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Review Article

EPIDEMIOLOGY AND CONTROL OF GASTROINTESTINAL PARASITES OF LIVESTOCK FOR ENHANCED PRODUCTION- AN OVERVIEW

A. Sangaran*, S.T. Bino Sundar and N. Jeyathilakan

Department of Veterinary Parasitology, Madras Veterinary College, Chennai-600 007
Tamil Nadu Veterinary and Animal Sciences University,
Madhavaram Milk Colony, Chennai-600051
E-mail: sangaranvet@gmail.com (**Corresponding Author*)

Abstract: Helminth infections are major health problem in domestic ruminants throughout the world. The economy of rural people largely depends on health and wealth of these livestock. Gastrointestinal helminthosis in ruminants cause considerable economic losses, with marked impairment of productivity of these animals, especially in poor management systems and poor parasite control programs. Infections caused by these helminths represent an obstacle to the expansion of the sheep and dairy industry. Furthermore, high parasite burdens were associated with increased mortality in young animals. The recommended methods for the control of gastrointestinal helminths not always have practical applicability. It is essential to know the epidemiological and control aspects with regard to gastrointestinal nematodes in sheep and cattle. For which, the need of the hour is a sustainable worm control programme which can be recommended. The domestic ruminates have been found to suffer from morbidity rather than mortality due to the presence of different species of helminth parasites in the gastrointestinal tract. The adverse effects of these GI parasites on the health of the livestock lead to great economic losses by affecting the productivity directly or indirectly.
Keywords: cattle, sheep, goats, gastrointestinal helminths, epidemiology, control.

Introduction

Gastrointestinal helminthosis in ruminants are caused mainly by strongylid worms excepting the lungworm *Dictyocaulus,* these helminths, are seen affecting the digestive tract of animals and birds. The most important genera in ruminants are *Haemonchus, Trichostrongylus, Cooperia, Nematodirus* and *Ostertagia.* These helminths represent a major obstacle to the expansion of the sheep and dairy industry (Amarante *et al*., 2004) and cause considerable economic losses, with marked reduction of these animals productivity. Gastrointestinal nematodes (GI nematodes) are a major problem in ruminants around the world, with its main consequence being a decrease in production (Charlier *et al*., 2014). This paper deals with epidemiological and control methods about gastrointestinal nematodes in sheep and cattle by adopting to better management practices.

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Most common species in sheep, such as *Haemonchus contortus, Cooperia curticei* and *Trichostrongylus colubriformis* can also infect cattle, and species that affect cattle, as *H. placei, T. axei* and *C. punctata,* can parasitize sheep. Heterologous infections are mild and over time the animals naturally eliminate them (Jiménez *et al*., 2010). With the beginning of the development of the immune response to these helminths, from 18 to 24 months, the tendency would be to reduce the parasitic burden, with a decrease in the number of eggs excreted in faeces and diminished incidence of clinical cases of hookworm. However, it was observed the frequent occurrence of nematodes in adult animals (Chollet *et al*., 2000). The resistance of sheep to infection by these worms is correlated to seasonal variations, the type of nutrition (Vagenas *et al*., 2007), proximity of parturition and genetic factors (Mpetile *et al*., 2015). Some studies have reported a higher predominance of *H. contortus* in sheep, confirming the observations of this nematode, being more prevalent in extensive regimes of tropical and subtropical regions (Liu *et al*., 2003; Tariq *et al*., 2008). *Trichostrongylids* are responsible for symptoms such as diarrhoea, anaemia, weight loss, emaciation, and may cause death, especially in young animals. The subclinical symptoms related to parasitism may affect weight gain, reproductive rates and even the immune condition of ruminants (Tariq, 2015).

Diagnosis

Counting of eggs of helminths shed in dung samples is used for the diagnosis of infection by gastrointestinal helminths, especially nematodes. For this, faecal cultures are used, allowing the production of third stage larvae (L3), which can be morphologically identified. These techniques do not allow the identification of species, but only genera. In epidemiological studies in which species identification is essential, it is necessary the necropsy of deceased animals for the collection of adult nematodes, which are then classified into species. Due to the resistance of gastrointestinal helminths of ruminants to many used active ingredients, the awareness of veterinarians is of great importance in order to evaluate the anthelmintic efficacy as well as resistance with periodic monitoring by faecal examinations.

Anthelmintic resistance in ruminants

The development of resistance to these products are likely to start as soon as they reach the market, due to the lack of effective options and the increasing pressure for the use of drug combinations against highly resistant isolates. The administration of anthelmintics to animals is the primary control measure adopted to prevent damages caused by worms (Miller and

Horohov, 2006). For many years, anthelmintics were effective in controlling intestinal parasites in ruminants. The sequelae of the widespread use of these drugs have been the emergence of resistant nematodes, a problem that is widespread in the sheep farming systems worldwide (Almeida *et al*., 2013). With the increasing problem of anthelmintic resistance, more emphasis has been placed on identifying herds or animals with helminth-induced production losses, and targeting anthelmintic treatment to these subgroups to preserve anthelmintic efficacy while preventing production losses (Charlier *et al*., 2014). The broad-spectrum anthelmintics (the benzimidazoles group, the imidazothiazoles and the macrocyclic lactones) remove parasites in different stages of development. The narrow-spectrum compounds, like salicylanilides, substituted phenols and triclabendazole, have activity against fewer species of parasites (Tariq, 2015).

Control strategies

Methods for the control of gastrointestinal helminths in a farm condition are balanced nutrition, pasture rotation, use of resistant breeds and alternate grazing of sheep and cattle, without having any practical applicability. The positive or negative effect of rotational grazing on the control of nematodes is directly dependent on the climatic conditions of each region. For an effective reduction of pasture contamination, it should be taken a rest for the pastures during an extended period of time, being economically unviable. To perform an integrated parasite management, knowledge of the ecology of the free living stages of sheep and cattle parasites is highly required. For example, in tropical areas, the average life of the larvae on the pasture is one to three months. In temperate climates the larvae can be viable for 180 to 540 days (O'Connor *et al*., 2006).The use of different species of ruminants grazing in the same area can be a way to reduce the populations of nematode larvae, besides allowing the improvement of pasture management.

In general, animals have great susceptibility to parasitism until puberty. The resistance increases in adulthood, but there are certain times and physiological conditions in which the adult animal becomes more susceptible (Miller and Horohov, 2006). With the adoption of strategic anthelmintic measures, it is possible to increase its efficacy. Measures such as rotational grazing, pasture rest periods and use of genetically resistant animals are approaches that match with the principles of organic livestock production and play an important role in controlling gastrointestinal nematodes Finally, supplementary feeding and breeding strategies to improve resistance to nematodes can reduce the use of anthelmintic drugs to control worm

infections (Amarante *et al*., 2014). Animals that have higher protein absorption produce more wool, meat and milk, as well as, it improves the fertility rate in females. Plant‐based products can be considered as a viable alternative (Tariq, 2015). *Carica papaya, Terminaliaarjuna* (Tannin and ellagic acid), *Fumaria parviflora* (alkaloids and tannins) and *Zingiber officinale* (ginger) showed efficacy against gastrointestinal nematodes of ruminants. The possibility of resistance to plant‐based drugs is lower than chemical anthelmintics (Bauri *et al*., 2015). These plant extracts could be introduced into the drinking water of livestock, especially cattle. This method of parasite control is indeed cheap and easy to practice and could be adopted to complement the already in‐use method of application of commercially available chemical anthelmintics. The sustainable use of certain fungi and earthworms may reduce parasitism in pastures, but needs to be further investigated against different gastrointestinal nematode parasite species all over the world (Tariq, 2015). The co administration of *Duddingtonia flagrans* and *Monacrosporium thaumasium* has been effective in controlling gastrointestinal helminths of adults and young sheep (Vilela *et al*., 2016).

Conclusion

Pasture rotation system can be effectively used to assess the pasture larval burden and control parasite populations in the pasture, as well as alternate grazing systems using different host species such as cattle, sheep and goats can be a better method. Plant‐based products can be considered a viable alternative therapy against gastrointestinal nematodes of ruminants.

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