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FATAL HAEMONCHOSIS (*H. contortus*) IN GAROLE SHEEP AT COASTAL REGION in BANGLADESH

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A B S T R A C T

Among gastro intestinal nematodes, *Haemonchus contortus* is one of the most pathogenic parasites of small ruminant in many countries of the world, including Bangladesh. Garole breed of sheep are adapted to the hot coastal regions in Bangladesh, and able to graze on marshy land. Sheep farm of Grameen Jano Unnayan Sangstha (GJUS), Bhola, a coastal region of Bangladesh faced sudden lamb mortality during the period of May, 2019 to August, 2019. Routine investigation was performed and data were summarized to find out the etiology, control measures and possible risk factors. During investigation both clinical and management history, physical examination and necropsy were performed. Salient case history includes: only Garole lamb with poor body condition at hot and humid climate died. Important clinical manifestation is defecation of bad odoured scanty blackish faeces. Physical examination of affected sheep revealed anemia and submandibular edema. Necropsy findings showed numerous *Haemonchus* sp. and frank haemorrhage in the abomasum. For control, all affected sheep were treated with anthelmintic, Nitroxynil (Nitronex®) and other supportive therapy; 4 hour after injection with Nitronex® one sick lamb was died, that might be due to anthelmintic stress, and others recovered within 3-5 days. This is the first report on haemonchosis in Garole sheep at coastal regions of Bangladesh; it will help the sheep rearers in the region to take protective measures against the fatal haemonchosis.

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INTRODUCTION

Sheep is an excellent domestic ruminant that can convert a variety of food such as weeds, grasses, shrubs, roots, cereals, leaves and barks into meat and wool (Sahana et al., 2001).Garole breed of sheep is very popular for its prolificacy, lambing frequency, disease resistance capacity and good quality wool and skin (Banerjee et al. 2010).Garole sheep is well suited with salinity and different sorts of animal husbandry in the coastal region of Indian subcontinent, including Bangladesh. In Bangladesh, comparing with other native sheep Garole sheep is reported to produce good quality wool production(Hassan and Talukder 2012). The parasite *Haemonchus contortus* is specially a parasite of sheep and goat in tropical and subtropical countries including Bangladesh (Dey et al., 2019; Islam et al., 2017; Nahar et al., 2015). Haemonchosis occurs in small ruminant throughout the years, it becomes higher during the warmest summer months, and the first outbreaks are normally seen in late June, increasing until August, and then gradually decline in August(Islam et al., 2017; Nahar et al., 2015). This parasite losses 0.05ml blood per day leading to serious health effects such as anemia, submandibular edema (bottle jaw) (Taylor et al., 2007).Due to its blood feeding behavior and rapid development in suitable environment, *H. contortus* is a frequent cause of mortalities in sheep and goats, especially in young animals(Taylor et al., 2007).Sheep become infected with the ingestion of L3 contaminated feed that eventually moults to L4 and L5, and then mature to adult stage in the abomasum; all these stages of the parasite able to loss host's blood by both direct feeding of blood and also producing haemorrhage after the parasites detach from the feeding site (Getachew et al., 2007). Besides intrinsic factors several other extrinsic factors such as environmental temperature, rainfall and humidity, and host's immune status, breed, age, sex and nutritional status affects number of parasites (Getachew et al., 2007). Effective control strategy depends on such factors that greatly influence the degree of infestation such as nature of the parasite, host genetic and physical, as well as environmental determinants. In one sheep farm of Grameen Jano Unnayan Sangstha (GJUS), Bhola, a coastal region of Bangladesh found sudden lamb mortality during May, 2019 to August, 2019. This article gives a comprehensive description of lamb mortality caused by *H. contortus*, treatment responses and identification of possible risk factors for successful control of the disease.

MATERIALS AND METHODS

Sheep breeding farm is located Bhola district, a coastal region of Bangladesh. The farm is consisting with 40 Garole and 7 local sheep. After installing in shed, all sheep were dewormed with combined anthelmintic Renadex® (Triclabendazole and Levamisole). The farm faced sudden mortality of 13Garole lambs at irregular interval during the period May, 2019 to August, 2019. A thorough investigation was done to find out the cause and possible risk factors using following techniques.

Clinical history

For investigation, data of breed, age, season, body condition, management, sources of feed, prophylactic measure and treatment were taken into count.

Physical examination

Physical examinations of sick lambs were examined by general inspection, palpation, percussion and auscultation methods to detect abnormalities. Mucous membrane color of sick animals was examined to find the abnormality. It showed severe pale conjunctiva, then degree of anaemia was evaluated using FAMACHA (FAffa Malan CHArt) method as described by before (Besier et al., 2016a).

Post mortem findings

Necropsy was done following the procedures described by Somvansi and Rao, 2009.

Treatment responses and advice plan

To check the lamb mortality caused by haemonchosis, all affected sheep were treated with Nitroxynil (Nitronex®) and other multivitamin and mineral supplements such as Aminovit plus®, Hemovit®, and Bjec® and follow-up study was performed for next 3 weeks.

RESULTS

Case history analysis

In sheep farm, among Garole breed and local sheep, only Garole sheep were affected and died; most of the affected sheep were in poor body condition. Mortality was observed in case of 6-7 months old lambs, on the other hand, all adult sheep survived though few of them showed mild weakness and pallor conjunctiva. Lamb mortalities were recorded during May, 2019 to August, 2019 when there were high humid weather and heavy rainfall. Besides, sheep were fed green grasses that were grown in nearby field connected with sheep pen drainage alleys. Immediately after arrival, all sheep were dewormed with combined anthelmintic Renadex® (Triclabendazole and Levamisole) that fail to protect sheep against *Haemonchus.*

Clinical sign and physical examination data

The affected survivors showed pallor mucous membrane that mainly seen in conjunctivae, progressive weakness and disinclination to move out. Some of the affected lamb showed submandibular edema (Figure 1) without any pain sensation; it might be due to hypoproteinemia produced by *Haemonchus.* Some animal defecated scanty blackish color faeces. Degree of anemia was measured using rapid diagnostic test indicator, FAMACHA system of scoring; it scored 3-5 level in the affected sheep.

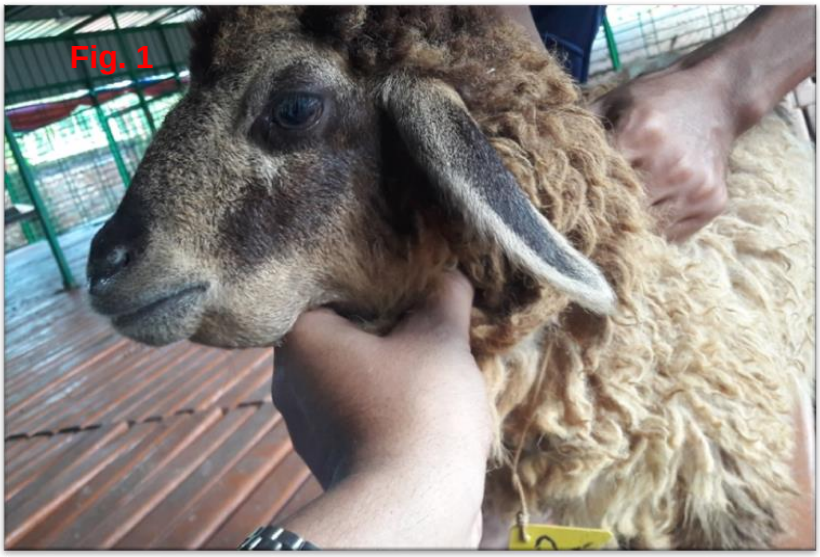

Figure 1. Submandibular edema in Garole lamb

Post mortem findings

The carcass was found severely cachectic. After opening of the carcass frank haemorrhages was found in the abdominal cavity that failed to clot (Figure 2A). All vital organs such as lung, heart and kidney were found normal in consistency. In the abomasum, numerous round worms having 2-3 cm in length, with the characteristics of typical Barber's pole, here blood-filled pink colored intestinal tract of the worm twisted around the paler reproductive tract (Figure 2B) was found that indicates fatal haemonchosis.

Figure 2. Postmortem findings of Garole lamb: **Figure 2A:** Frank haemorrhage in the abdominal cavity that failed to congeal. Black arrow indicates watery blood produced by *H. contortus* infection. **Figure 2B:** Barber's pole worm. Black arrow indicates typical *H. contortus*, wire worm (Barber's pole worm)

Treatment responses

All affected sheep were treated with anthelmintic, Nitroxynil (Nitronex®) and other mulivitamin and mineral supplements such as Aminovit plus®, Hemovit®, and Bjec® as per company instruction. Unfortunately, four hour after injection with Nitronex®,one sick lamb was died; it might happen that the sick lamb was too weak to tolerate the dose of anthelmintic. On the other hand all other affected lamb recovered the infection.

DISCUSSION

Haemonchus contortus is an economic important and widely prevalent gastro intestinal nematode of small ruminant in Bangladesh. This is the first comprehensive report on haemonchosis in Garole sheep at the coastal region of Bangladesh. Investigative analysis of clinical examination and post mortem findings data along with epidemiological factors such as nature of the host, seasonal occurrence and nutritional status rapidly confirms diagnosis of haemonchosis.

This parasite is considered primarily a parasite of tropical and summer rainfall zones; due to its high biotic potential a large number of parasite develop rapidly when free-living stages get favorable condition such as hot and humid climate, and it can cause sudden death in affected animal without showing any prior symptoms(Besieret al.,2016b). In this investigation, it is found that all Garole lambs were died during May, 2019 to August, 2019 when there were heavy rainfall and high humid condition. Besides, on investigation it was found that inadequately nourished lambs were fed green succulent green grass grown in nearby field that was connected with farm drainage system, it might happen that feeding of contaminated grass enhances rapid development of disease.

In general, highly productive sheep and goat breeds are particularly susceptible to *Haemonchus* infection (Hoste et al., 2016).There is a remarkable variation in resistance to haemonchosis among breed even individuals in a flock, however, locally adapted breed get significant advantages (Besieret al.,2016b); Garole sheep are considerably more resistant to *H. contortus* (Banerjee et al., 2010). But, in this sheep farm, mortality was observed in Garole lamb which were found in poor body condition, local sheep were found unaffected. It might happen that imported Garole sheep could not tolerate the *H. contortus* infection with their poor nutritional status, whereas, local sheep protected the infection because of their acquired immunity. No age groups of animals are particularly prone to haemonchosis, however, lamb that has not received any natural

acquired immunity is found to be more susceptible(Besier et al., 2016b). In this sheep farm, all mortality was found in lamb at the ages 6-7months of age; it might happen that all the Garole lamb were imported from different location that had not optimum natural acquired immunity against *H. contortus* resulting mortality.

The clinical signs of *H. contortus* infection depend on parasitic load in the abomasum, individual variation and nutritional status of the animal. Clinical symptoms are detail discussed in different Veterinary and Parasitology text books (Urquhart et al., 1996). Most predominant clinical signs are different degree of anaemia, production losses through decreased body weight and poor wool growth, weakness, less inclined to move out, submandibular edema, although this is not pathognomonic, and death without showing any symptoms (Besier et al., 2016b). In this investigation of lamb mortality, affected lamb showed similar symptoms such as, anaemia, submandibular edema (Figure 1A) and spent more time lying. FAMACHA (FAffa Malan CH Art) is the widely accepted technique used for anaemia level measuring by comparing conjunctiva color with the prescribed chart as expressed score ranging 1-5 in case of *H. contortus* infection (Malanet al.,2001),here also all affected lamb scored 3-5. In case of single *H. contortus* infection, diarrhoea is not a common manifestation, but faeces appeared as firm, scant and may be dark (Besier et al., 2016b); in this sheep farm affected lamb showed blackish scanty faeces that might be due to melaena produced by blood losing tendency of the parasite.

Among diagnostic approaches, diagnosis of haemonchosis using morphological identification of parasitic species is gold standard. There is strong association between *H. contortus* and small ruminants such as sheep and goat. *H. contortus* in sheep could be confirmed by their typical Barber's pole appearance locating in the abomasum. In general, necropsy findings of haemonchosis varies depending on infection doses, and body condition of the host; it ranges from moderate to extreme anemia with watery blood that fail to coagulate, pallor mucosa, fatty degeneration of the liver (Besier et al., 2016a). Numerous nematodes, Barbar's pole worm in the abomasal content indicates severe infestation. Here, in this investigation, we also found hundreds of worms in the abomasum (Figure 2B); frank watery blood in the abdominal cavity (Fig. 2A) which indicates the lamb mortality caused by *H. contortus* infection. Using necropsy findings and clinical examination data similar results were reported in sheep (Kumar et al., 2019).

A group of anthelmintic is effective against haemonchosis but parasitic load and strain limits drug choice. Levamisole and Triclabendazole both anthelmintic works separately against *H. contortus*, and their combined therapy have significant role against it; endemicity of the parasite restricts the effectiveness of these drugs (Besier et al., 2016a). In this sheep farm, after arrival of purchased sheep, all were dewormed with commercial combined anthelminitic Renadex® (Levamisole+Triclabendazole) which failed to protect Garole lamb against *H. contortus* infection. Compounds of Salicylanilides group such as Nitroxynil reported to be effective against helminthes including *H. contortus* by inhibiting energy metabolism of the parasite (Besieret al., 2016a). In this investigation, after confirmation of haemonchosis all sheep were treated with Nitroxynil (Nitronex®) with other supportive therapy and affected animals were recovered the infection except one sick lamb that died immediately after injection; it might happen that the sick lamb were too weak and stressed to tolerate the anthelmintic doses.

CONCLUSION

The parasitic nematode, *H. contortus* has significant threat to health and production of sheep in tropical areas. Based on clinical and managemental history, clinical findings, post mortem findings and gross appearance of the adult parasite, the Garole lamb mortality was diagnosed as fatal haemonchosis. It occurs in sheep and goat due to its improper feeding habit and managemental practices. Nitroxynil is an effective anthelmintic against *H. contortus* infection of the coastal region of Bangladesh. Combined approaches such as rational use of anthelmintic, regular checking of *Haemoncus* ova using direct smear of faecal sample examination, anaemia checking using FAMACHA technique, avoid of suspected contaminated grass during peak season of haemonchosis and maintenance of proper nutrition might protect Garole sheep against haemonchosis in the coastal region of Bangladesh.

COMPETING INTEREST

The authors declare that they have no competing interests.

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