Anthelmintic resistance in nematode parasites of sheep in Denmark


N. Maingi\textsuperscript{a, b}, H. Bjørn\textsuperscript{a, c}, S.M. Thamsborg\textsuperscript{a, d}, H.O. Bøgh\textsuperscript{a}, P. Nansen\textsuperscript{a} (1997)

\textsuperscript{a} Danish Centre for Experimental Parasitology, Royal Veterinary and Agricultural University, Bülowsvej 13, DK-1870 Frederiksberg C., Denmark

\textsuperscript{b} Department of Veterinary Pathology and Microbiology, Faculty of Veterinary Medicine, University of Nairobi, P.O. Box 29053, Nairobi, Kenya

\textsuperscript{c} Department of Pharmacology and Pathobiology, Laboratory of Pharmacology, Royal Veterinary and Agricultural University, Bülowsvej 13, DK-1870 Frederiksberg C., Denmark

Abstract

The occurrence of anthelmintic resistance on sixteen sheep farms in Denmark was investigated using the faecal egg count reduction test (FECRT), the egg hatch assay (EHA) for thiabendazole (TBZ) and a microlarval development assay (LDA) for TBZ, levamisole (LEV) and ivermectin (IVM). At least two anthelmintics with different modes of action were tested on each farm in the FECRT, depending on the number of sheep available. Less than 95\% faecal egg count reduction (FECR) were recorded 10–14 days after treatment with both LEV and IVM on two farms, LEV on two farms, benzimidazoles (BZs) on two farms and IVM on one farm. This indicated resistance to the respective anthelmintics according to the definitions of the World Association for the Advancement of Veterinary Parasitology. \textit{Trichostrongylus} and \textit{Ostertagia} spp. were the predominant nematode species in both pre-treatment and post-treatment faecal cultures. The LD50 values for TBZ in the EHA for isolates from the two farms where BZ resistance was detected in the FECRT were 0.52 and 1.5 \textmu M TBZ, indicating resistance. The LD50 values for TBZ for these isolates in the LDA were 0.09 and 1.1 \textmu M. The LD50 values in the LDA for isolates declared resistant to LEV ranged from 0.14 to 1.1 \textmu M LEV. For IVM, the two resistant isolates had LD50 values of 23 and 24 nM IVM in the LDA. There were gross disagreements in the declaration of resistance between methods of calculating \%FECR based on the arithmetic mean and those that use geometric mean eggs per gram (EPG) of faeces. Similarly, inclusion of pre-treatment EPG or control group EPG in the calculation of \%FECR influenced declaration of resistance.

Keywords

Sheep; Nematodes; Anthelmintic resistance; Faecal egg count reduction test; Egg hatch assay; Larval development assay