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Pathomorphological studies on verminous pneumonia in a Gaddi goat

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ABSTRACT: Verminous pneumonia is an important parasitic respiratory disease of goats causing significant economic losses, especially under extensive grazing systems. The present case report describes the gross and histopathological findings of verminous pneumonia in a 2-year-old Gaddi goat. Grossly, the lungs showed multifocal, raised, whitish emphysematous nodules predominantly in the caudal lobes and failed to collapse on opening of the thoracic cavity. Frothy exudate mixed with slender lungworms was observed in the trachea and major bronchi. Microscopically, parasitic eggs were present within alveoli and bronchioles, surrounded by eosinophilic inflammatory exudate. These lesions demonstrate significant inflammatory and structural alterations in the lungs, compromising respiratory function. The findings highlight the importance of pathological examination for accurate diagnosis and reinforce the need for strategic deworming and improved management practices to control lungworm infections in goats.

Key words: Goat, Histopathology, Lungworms, Pathology, Verminous pneumonia

Goat husbandry plays a vital role in the livelihood and nutritional security of small and marginal farmers in many developing countries. Owing to their high fertility, short generation interval and remarkable ability to thrive even under harsh environmental conditions, goats serve as dependable assets for rural households. They not only provide regular income but also act as a form of financial security, helping families withstand periods of crop failure (Asfaw, 1997).

Among various pathological conditions, diarrhea and pneumonia are the major causes of mortality in small ruminants, accounting for 35.71% and 28.57% mortalities, respectively (Dohare *et al.,* 2013). Verminous pneumonia is one of the most common respiratory diseases affecting goats and is primarily caused by lungworms such as *Dictyocaulus filaria*, *Muellerius capillaris* and *Protostrongylus rufescens* (Panuska, 2006). Lungworms colonize the lower respiratory tract and cause high mortality and heavy economic losses to the farmers (Asmare *et al.,* 2018). Clinical signs consist of chronic fever, thick nasal discharge, cough, increased respiratory rate, lack of appetite and progressive weight loss (Shite *et al.,* 2015). Pathologically, verminous pneumonia is characterized by the presence of adult worms, larvae or eggs within the airways and alveoli, along with bronchiolitis. These lesions significantly compromise respiratory function and predispose the lungs to secondary infections, which result in mixed or complex pneumonic conditions.

The present study describes a case of verminous pneumonia in a Gaddi goat, with emphasis on the gross and histopathological findings, to help in a better understanding of the disease and aid in its diagnosis and control.

MATERIALS AND METHODS

A Gaddi goat, aged 2 years, was presented for necropsy to the Department of Veterinary Pathology, Dr. G. C. Negi College of Veterinary and Animal Sciences, Palampur. A detailed necropsy examination was conducted following standard procedures. External examination of the carcass was followed by systematic internal examination of thoracic and abdominal organs.

The lungs were examined thoroughly by visual inspection and palpation for the presence of gross pathological lesions. Representative tissue samples from the affected areas of the lungs were collected in 10% neutral buffered formalin. The tissues were processed by routine paraffin embedding technique,

and sections of 4–5 µm thickness were cut and stained with Haematoxylin and Eosin (H&E) as per standard protocol (Luna, 1968). Microscopic lesions were recorded, and photomicrographs were captured using a binocular research microscope (Olympus BX-40) fitted with a digital camera.

RESULTS AND DISCUSSION

Gross pathology

Gross examination of the lungs revealed multifocal, well-defined, raised, round to oval, emphysematous whitish patches predominantly involving the caudal lobes (Fig 1.). The affected areas appeared spongy and failed to collapse on opening of the thoracic cavity. Abundant frothy exudate mixed with several slender, creamy white lungworms (Fig 2.) was observed in the trachea and major bronchi. These gross findings were suggestive of lungworm infestation and were consistent with earlier reports by Mishra *et al.* (2018) and Teshale *et al.* (2024).

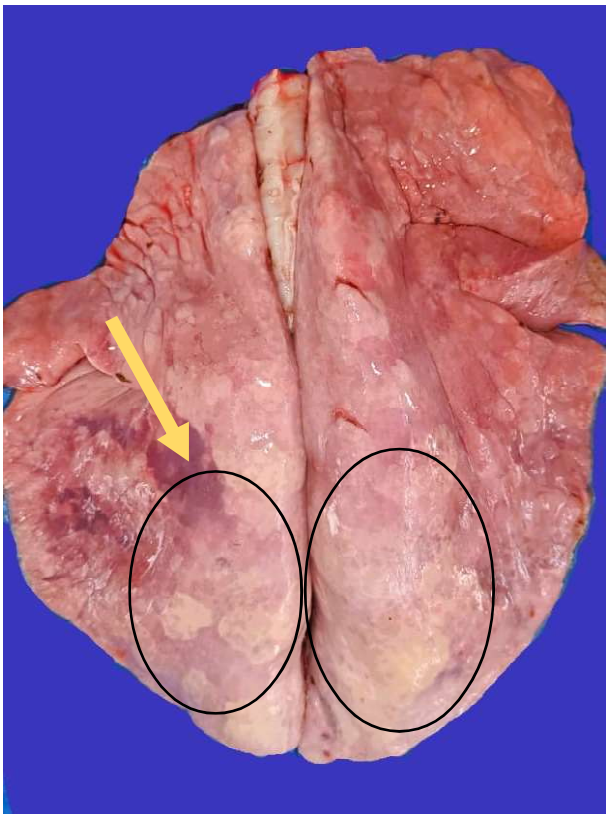

Fig 1: Gross photograph of goat lungs showing multifocal, whitish emphysematous lesions (black circle) on the caudal lobes of the lungs along with the presence of focal area of congestion on the left lobe (yellow arrow)

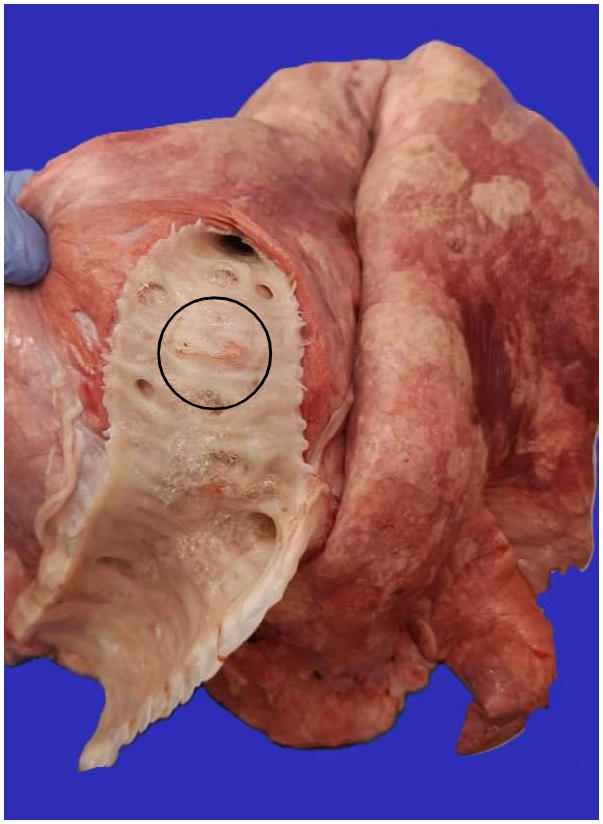

Fig. 2: Gross photograph showing froth along with thin, whitish lungworms (black circle) in the trachea of goat

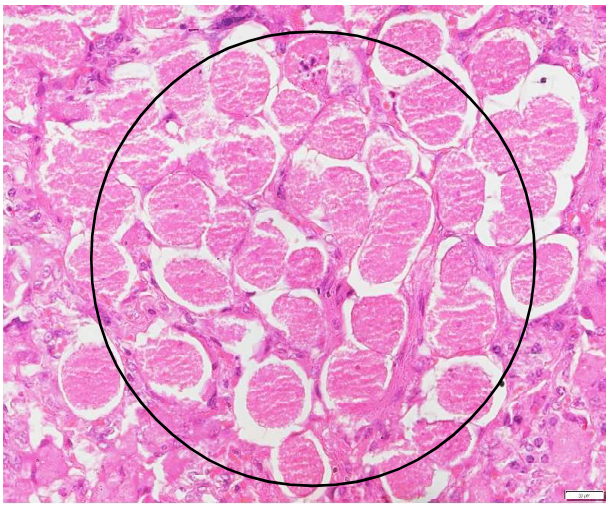

Fig. 3: Microphotograph of goat lungs showing presence of multiple parasitic eggs in the alveolar spaces (black circle) (Hematoxylin & Eosin, 40X).

Histopathology

Histopathological examination of the lung sections revealed the presence of different developmental stages of parasites within the alveolar spaces and bronchioles. Parasitic eggs surrounded by eosinophilic inflammatory exudate were frequently observed, similar to the observations of Ali and Abdullah (2024) (Fig 3.). The adjacent interstitial tissue showed marked infiltration of mononuclear cells and eosinophils. When helminth larvae first reach the lungs, the body quickly responds by attracting eosinophils to the site. This happens because the infection stimulates the release of chemical signals such as eotaxins and MIP-1±, along with the cytokine IL-5, which together activate and recruit eosinophils to the affected lung tissue (Weatherhead *et al.*, 2020).

Severe hyperplasia of the bronchiolar epithelium was evident, along with sloughing of epithelial cells into the lumen. The bronchiolar lumen contained necrotic cellular debris and inflammatory exudate predominantly composed of polymorphonuclear leukocytes. Thickening of the interalveolar septa was observed due to inflammatory cell infiltration and, in some areas, proliferation of fibroblasts, suggesting chronicity of the lesion. Peribronchiolar lymphoid hyperplasia was also a prominent feature. These histopathological findings were in agreement with the reports of El-Mashad *et al.* (2020) and Teshale *et al.* (2024).

The observed lesions clearly demonstrate the pathogenic effects of lungworms on pulmonary tissue and explain the compromised respiratory function commonly seen in affected animals.

CONCLUSION

The present case highlights verminous pneumonia as an important parasitic respiratory disease of goats, characterized by distinct gross and histopathological lesions. Lungworm infestation leads to significant inflammatory and structural changes in the lungs, which can predispose animals to secondary infections and production losses. Regular monitoring, strategic deworming, and improved pasture management are essential to reduce the incidence of verminous pneumonia in goats, particularly in regions that practice extensive grazing. Early diagnosis through pathological examination remains a valuable tool for effective disease control.

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