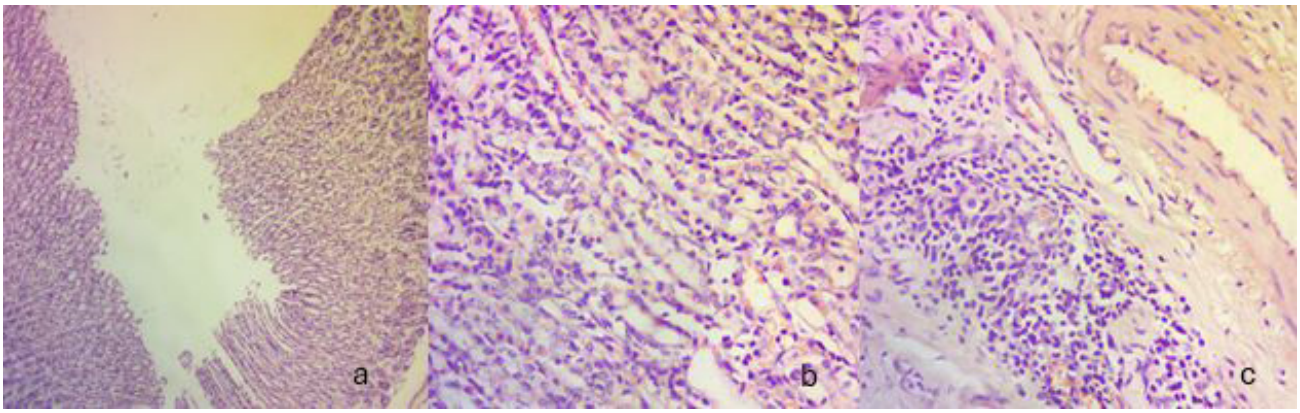



**Fig. 3:** Histopathological lesions in abomasum of sheep affected with *H. contortus.* **(a)** Degeneration and desquamation of abomasal epithelium H&E 100X. (**b)** Multifocal haemorrhages and congestion in lamina propria of abomasum H&E 400X. (**c)** Mononuclear cell infiltration in abomasum H&E 400X

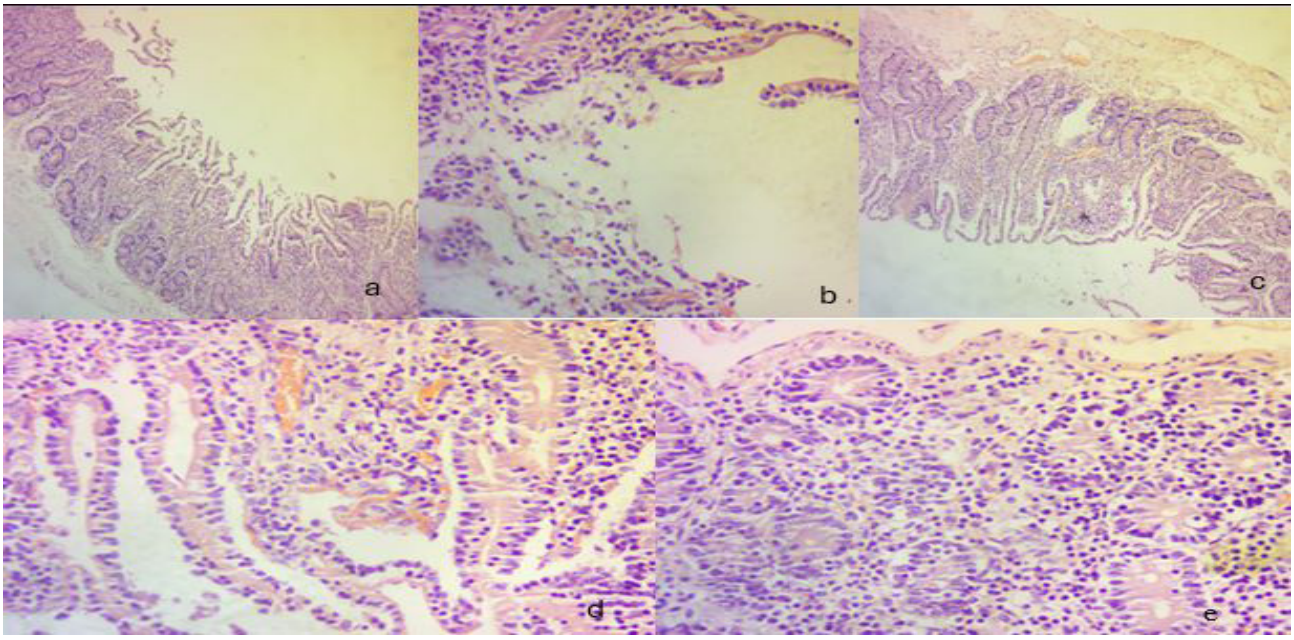



**Fig. 4:** Histopathological lesions in intestine of sheep affected with *H. contortus.* **(a)** Degeneration and desquamation of intestinal epithelial cells H&E 100X. **(b)** Disrupted mucosal epithelium of intestine H&E 400X. **(c)** Dilatation and congestion of submucosal blood capillaries H&E 100X. **(d)** Haemorrhage in the lamina propria of intestine H&E 400X. € Infiltration of inflammatory cells in the mucosa of intestine H&E 400X

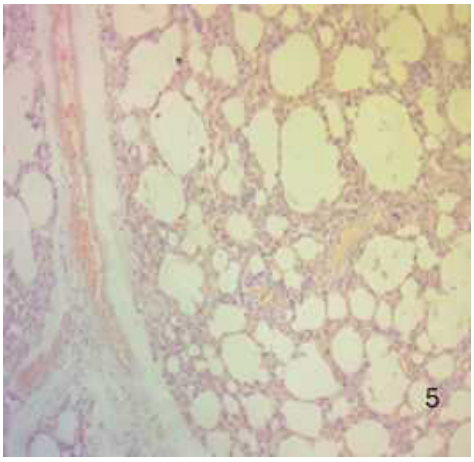



**Fig. 5:** Edema, congestion, emphysema and infiltration of inflammatory cells in lungs of sheep affected with *H. contortus*

Microscopic lesions such as mucosal haemorrhage and inflammatory cell infiltration in abomasum seen were in agreement with documented tissue damage caused by parasite attachment and feeding activity (Vegad and Katiyar, 2015). The intestinal lesions noted in the present study, including congestion and villous damage, may be secondary to systemic effects of infection or associated gastrointestinal disturbances. Although diarrhoea is not always a prominent feature of haemonchosis, these changes can impair nutrient absorption and contribute to clinical deterioration (Taylor *et al.,* 2016). Variation in severity of lesions reported in different studies may be attributed to differences in parasite load, host immunity, and environmental conditions (Besier *et al.,* 2016). The combined effects of blood loss, vascular damage, and inflammatory response ultimately led to hypovolemic shock and death, as also documented in earlier studies (Constable *et al.,* 2017).

## Conclusion

The present study confirms that Haemonchosis produces severe pathological alterations in sheep, primarily due to its blood-feeding activity. Gross findings such as pallor, serous effusions, and heavy worm burden indicate severe anaemia and hypoproteinemia. Microscopic lesions, including mucosal haemorrhage, epithelial desquamation, vascular congestion, and marked inflammatory cell infiltration reflects extensive tissue damage and host's response to infection. The combined effects of continuous blood loss and mucosal injury lead to circulatory compromise, and in severe cases, ultimately leads to hypovolemic shock and death. Systematic necropsy, careful examination of the abomasum, and morphological identification of parasites is crucial for definitive diagnosis. The study also highlights that disease severity depends on parasite load and host factors, emphasizing the need for early detection and effective control measures. Overall, these findings reinforce the pathogenic significance of *H. contortus* and highlight the importance of regular monitoring, strategic deworming, faecal egg count monitoring, pasture management and improved managemental practices to reduce economic losses in small ruminant production.

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