

Hemonchus contortus: A serious concern in small ruminants

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Abstract

Haemonchosis, caused by the parasitic nematode *Haemonchus contortus*, is a common occurrence in small ruminants. It poses a significant threat to the health and productivity of sheep and goats in tropical and warm temperate zones. The occurrence of hypobiosis (inhibition of the fourth-stage larvae within the host) explains the sporadic outbreaks of haemonchosis in arid and colder environments. The wide climatic distribution of the parasite may also be attributed to the adaptation of local isolates to less favorable ecological conditions. The primary indicators of the disease are related to the nematode's blood-feeding behavior, resulting in anemia, hypoproteinemia, weakness, edema (bottle jaw) and frequent deaths unless treated. While the risk of haemonchosis varies significantly at the local level, even in endemic areas, extensive ecological investigations provide a solid foundation for predicting the relative geographical and seasonal risk based on climatic conditions (Arsenopouloset *al.* 2021).

Introduction

Hemonchosis is a significant and common parasitic infection in Sheep and Goat, prevalent in tropical, subtropical, warm and summer rainfall areas than cooler areas. *Haemonchus contortus*, commonly called as wireworm or stomach worm is a nematode parasite of family Haemonchidae. It is highly pathogenic parasite that localizes in abomasum of affected animals and pathogenicity is mainly due to blood sucking behavior of parasite which adversely affect health and productivity of animals. Diagnosing the disease is difficult as the field evidence can provide suspicion about the infection, but needs to be subsequently confirmed by laboratory tests through parasitological or molecular techniques. Antihelminthic resistance to various drugs like benzimidazoles, imidazothiazole and macrocyclic lactones makes the infection difficult to control.

Morphology

Males are even reddish in colour while in the female the white ovaries are spirally wound around the red intestine giving the appearance of barber pole. The cervical papillae are prominent and spine like. Buccal cavity contains a dorsal lancet. Male bursa has elongated lateral lobes supported by long slender rays. The small dorsal lobe is asymmetrically situated against the left lateral lobe and supported by Y shaped dorsal ray (fig 1b). The spicules have small barb near its extremity. The Vulva of female has linguiform process (vulval flap, fig 1c). Egg is yellowish in colour and in early stages of cleavage contain 16-32 cells (fig 1d).

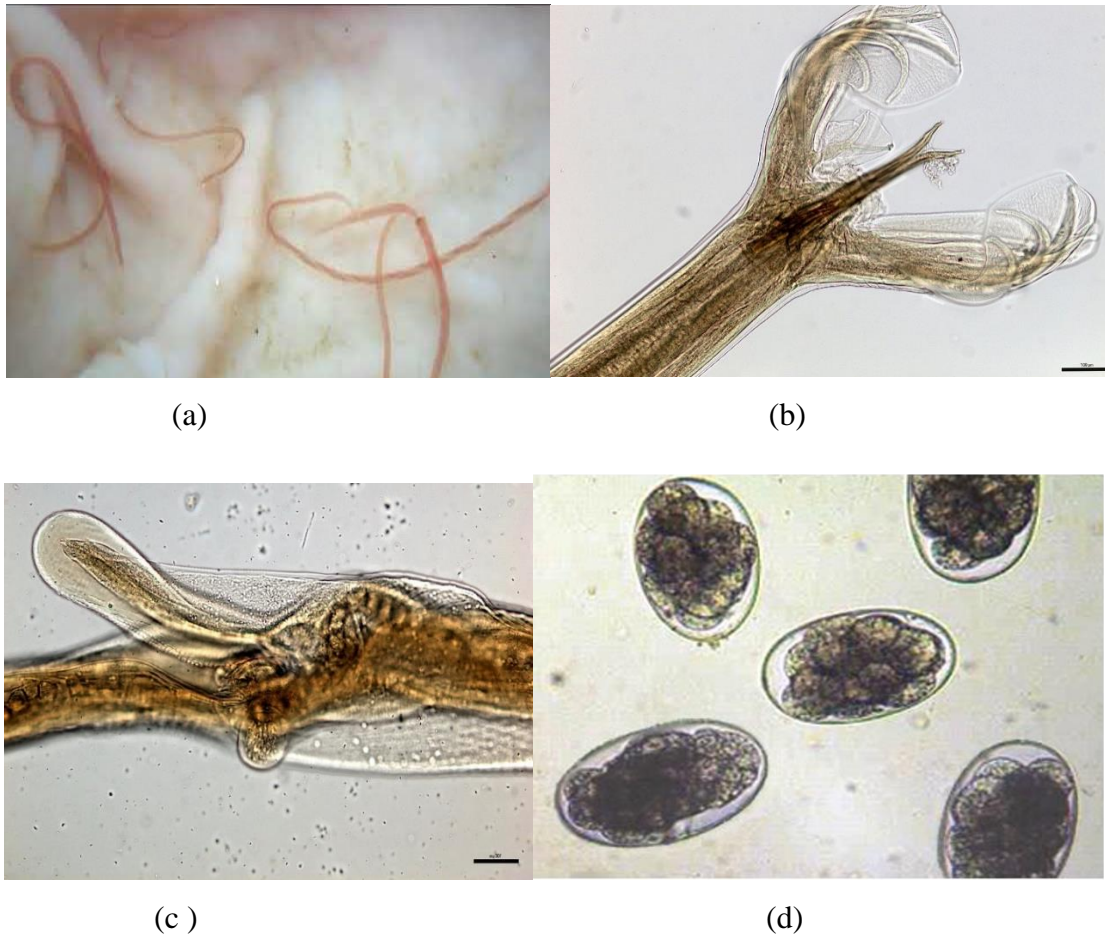


Fig. 1 a- brown worms in abomasum, b- hind end of male showing spicules, c- vulval flap of female, d- eggs of *Haemonchus contortus*

Pathogenesis

It usually occurs in three stages

I stage: seen during 7-25 days of post infection, the packed cell volume (PCV) of the blood decreases but the serum iron concentration remains normal, this is mainly due to time lag between blood loss and compensatory system of body.



II stage: seen from 6-14 weeks post infection, PCV is maintained but lower than the normal rate. Infected sheep compensate by threefold increase in erythrocyte production.

III stage: characterized by rapid drop in PCV is due to dyshaemopoiesis due to iron deficiency.

Clinical signs

Disease occurs in three forms

Hyperacute form: uncommon form, mostly occurs due to sudden massive invasion, characterized by anemia, passing of dark colored faces and sudden death.

Acute form: most commonly seen in young animals, characterized by anemia, hypoproteinemia, oedema, weakness and finally leads to death. Faecal egg counts of 1,00,000 egg per gram(egg) is observed during faecal examination.

Chronic form: This is most extreme form of disease and is economically important, here morbidity is 100 % but mortality is low. Animal shows symptoms like weak, unthriftiness, emaciated, anaemia, hypoproteinaemia it may or may not be severe. Faecal egg counts of 2000 eggs are observed during faecal examination.

Post mortem findings

Pale mucous membrane and skin, blood is watery appearance, internal organs pale in colour, hydrothorax, pericarditis, ascites, extreme cachexia, fat is replaced by gelatinous tissue. Liver is light brown in colour, fragile, fatty changes occur in it, abomasum has reddish brown fluid ingesta and large number of worms present freely moving in warm carcass, abomasal mucosa swollen and bite marks are present.

Diagnosis

1. Clinical signs – history, examination of body by FAMACHA score, faecal score
2. Faecal egg count and identification- McMaster method, lectin staining, automated egg examination, FLOTAC
3. Larval culture, egg hatch test
4. Immunological detection – ELISA, CFT, indirect immunofluorescence, indirect haemagglutination
5. Visible near infrared spectroscopy- for detection of haemoglobin in sheep faeces
6. PCR, droplet digital PCR – done by DNA extraction from egg in faeces
7. Post mortem examination

Treatment

Periodical deworming of flock with anthelmintics but the disadvantage with this procedure



is costly, less immune response and development of resistance. Targeted flock and target selective treatment in which only selected animals are treated leaving remaining but these two are labour intensive. Broad spectrum substances like albendazole and macro-cyclic lactones have been known to create resistant parasite strains. the combined use of more than one anthelmintic has been found adequately effective against resistant parasites.

Control

Due to constantly increasing drug resistance in *H. contortus* and residual effects, the control strategies which employ minimal use of synthetic anthelmintics have gained importance in the sheep industry. The experts have recommended an integrated control mechanism encompassing various approaches instead of relying on a single option to achieve enough control. Management fields like the selection of resistant lines of sheep, adoption of grazing techniques, and vaccines like barberivax, biological control using *B. thuringiensis* act against larvae by releasing toxins (Naeem *et al.*,2021).

Conclusion

Haemonchosis is a serious infection in small ruminants needed to be a great concern as it decreases productivity of animals and sometimes may leads to death. So effective control measures needed to be taken to control this infection

References

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