

REVIEW

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Impact of gastrointestinal parasitic nematodes of sheep, and the role of advanced molecular tools for exploring epidemiology and drug resistance - an Australian perspective

Florian Roeber*, Aaron R Jex and Robin B Gasser

Abstract

Parasitic nematodes (roundworms) of small ruminants and other livestock have major economic impacts worldwide. Despite the impact of the diseases caused by these nematodes and the discovery of new therapeutic agents (anthelmintics), there has been relatively limited progress in the development of practical molecular tools to study the epidemiology of these nematodes. Specific diagnosis underpins parasite control, and the detection and monitoring of anthelmintic resistance in livestock parasites, presently a major concern around the world. The purpose of the present article is to provide a concise account of the biology and knowledge of the epidemiology of the gastrointestinal nematodes (order Strongylida), from an Australian perspective, and to emphasize the importance of utilizing advanced molecular tools for the specific diagnosis of nematode infections for refined investigations of parasite epidemiology and drug resistance detection in combination with conventional methods. It also gives a perspective on the possibility of harnessing genetic, genomic and bioinformatic technologies to better understand parasites and control parasitic diseases.

Keywords: Australia, Gastrointestinal nematodes, Strongylida, Small ruminants (including sheep and goats), Molecular methods, Epidemiology, Drug resistance

Review

Introduction

Parasites of livestock cause diseases of major socio-economic importance worldwide. The current financial and agriculture losses caused by parasites have a substantial impact on farm profitability. For example, the annual cost associated with parasitic diseases in sheep and cattle in Australia has been estimated at 1 billion dollars [1,2] and are proposed to be tens of billions of dollars worldwide, according to the sales of anti-parasitic compounds by pharmaceutical companies, excluding production losses. Thus, there are major economic gains to be made in agriculture by enhancing the control of key parasitic diseases.

Parasitic nematodes of livestock are controlled mainly through anthelmintic treatment. Even with optimally

timed, strategic treatments, this type of control is expensive and, in most cases, only partially effective. In addition, the excessive and frequent use of anthelmintics has resulted in substantial and widespread problems with anthelmintic resistance in nematode populations [3-5]. Therefore, there is an obvious need for and significant global interest in the development of improved means of controlling parasitic nematodes. Given the significant problems with drug resistance, there is an urgent need for an increased focus on understanding the epidemiology of parasites, in order to work toward better strategic and integrated approaches of parasite control. The purpose of the present article is to provide a concise account of the biology and current knowledge of the epidemiology of gastrointestinal nematodes in small ruminants in Australia, and to emphasize the importance of the application of advanced molecular tools for the diagnosis of infections for refined investigations into the epidemiology of parasites and drug resistance.

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The Epidemiology And Control Of Gastrointestinal Parasites Of Sheep In Australia

Michael Hoelscher



The Epidemiology And Control Of Gastrointestinal Parasites Of Sheep In Australia:

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