International Journal of Pharmaceutical research and Applications
Volume 9, Issue 1, Jan.-Feb. 2024, pp:1516-1519 www.ijprajournal.com ISSN: 2456-4494

Gastrointestinal Nematodes in Small Ruminants:A Comprehensive Review

Author Name - Komal Rajendra Baviskar

Date of Submission: 08-02-2024 Date of acceptance: 23-02-2024

Abstract

Through the export of live animals, meat, and skin, small ruminants are a significant source of income for the agricultural community and one of Ethiopia's main sources of foreign exchange. Internal parasites are a significant contributor to illness and productivity loss in small ruminants. Small- and large-scale small ruminant production are both severely hampered in poor nations by gastrointestinal nematodes. The health of infected animals in various places might be harmed by them, and they could also result in production losses and economic losses owing to mortality and reduced weight increase. Small ruminants are among the livestock that are affected by gastrointestinal nematode parasites, which can cause health issues in other livestock and economic losses owing to decreased productivity, morbidity, and death. Consequently, strategic use of anthelmintics and parasite control in small ruminants and prevention should be practiced in the study area to minimize the impact of gastrointestinal nematodes on the health of animals.

Keywords: Gastrointestinal nematodes; Small ruminants

I. Introduction

The production of livestock is a vital part of Ethiopia's agricultural economy, contributing significantly to both domestic and export goods as well as industrial raw materials [1]. A significant portion of this livestock herd is made up of tiny ruminants [2]. About 25.5 million sheep and 24.06 million goats exist in the nation and are a significant source of income for the nation's poor farmers [3]. Through the export of live animals, meat, and skin, small ruminants are a significant source of revenue for the agricultural community and one of Ethiopia's main sources of foreign exchange [4].

Small ruminants have a significant economic impact on the nation since they provide meat, milk, fibre, monetary revenue, and skin. They can also survive in harsh climates and consume plants that are inappropriate for large ruminants, and they don't need many labor-intensive inputs [5]. Internal parasites play a significant role in illness and productivity loss in small ruminants [6]. Both small- and large-scale small ruminant production in underdeveloped countries are acknowledged to be significantly hampered by gastrointestinal nematodes [7]. These may impair the health of infected animals in various areas and result in economic losses due to mortalities, reduced weight increase, and other production losses [8].The expense of control is likely where these nematode parasites have the greatest negative influence in industrialised countries.

However, because of ecological conditions that favour a variety of hosts and parasite species, their influence is larger in sub -Saharan Africa in general and in Ethiopia in particular. The local climatic conditions, such

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as humidity, temperature, rainfall, vegetation, and management techniques, affected the epidemiology of gastro-intestinal (GIT) parasites in cattle. The prevalence and severity of different parasite infections in a given area are significantly influenced by these variables [9]. Different types of gastrointestinal nematodes live within small ruminants as hosts. Numerous variables controlled by parasite host-environment interactions affect nematode epidemiology.

Therefore, the main risk factors may be generically categorised as host factors, parasite factors, and Environmental Factor.

parasites and epidimology

The most harmful parasites in small ruminants are gastrointestinal nematodes. Although incidences of serious infections can happen in adult animals housed in suburban paddocks and subjected to overcrowding and bad management, helminthis are most usually a concern in young animals raised in permanent animals' pasture [13]. The kind and intensity of infection are determined by a number of variables associated with this connection. Age, immunity, sex, species, and genetic resistance are host- related factors; life history, length of the histotropic phase, larval survival in the environment, and larvae's placement in the host are parasite-related factors. The propensity for illness to arise and the course of infection are mostly determined by interactions between the host and the parasite, although interactions between the environments of the host and the parasite have an impact on disease transmission [14].The prevalence of small ruminant GI nematode infections in Ethiopia has been found to range from 15.7% to 100% [8]. These infections in sheep and goats were caused by several nematode genera. These include Oesophagostomum, Haemonchus, Trichostrongylus, and others [15]. Haemonchus contortus is the most common parasite in sheep and goats, according to Asmare et al. [16], and needs special consideration in GI parasite management strategies. It is true that this nematode parasite, one of the most dangerous to ruminants, is a major cause of widespread sickness and death in sheep and goats.

morphology

In terms of nematode shape, the body is cylindrical, tapering at the extremities, and elongated. The cuticle covering the body is thick and continuous with the cuticular lining of the buccal cavity, oesophagus, rectum, and the distal sections of the genital ducts. The body is also unsegmented. [17]

General life cycle of gastrointestinal nematodes

Life cycles of GIT nematodes are generally similar. The majority of them are oviparous, and because their eggs are of a similar and distinctive kind, there is no direct transmission of infection from one host to another. Nematode life cycles can be either direct or indirect. Normally, the sexes are separated. However, all of the commercially significant small ruminant gastrointestinal parasites have direct life cycles and don't need any intermediary hosts [18]. The parasites develop, reproduce within the host, anddeposit eggs that pass through the host and are expelled in the faeces. When the eggs leave the host, they moult into second-stage larvae (L2) under the proper humidity and temperature circumstances after hatching into first-stage larvae (L1).

For the larvae to grow and migrate, they require moisture. The bacteria-eating larvae(L2) moult into infectious larvae (L3) during this period, which travel out of the faeces and up grass blades. When a sheep or a goat grazes, parasite larvae may also be consumed together with the grass. Typically, L3 may moult into L4 in just two to three days, and then it needs another 10 to 14 days to moult into young adult parasites [19].

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Effect of nematode parasites on animals

Effect of larval stages on the host:

The host is harmed significantly by the fourth-stage larvae (L4) of the abomasal parasites Haemonchus, Ostertagia, and T. axei. Within six hours of entering the host, the L3 move into the mucous membrane of the wall of the abomasum where they typically remain for two to three weeks. The host will be harmed if a significant amount of Haemonchus, Ostertagia, or T. axei larvae reach the abomasum. The intestinal mucous membrane may sustain significant harm from Trichostrongylus larvae in the small intestine, which would have comparable consequences.

Effect of adult worms on the host:

A history of the region, a history of anti-helminthes medication, a history of grazing, the age of the animal, and clinical indications of the disease are necessary for the clinical diagnosis of GIT nematodes in sheep and goats.

However, laboratory testing is crucial since GIT nematodosis and other illnesses have similar clinical signs. The presence of their eggs, or larvae, in faecal samples or the presence of parasites collected from the animals' digestive systems are used to diagnose nematode parasites in small ruminants [21].

treatment

Ethiopian pastoralists and small-scale farmers use several methods to manage parasites in their cattle. These methods include using traditional treatments as well as anthelmintic medications of different quality [18]. Anthelmintics, however, work best when given orally to tiny ruminants [27].

control and prevention

Pastures can be managed to reduce nematode infestation in small ruminants. Animalsneed to be taken off diseased ground, put on a dry pasture, and given access to clean drinking water. Many larvae that easily survive the cold winter are killed by draining andresting pasture during the dry summer. Their excretions shouldn't be used to fertilise fields where green food crops are cultivated, they shouldn't be fed to animals, and adults shouldn't graze with young stock [28]. A strategic feeding plan at periods of increased seasonal incidence or as part of regular feed supplements/additives might be imagined as a therapeutic use of medicinal plants as a replacement for synthetic pharmaceuticals to control gastrointestinal nematodes in small ruminants [29].The most successful and long-lasting method of prevention and control may involve nematode immunisation.

High effectiveness and commercial viability are ideal requirements for vaccinations for their intended application in the cattle industry. Reducing parasitism below the level that results in a major output loss is the definition of useful levels of protection [30].

II. CONCLUSION AND RECOMMENDATIONS

Small ruminants are among the livestock that are affected by gastrointestinal nematode parasites, which also cause health issues and economic losses owing to decreased productivity, morbidity, and death. In light of the foregoing conclusion, the following suggestions were made:

Creating public awareness about methods for preventing and controlling gastrointestinal nematodes in small ruminants should be practised.

To reduce the negative effects of gastrointestinal nematodes on animal health, smallruminants should be strategically treated with anthlmentics.Its important to take precautions against and manage parasites.

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