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Mixed gastrointestinal parasitism in a free-ranging nomadic sheep flock: A field study from Cauvery delta

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Abstract

A pattanam sheep from a flock of twenty maintained in a free-range grazing system presented with a history of anorexia, dullness, blanched mucous membrane and diarrhea for the past few days. During treatment, the animal collapsed suddenly and was subjected to postmortem examination. On postmortem examination, numerous parasites were recovered from the gastrointestinal tract and identified as *Haemonchus spp.*, *Trichuris spp.* and amphistomes. This implies that the animal was affected by mixed gastrointestinal infections mainly due to poor pasture management and absence of strategic anthelmintic intervention. The combined effects of the parasites induced severe anaemia, malabsorption of nutrients and fluids and led to hypovolemic shock. This case highlights the need for early diagnosis and the importance of strategic deworming to prevent the economic loss and to increase the productivity of the farmers

Keywords: Mixed parasitism, *Haemonchus sp.*, *Trichuris sp.*, Amphistomes, sheep, deworming

Introduction

Gastrointestinal parasitism is one of the most prevalent issues affecting the sheep population worldwide, particularly under free-range and extensive grazing systems. Helminth parasites cause economic losses by reducing feed intake, growth rate, productivity and fertility of the animals and death in severe cases (Win *et al.*, 2020) [15]. Due to grazing behavior of sheep, they are more susceptible to parasitic infection than goats, and climatic conditions also influence the occurrence and severity of the gastrointestinal parasitism which results in morbidity and mortality of the animals (Singh *et al.*, 2017) [9]. Sheep grazing on contaminated pastures result in mixed parasitic infection due to long-term exposure to different stages of infective eggs and larvae (Soulsby, 1982) [10].

Haemonchus contortus is the most pathogenic parasite causing anaemia and sudden death which is highly prevalent and most important parasite inhabiting the abomasum of sheep (Khalafalla *et al.*, 2011 and Besier *et al.*, 2016) [6, 2]. *Trichuris sp. parasitizes the large intestine, mainly the caecum and colon, causing enteritis which results in wasting* (Wang *et al.*, 2022) [14]. Amphistomes or rumen flukes, mostly seen in herbivores during the rainy season, cause digestive disturbances and significantly aggravate the disease when co-existing with other roundworm infections (Huson *et al.*, 2017 and Nyagura *et al.*, 2024) [4, 8]. This study highlights the sudden mortality of sheep from a flock with mixed helminthic infection.

Materials and Methods

A pattanam sheep from a flock of twenty animals maintained on a free-range grazing system in Trichy, Tamil Nadu was presented to the Veterinary Clinical Complex, VCRI, Orathanadu, TANUVAS with a history of dullness, reduced appetite, lethargy, blanched mucous membranes, diarrhoea and no history of anthelmintic intervention in the flock. The animal appeared severely debilitated and was subjected to the emergency treatment but collapsed during treatment. A detailed post-mortem examination was carried out immediately after death. During thorough examination of the gastrointestinal tract, parasites were observed in the rumen, abomasum and intestines. The parasites were collected in 70% ethanol and submitted for identification in Veterinary Parasitology Laboratory.

The worms were processed using standard procedures for identification based on morphological characteristics (Soulsby, 1982) ^[10]. In addition, faecal samples were collected from the remaining sheep in the flock randomly and examined for detection of endoparasites using sedimentation and floatation techniques.

Results and Discussion

Post-mortem findings revealed mixed gastrointestinal parasitism in the sheep. Heavy infection of reddish worms from the abomasum was identified as *Haemonchus contortus* based on the barber's pole appearance of the intestine and uterus, and the presence of a tongue-shaped vulval flap (Fig 1). Whip like worms were present in the large intestine identified as *Trichuris* sp., which is characterized by having a posterior part thicker than the anterior part of the body, and in the case of male worms, the posterior end is curved with a single spicule in a sheath (Fig 2). Amphistomes recovered from the rumen were identified as *Gastrothylax crumenifer*, which is characterized by crossing over of the uterus from right to left at the middle level (Fig 3). The carcass showed marked pallor of the intestinal mucous membrane, indicating severe anaemia (Fig 4). Faecal examination of other animals in the flock revealed strongyle, amphistome and *Trichuris* sp. eggs (Fig 5) indicating the presence of mixed parasitic infection in the flock. The flock was dewormed with a combination of oxclozanide and levamisole for eliminating the parasites (Soulsby, 1982) ^[10]. Fecal samples were negative for parasitic eggs 7 days after the treatment, and increased activity of the animals indicated successful recovery in the flock. Mixed helminth infection is most commonly seen in sheep maintained under extensive and free-range systems, which causes a major problem particularly in tropical and subtropical regions and results in severe economic loss by decreasing productivity and causing morbidity and mortality (Waller, 2006) ^[12]. In the present study, the detection of *Haemonchus contortus*, *Trichuris* sp. and *Gastrothylax crumenifer* indicated the multiple parasitism of the gastrointestinal tract of the sheep. Among these, haemonchosis is one of the most ubiquitous parasitic diseases of sheep due to blood-sucking activity (0.05

ml/day/worm) and high burden lead to severe anaemia, haemorrhagic abomasitis, hypoproteinaemia, submandibular oedema and often cause sudden death (Gadahi *et al.*, 2009 and Arsenopoulos *et al.*, 2021) ^[3, 1]. The marked pallor of the mucous membrane observed during the present study strongly indicates acute haemonchosis as the primary cause of mortality in the sheep.

Amphistomes are digenetic trematodes which inhabit the rumen and reticulum and impair the normal digestive function of the animals. They cause significant damage to the ruminal mucosa, loss of ruminal papillae in severe cases which impacts both ruminal motility and fermentation, leading to anorexia, malabsorption of nutrients, and contributing to gradual wasting (Tandon *et al.*, 2014 and Wani *et al.*, 2024) ^[11, 13]. Immature amphistomes are pathogenic, causing haemorrhagic enteritis and diarrhoea (Mondal *et al.*, 2002) ^[7]. In chronic conditions, animals exhibit signs such as anorexia, weight loss and severe debilitation, thereby resulting in reducing the animal's ability to withstand concurrent infection. *Trichuris ovis*, known as the ovine whipworm, is a caecal parasite mainly causing the thickening of the caecal mucous membrane, haemorrhages, congestion, nodule formation and ulceration of the large intestine. Heavy burdens impair the absorption of fluids by the intestine and cause diarrhoea resulting in dehydration (Iliev *et al.*, 2017 and Bulbul *et al.*, 2020) ^[5, 13]. The concurrent infection of haemonchosis, amphistomosis and trichuriasis causes the combined clinical consequences such as blood loss, digestive disturbances and impairment in fluid absorption, which led to hypovolemic shock and death in this case.

The current findings of the study highlight the life-threatening effects of mixed parasitic infection in sheep maintained in free-range conditions. The continuous exposure of animals to a contaminated pasture especially in extensive and free-range grazing systems, absence of deworming and climatic conditions play a major role in the development of mixed helminthic infection. The combination of anthelmintics after proper diagnosis using faecal examination will always help the farmers to avoid concurrent infections in animals.

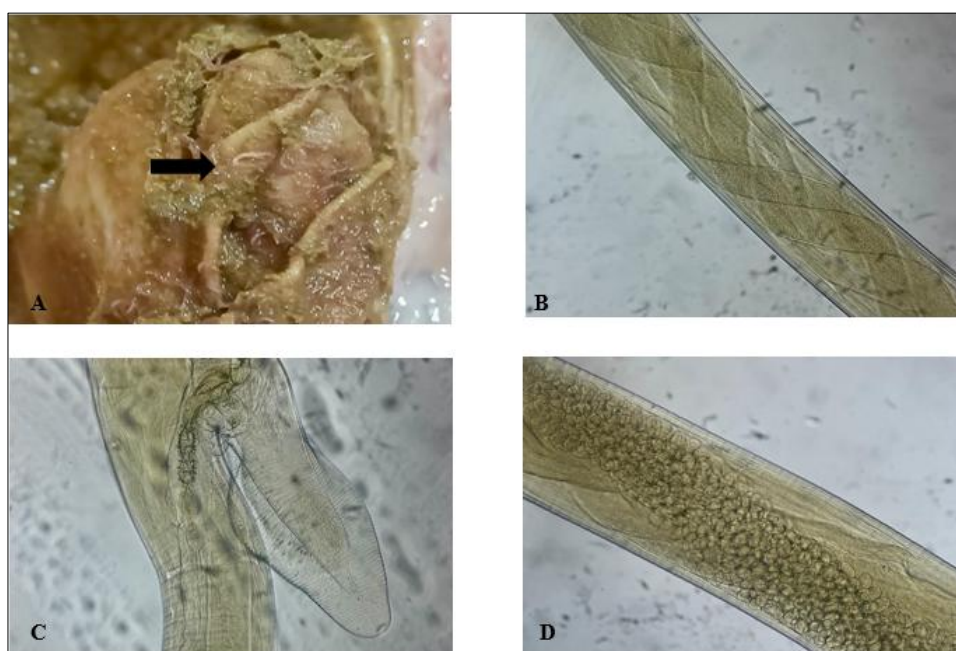


Fig 1: A) Abomasal mucosa showing *Haemonchus contortus* (arrow); B) Female *H. contortus* showing coiling of intestine and uterus (arrow); C) *H. contortus* – Female with linguiform vulval flap (arrow); D) Uterus filled with eggs - Female *H. contortus* (arrow)

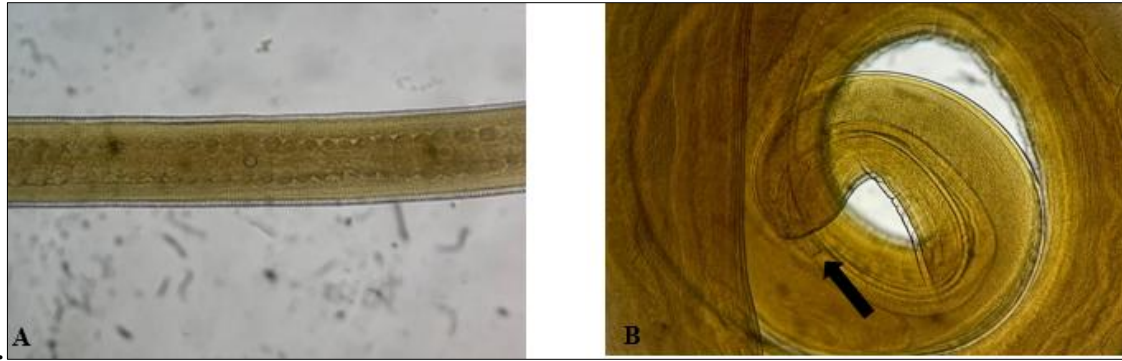


Fig 2: A) *Trichuris* sp. showing stichosome oesophagus (arrow); B) *Trichuris* sp. curved posterior end – showing a spicule in spicule sheath



Fig 3: A) Amphistomes attached to rumen mucosa in sheep; B) *Gastrothylax crumenifer* characterized by crossing over of uterus (arrow)



Fig 4: Pallor intestinal mucosa indicating severe anaemia



Fig 5a: Amphistome egg – Oval shape with distinct operculu

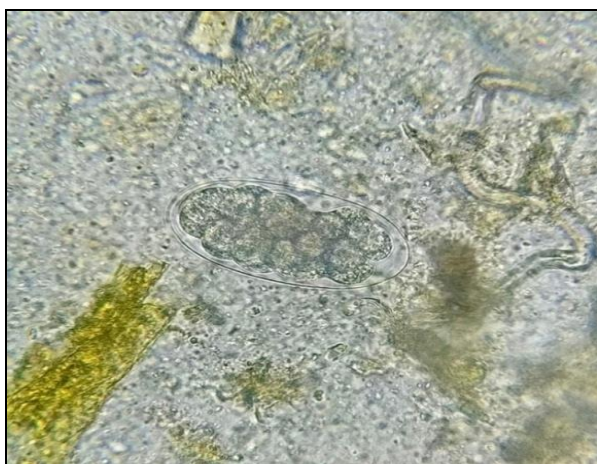


Fig 5b: Strongyle egg – Oval, thin shelled egg with segmented yolk



Fig 5c: *Trichuris* sp. egg – Brown colour, barrel shaped egg with plugs

Conclusion

This study highlights the mixed gastrointestinal parasitic infection in sheep and the need for early diagnosis. Sheep are most affected due to their grazing habit, and the factors

which predispose to the mixed infections — lack of deworming, contaminated pasture, climatic conditions, and poor nutrition — significantly increase the susceptibility of animals to the heavy parasitic burdens. This led to the death of animals and caused economic loss to the farmers. The strategic deworming based on faecal examination, pasture management, rotational grazing, maintaining proper hygiene and providing nutritional support not only prevents the mixed parasitic infection but also improves the productivity of the farmers.

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