Final report

Sustainable internal parasite control in goats: Effective and safe anthelmintic use – Executive Summary

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Executive summary

Background

Internal parasites continue to be a major problem for Australian goat producers as goats do not develop an age resistance to worms to the extent that occurs with sheep and cattle, and there are relatively few effective anthelmintic products registered for use in goats.

Within the limited registered anthelmintics for goats there is already a high degree of anthelmintic resistance present. There is an ongoing risk of producers using products off label and of the wrong dosage. This poses a risk to industry regarding the potential for violative residues in goat products.

Goat producers across Australia consider the anthelmintics registered for goats are inadequate to effectively control internal parasites. Consequently, 69% of surveyed producers are using off-label products for worm control treatment in goats and half are using a dose greater than the recommended label dose, whilst the other 50% use the standard label dose for other livestock.

This project has generated information for veterinarians who provide veterinary advice to the goat industry, which is vital in off-label use of anthelmintics. The project has established effective dose rates of selected sheep and cattle anthelmintic treatments in goats; and their metabolism and pharmacokinetics in plasma, tissue and milk following oral, topical and injectable administration.

The information will be made available to Australian goat veterinarians to support their goat-owning clients. Safe use of anthelmintics will give the goat producers confidence that they are supplying products without violative residues that would be a risk to the goatmeat markets.

Objectives

1. Establish the effective dosages and tissue/milk depletion curves of sheep and cattle anthelmintics that would be beneficial to the goat industry in Australia.
2. Develop dosage and tissue/milk depletion curves to inform goat veterinarians in off-label use to maximise and preserve efficacy of anthelmintics and satisfy importing country residue limit requirements.

   More specifically, examine seven sheep and cattle anthelmintics that are widely used by producers and identify dose determination and pharmacokinetics using World Association of Animal Veterinary Parasitology (WAAVP) and technical requirements for registration of veterinary medicinal products (VICH) guidelines.

Methodology

Experiment 1 - First dose determination study and pharmacokinetic study

Boer Goats were housed and administered an oral artificial infection with 6000 L3 *H. contortus*, and 4000 L3 *Trichostrongylus colubriformis* and *T. vitrinus*. On day 28, the goats were allocated to treatments according to worm egg count (WEC) and randomly allocated to one of seven registered sheep and cattle anthelmintics at four different dose rates (n=8). On Days 63–70 post infection half the goats from each treatment were slaughtered for total worm burden assessment. For the serum pharmacokinetic study, blood samples were collected at 0, 0.5, 1, 1.5, 2, 5, 8, and 12 days after drug administration.

Experiment 2 – In field dose determination study

Boer goats with natural infection consisting of 94% *H. contortus* and 3% *T. colubriformus* and 3% *Teladorsagia* were dosed with six registered sheep and cattle anthelmintics (n=15). A WEC test was conducted 14 days following anthelmintic treatment to determine efficacy.

Experiment 3 - Marker residue depletion study

Boer Goats were treated with six registered sheep and cattle anthelmintics (n=24). Four animals (evenly mixed as per sex) were slaughtered on each of the following days post treatment, 2, 4, 7, 14, 28 and 42 days. Samples of liver, kidney, peri-renal fat and loin were collected and immediately frozen and analysed for metabolites.

Experiment 4 – Marker residue depletion study for milk

Lactating dairy goats, naturally infected with 37% *T. colubriformis,* 33% *T. circumcinta* and 30% *H. contortus* were treated with five registered sheep and cattle anthelmintics. A combination of Panacur (fenbendazole) and Caprimec (abamectin), which are registered for use in milking goats, was included in the study as a positive control. Faecal samples were taken day 0 and 16 post-treatment. Blood and milk samples were collected on day -1 and at 12, 24, 36, 48, 120, 192 and 288 h post treatment.

Results/key findings

The project has established the use of six off-label products with effective dose rates and residue depletion levels for meat and milk goat products.

The study determined the use of moxidectin pour-on for goat-owners was ineffective for some species of roundworms. Therefore, residue depletion levels were not examined.

Goat producers cannot be directly notified of the dose rates, as the products are not registered by the Australian Pesticides and Veterinary Medicines Authority (APVMA) to be used in goat species. The use of the products must be through the direction and script from a veterinarian.

The outcomes of this project also highlighted the need for anthelmintic resistance testing to be conducted, as goat populations already have resistance to some of the off-label products

Benefits to industry

This project has enabled Australian goat producers to use six off-label anthelmintic actives with the knowledge of the correct dose rate to ensure anthelmintic resistance is not encouraged and efficacy is maintained.
Compliance is met in export goat products by the national monitoring of pesticides and veterinary medicine residues in Australian food products.

Future research and recommendations

Project findings and recommendations will be disseminated by ParaBoss directly to veterinarians who service goat producers.

Goat producers will be made aware that veterinarians have been provided with updated dose rates and residue depletion through the Goats on the Move e newsletter and ParaBoss communications. Off label dose rates will not be made directly available to goat producers by ParaBoss, only to veterinarians.

Animal ethics

Experiment one - First dose determination study and pharmacokinetic study

The Animal ethics approval was obtain by the Animal ethics committee at the University of New England. Authority No. AEC19-040.

Experiment two - In field dose determination study

The Animal ethics approval was obtain by the Animal ethics committee at the University of New England. Authority No. AEC20-020.

Experiment 3 - Marker residue depletion study

The Animal ethics approval was obtain by the Animal ethics committee at the University of New England. Authority No. AEC19-101.

Experiment 4 – Marker residue depletion study for milk

The Animal ethics approval was obtain by the Animal ethics committee at the University of New England. Authority No. AEC20-080.