Diagnostic and Control Methodologies for Gasrointestinal Nematodes in Ruminants: An Overview

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Abstract

Method for the control and diagnosis of ruminant G.I.T. nematodes have been described. However, minor details on the procedures for conducting the diagnostic methods in the laboratory have been omitted as they have been dealt with elsewhere and comprehensive reviews have been presented by others in various textbooks. Similarly, the detailed descriptions of the control methods have also been scaled down.

The diagnostic methods available includes epidemiological considerations and clinical signs may be observed, parasitological methods entailing faecal worm egg counts (e.g.), faecal cultures for larval differentiation and post-mortem worm counts. Others are the haematological and biochemical methods, serological and molecular biological methods.

Of the control methods the available ones include grazing management coupled with use of anthelmintics, vaccination, biological and genetic control strategies.

Introduction

Gastrointestinal (G.I.T.) nematode parasitism is one of the major animal health problems facing the ruminant livestock industries. These industries are based predominantly on year-round grazing of pastures on which infective larvae (L₃) are always potentially available, although with seasonal fluctuations dependent mainly on rainfall.

Farmers normally think that nematode parasites are more important to the sheep industry than to the cattle industry. However, this is probably a consequence of the ability of pathogenic species such as Haemonchus contortus to cause the death of large numbers of sheep, whereas deaths of cattle attributable to nematode infections are less common. In any case, in both sheep and cattle, nematode infections cause similar reductions in weight gains with an additional penalty in sheep of significantly reduced wool production.

I Diagnostic Methods

The available methods used in the diagnosis of G.I.T. nematodes are the use of epidemiology and clinical symptoms, parasitological, haematological, serological and molecular biological methods. The diagnosis of an outbreak of clinical helminthosis is not usually difficult because there are strongly suggestive symptoms and the nematode eggs can be found in the faeces in large numbers. This is in contrast to sub-clinical infections which can be confused with other infections. Clinical signs will usually vary with the type and species of nematode and severity of infection and it is always wise to apply laboratory diagnosis.

A. Parasitological Methods

Most useful are:

i) Quantitative and qualitative faecal worm egg counting procedures such as the McMaster and floatation techniques. In the quantitative method the eggs are expressed as the number of eggs per gram of faeces (EPG) and various factors can affect the results obtained. The EPG does not necessarily indicate the worm burden.

ii) Faecal culture for differential strongyloid larval (L₃) counts.

iii) Pasture Larva Counts. This is widely used for the estimation of populations of L₃ in pasture, for epidemiological studies or for comparing levels of L₃ on two or more pastures.

iv) Post-mortem examination. This provides a more precise assessment of parasite burdens than the EPG. Immature early L₄ can be recovered by a digestion process.
B. Haematological & Biochemical Methods

This involves the use of blood parameters and serum protein as well as serum pepsinogen and the hormone gastrin.

C. Serodiagnosis

Several tests (e.g. ELISA) are available but are usually used in epidemiological studies e.g. to monitor carrier status or presence of reservoirs. However, presence of antibodies cannot indicate the degree of infection or even differentiate current infection or previous infection in a host.

D. Molecular Biological Method

These include the DNA probes and the polymerase Chain Reaction (PCR). They rely on the detection and demonstration of the parasite nucleic acid sequence and are highly specific and sensitive.

II. Control Methods

The objective of nematode parasite control is to ensure that parasite populations do not exceed levels compatible with economic production otherwise complete eradication of helminthosis is not possible.

Methods that can be used in the control of G.I.T nematodes can be grouped into conventional and alternative (novel) methods. The conventional ones include grazing management, use of anthelmintics and the integrated control incorporating grazing management. The alternative methods are development of vaccines, biological control by use of nematopathogenic fungi that prey on infective larvae in the faeces, nutritional control and breeding for resistance hosts (genetic control).

The common grazing management control methods are rotational grazing, pasture resting and pasture sterilization, alternate grazing and adjustment of stocking density.

Use of anthelmintic constitute the classical control method. However, there is concern because of an increasing prevalence of anthelmintic resistance and concerns regarding drug residues in meat and environment (Barger, 1989).

Of importance to note is the need to reduce pasture contamination especially from lactating animals as a result of the relaxation of immunity during the periparturient rise and the impact of nutrition.

References