BRIEF COMMUNICATION: The efficacy of a herbal drench treatment on internal parasites in lambs

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INTRODUCTION

Internal parasites reduce live weight gains and are a cause of diarrhoea in growing lambs (Macchi *et al*., 2001). A challenge to organic sheep production is the control of internal parasites without intervention using synthetic chemicals. Whilst in conventional sheep production systems anthelmintic resistance to synthetic chemicals is increasing (Pomroy, 2006). The development of an effective herbal worm drench that can be commercialised will allow the organic sheep sector to develop and may offer an alternative for conventional systems.

Oral dosing with myrrh has shown promise in uncontrolled field trials for the treatment of various parasitic infestations in sheep (Haridy *et al*., 2003; Al-Mathal & Fouad, 2004; Haridy *et al*., 2004). Myrrh is composed of a volatile essential oil (2 to 10%) including sesquiterpenes, an alcohol-soluble resin (25 to 40%) containing commiphoric acids and a water-soluble gum (30 to 60%) (Mills & Bone, 2005). A blended herbal worming drench, composed primarily of myrrh has been developed which may have potential use in lambs. The aim of this preliminary trial was to determine the efficacy of the herbal drench against internal parasites in lambs.

MATERIALS AND METHODS

A blended herbal worming drench, composed primarily of myrrh, was tested for its efficacy against internal parasites in lambs compared to undrenched cohorts. The contents of the organic drench were approved by the Therapeutic Goods Administration of Australia. All ingredients in the drench are safe for human consumption. Animal ethics approval was obtained from the Massey University Animal Ethics Committee protocol No. 10/16. Sixty Romney lambs, naturally infected with internal parasites from ryegrass/white clover pastures, were managed as one group under commercial farming conditions to ensure theoretical lamb intake was not limited. The lambs were stratified by body weight (average weight = 30.1 kg) into groups of twenty and orally drenched with the blended herbal treatment at 0 mL/kg live weight (Control), 0.5 mL/kg live weight (1-dose) or 0.5 mL/kg live weight on 3 consecutive days (3-dose). All lambs were weighed and faecal samples taken from each lamb 0, 7, 10 and 14 days after the initial treatment. The samples were analysed for faecal egg counts (FEC) using a modified McMaster method for which each egg counted represented 50 eggs per gram of faeces. Bulk larval cultures were prepared by mixing faecal samples with vermiculite and stored at 25ºC for approximately two weeks before the third stage larvae were recovered (Hendrix, 1998) and the first 100 larvae identified to determine the proportions of *Cooperia*, *Haemonchus*, long-tail (*Oesophagostomum* or *Chabertia*), *Nematodirus*, *Ostertagia* and *Trichostrongylus*, genera. Faecal samples from the different lambs within a treatment group were pooled.

Faecal egg count data was normalised by a square root transformation. Repeated measurement analysis, for FEC and live weight were performed using the MIXED procedure of SAS (2003) with a linear model that included fixed effects of group, day and their interaction. Day was included as a covariate and a random effect of lamb within treatment was assigned. An auto-regressive covariance structure was used (Littell *et al*., 1998). The model for live weight included the Day 0 live weight as a covariate to adjust for differences in initial weight.

Larval proportions for each genera were divided by the total larval count to get the proportion of larval genera present in the sheep of each treatment. For statistical analyses, larval counts were repeated across days on Days 7, 10 and 14 of the experiment as a triplicate measurement. The percentages were normalised by an arcsine transformation. Transformed larval percentages were subjected to an analysis of variance using a linear model (PROC MIXED, SAS, 2003) that included the effects of group, larval genera and their interaction.

TABLE 1: Back transformed mean faecal egg count (eggs/g of faeces) with the 95% confidence interval in brackets following administration of no dose (Control), one dose or three doses of a herbal drench to groups of 20 lambs naturally infected with internal parasites. Means within rows with letters in common or without superscripts are not significantly different.

Day after treatment	Anthelmintic treatment		
	Control	One dose	Three doses
0	667 (469 - 900)	716 (510 - 956)	627 (436 - 853)
7	310 (181 - 475)	410 (259 - 597)	261 (143 - 412)
10	369 (226 - 547)	338 (202 - 509)	282 (160 - 440)
14	577 (392 - 798)[a]	535 (359 - 745)[a]	200 (99 - 335)[b]

TABLE 2: Back transformed mean larval count (%) with the 95% confidence interval in brackets following administration of no dose (Control), one dose or three doses of a herbal drench to groups of 20 lambs naturally infected with internal parasites. All means within rows are not significantly different.

Genera	Anthelmintic treatment		
	Control	One dose	Three doses
Cooperia	6.1 (0.9 - 31.3)	10.2 (0.0 - 38.5)	10.6 (0.0 - 39.1)
Haemonchus	3.6 (2.3 - 26.0)	1.8 (4.3 - 21.2)	3.8 (2.2 - 26.3)
Long tail	9.1 (0.1 - 36.5)	12.7 (0.0 - 42.2)	5.1 (1.3 - 29.3)
Nematodirus	0.0 (0.0 - 11.4)	0.0 (0.0 -1 1.4)	0.2 (8.5 - 14.5)
Ostertagia	7.5 (0.4 - 33.9)	5.9 (1.0 - 30.8)	6.9 (0.6 - 32.8)
Trichostrongylus	69.5 (35.9 - 94.3)	65.0 (31.3 - 91.9)	68.3 (34.7 - 93.7)

RESULTS AND DISCUSSION

There was no difference ($P > 0.05$) in FEC on Days 0, 7 or 10 post-treatment between the Control, 1-dose or 3-dose groups (Table 1). The FEC for the Control, 1-dose and 3-dose groups was lower at Days 7 and 10 compared to Day 0 ($P < 0.01$). Group 3 also had lower FEC at Day 14 compared to Day 0 ($P < 0.001$). At Day 14 the 3-dose treatment group had a lower FEC compared to the Control and 1-dose treatment ($P < 0.001$). Therefore, Group 3 maintained lower FEC at Day 14 while Groups 1 and 2 showed an increase in FEC at Day 14.

There was no effect ($P > 0.05$) of the drench dose on the proportions of larval genera in culture (Table 2). The larval proportions were different ($P < 0.001$) between larval genera but the changes in the counts between larval genera were the same ($P > 0.05$) within each group. The herbal drench did not selectively inhibit any internal parasite genera. There was no difference ($P < 0.05$) in mean live weights between the lamb groups at Day 0; 30.0 ± 0.76 kg Control; 32.2 ± 0.46 kg 1-dose; and 32.2 ± 0.86 kg 3-dose. All groups gained weight ($P < 0.001$) over the trial period at a rate similar to the accepted level of 128 g/hd/d for perennial ryegrass/white clover pasture (Jagusch *et al*., 1979); 128 ± 0.03 g/d Control; 143 ± 0.03 g/d 1-dose; and 143 ± 0.02 g/d 3-dose but there was no effect ($P > 0.05$) of treatment on weight gain.

The herbal drench demonstrated some potential for controlling internal parasites in lambs but the response was delayed and the efficacy was lower compared to expected responses from conventional anthelmintics. The lack of weight gain above that of the Control group may be a reflection of the low efficacy of the herbal drench. However, a delayed response has also been observed from other herbal anthelmintics including fagara leaves (*Zanthoxylum zanthoxyloides*), which when consumed regularly in small amounts resulted in reduced nematode egg excretion from sheep (Hounzangbe-Adote *et al*., 2005). An understanding of the mode of action of the herbal treatment used in the present study may improve the administering procedure and maximise the efficacy. Repeatable trials are required for the development of this herbal drench and other potential herbal anthelmintics.

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