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The effect of anthelmintic treatment of ewes during pregnancy

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ABSTRACT

Results from farmlet studies indicated that anthelmintic treatment of ewes during pregnancy virtually eliminated ewe parasite faecal egg counts and lead to significantly higher lamb weaning weights. The objective of this study was to develop strategies to enable the rearing of lambs with minimal anthelmintic administration.

There were four farmlets, with paired units on dry and irrigated land (5 and 6.4 ha respectively) with mixed aged flocks of 60 or 80 ewes respectively. One flock on each pair of farmlets, termed treated flock, were treated with a continuous anthelmintic release bolus in March prior to mating and again 100 days later in June. The control flock of each pair was given an oral anthelmintic post-lambing in line with local farmer practice.

In March of both years faecal egg counts (FEC) were similar for all flocks and averaged between 40 and160 eggs per gram (epg). For bolus treated flocks average FEC declined to 0 after treatment and remained below 32 epg until September. In contrast the control flocks had significantly higher ($P<0.001$) egg counts at levels of 50 to 600 epg through out winter, but exhibited the classic periparturient peak in 1993 only. From October all flocks had similar FEC's below 100 epg.

Lamb birthweights in September/August corrected for birth rank, birth date, sex and year were 400g higher for bolus treated flocks but this result was not significant. Weight of lambs weaned per hectare was greater from the treated unit ($P < 0.05$) by 11%.

These results show that anthelmintic treatment of ewes in autumn and winter by way of slow release bolus almost eliminated FEC output from ewes during pregnancy and early lactation and eliminated the expected spring rise in FEC of ewes associated with lambing. The benefits were greater lamb weight gains and elimination of the need for pre-weaning lamb drenching. The implications for on-farm drenching strategies, particularly in view of parasite resistance problems, is discussed.

Keywords: sheep; internal parasites; ewe; anthelmintic; albendazole; slow release; CRC; production; response.

INTRODUCTION

The use of anthelmintics in sheep to control internal parasites is a necessary adjunct to economical sheep production on many farms. The advent of increasing levels of anthelmintic resistance in parasite populations and the problems of anthelmintic residues in carcase meat, require alternative methods of control to those currently being used to reduce the frequency of anthelmintic usage.

The major source of pasture larval contamination is thought to be the post-parturient rise in faecal eggs from undrenched ewes in the spring which then decreases to low levels by weaning and remains low for the rest of the year and from lamb and hogget faecal egg contamination of pasture in the autumn (Brunsdon and Vlassoff 1982). The consequences of peri-parturient contamination of pasture by ewes has been demonstrated under New Zealand conditions (Brunsdon 1966; Brunsdon and Vlassoff 1985; Vlassoff 1976). However recent studies in New Zealand have suggested that ewes may be a major source of contamination at periods other than the peri-parturient period and this effect is much greater than previously considered (Beckett 1993; Familton *et al.* 1986; Stafford *et al.* 1994; Sykes 1982; West 1982).

With the advent of slow release anthelmintic devices it has become possible to examine the production response and epidemiological consequences of reduced ewe faecal egg contamination with much greater ease than drenching every 3 weeks to supress faecal egg output. In this report we have reported only the effect of the reduction in faecal egg output from the ewe on lamb birth and weaning weights when compared to post-parturient anthelmintic administration.

MATERIALS AND METHODS

Design

The trial was a 2 drench treatments by 2 farmlet systems factorial design with data collected over each of 2 years. The systems were irrigated or dryland pasture and, as there were no significant effects of systems, these have been treated as replicates. The results are from analysis of the 1992 and 1993 year's data.

Two farmlets were developed in 1992: one a dryland unit (10 ha) comprising 18 paddocks (ranging from 0.44 to 0.75 ha) in 2 matched replicates (each of 5ha) of 9 paddocks each consisting of similar pasture type and pasture quality and the other a spray irrigated unit (12.8 ha) comprising 30 paddocks (ranging from 0.40 to 0.45 ha) which were similarly matched (each of 6.4ha).

The units were stocked with Coopworth sheep. Each replicate in the dryland block was stocked with 60 ewes matched for age. No hogget replacements were run on this block. On each of the irrigated units 80 ewes matched for age and 20 ewe hoggets reared for replacements were run. Mating occurred in late March and lambing commenced in late August. Lambs were weaned at 10 - 14 weeks of age, depending on feed supply, and then were grazed on the units until drafting. In late March all remaining lambs were sold as stores except for the 40 retained as ewe hogget replacements on the irrigated unit.

Perennial ryegrass (*Lolium perene*) and white clover (*Trifolium repens*) were the main pasture components in all paddocks. A rotational grazing system was used on each unit with replicate paddocks being grazed in tandem so as to fully utilise available pasture. Limited supplementary feeding of either meadow hay or pasture silage was provided during July and August .

Treatments

Treated ewes on each unit received 1 controlled release capsule (CRC) containing 3.85 g of albendazole (Extender 100, Nufarm Animal Health Aust/Profril, Smith Kline NZ Ltd.) 14 days prior to the introduction of the rams in March. A further capsule was administered 100 days later. These ewes received no other anthelmintic treatment. Control ewes were given 5.0 mg/kg fenbendazole (Axilur 2.5, Bomac Lab Ltd, NZ) orally at approximately 3 weeks after lambing. This later procedure reflected local farmer practice in the use of periparturient anthelmintic administration. No lambs from either system received any anthelmintic treatment before weaning.

Parasites

All parasitic infections were pasture derived and consisted of *Telodorsagia (Ostertagia) circumcinta, Trichostrongylus axei, Trichostrongylus colubriformis Cooperia curticei, Nematodirus spathiger* and *Nematodirus fillicollis*. Prior to the commencement of the trial all pastures had received similar grazing treatment and contamination from grazing animals.

Sampling Techniques

Faecal egg counts (FEC) were assessed at 14 day intervals (weather and lambing management permitting) using a modified McMaster Technique where each egg counted represented 100 eggs per gram of wet faeces. Lambs were weighed at birth and again at weaning.

Statistical Analysis

Treatment effects were assessed using analysis of variance on mob means. Mobs were used as the experimental unit. Lamb birth weight data were corrected for birth rank, lamb age and sex using a general linear model. Weight of lambs weaned per hectare was used as the measure of productivity at weaning. This measure incorporates both numbers of lambs (which varied between experimental units due to differences in lambing rate and post natal deaths) and growth rate to weaning. Faecal egg counts were subject to log (base10) transformations.

RESULTS

In March of both years faecal egg counts (FEC) were similar for all flocks and averaged between 40 and160 eggs per gram (epg). For the control groups, the FEC varied between 50 to 600 epg throughout the winter but the FEC pattern exhibited the classical periparturient peak only in 1993. In contrast, the bolus treated ewes' FEC declined to 0 and remained below 32 epg until September/October ($p < 0.001$) (see Figures 1 and 2) when a small rise in FEC occurred. From October all flocks had FEC's below 100 epg.

FIGURE 1: Faecal egg count of farmlet ewes (1992).

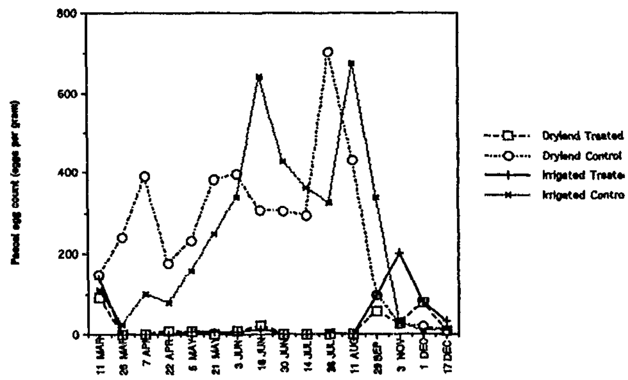
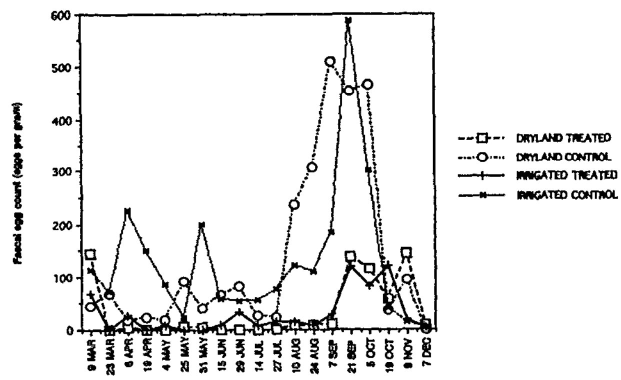


FIGURE 2: Faecal egg count of farmlet ewes (1993).



The major response in lamb production was observed in the weight of lamb weaned per hectare with the treated compared to control farmlets being 40 kg/ha heavier ($P < 0.05$) (Table 1). Number of lambs weaned per ewe mated were 0.99 and 1.05 on irrigated farmlets, and 1.15 and 1.17 on dryland farmlets for treated and control mobs respectively in1992, and were 1.60, 1.29, 1.35 and 1.38 respectively for the same treatments in 1993. Differences between irrigation and dryland mobs was not associated with anthelmintic treatments, and the lower rates in 1992 were the result of higher lamb mortalities due to snow during lambing. Anthelmintic treatment had no effect on lamb weaning rate and the higher lamb production/ha was due to higher birth weight and higher lamb growth rate to weaning in lambs from the treated mobs. Birth weights showed a tendency to favour treatment by 400g but these results were non-significant over the two years.

TABLE 1: Lamb production data from farmlets for 1992 and 1993.

	Bolus Treated	Control	sed
Birth weight (kg)	4.7	4.3	0.27
Weight of lambs weaned/ha (kg/ha)	374*	334	11.8

*p<0.05

DISCUSSION

The contribution of overwintered parasitic larvae to the pasture larval population in the late spring which results in both clinical and subclinical parasitism in lambs at or before weaning has been documented under New Zealand conditions (Brunsdon 1966; Brunsdon and Vlassoff 1982; Brunsdon and Vlassoff 1985; Vlassoff 1976) however the proportion of these overwintered larvae in the pasture population in the spring may have been underestimated. It has been demonstrated that during winter in Canterbury, the development of substantial numbers of both *Ostertagia* and *Trichostrongylus* eggs to third stage larvae can occur (Familton and McAnulty 1994). This source of infection has implications for both the reinfection of ewes and the establishment of primary infection in lambs .

Considerable debate has arisen over the use of anthelmintics in adult sheep with the suggestion that this may increase the rate of development of anthelmintic resistance but the hypothesis has yet to be proven. The use of slow release anthelmintic devices has also been questioned but several authors (Anderson 1985; Barger 1993) have stated that this method of administration may be no more of a problem than the regular drenching of lambs and may possibly delay the advent of anthelmintic resistance (Barger 1993).

The albendazole CRC devices in this trial were primarily used to examine the effect on the parasite epidemiology and to attempt to quantify the contribution of the adult ewe during pregnancy and lactation to the subsequent parasite status of both pasture (to be reported in later papers) and lambs. The devices were successful in depressing faecal egg counts in the ewes to very low levels and producing production responses in the lambs and confirms the findings of previous investigations (Alzieu *et al.* 1990; Corba *et al.* 1991; Louw and Reinecke 1992). However this is the first time that the devices have been used continually during pregnancy. It is reasonable to assume that a reduction in parasitic challenge has been achieved through reducing the faecal egg output in treated ewes and this effect is reflected in the higher body weight of lambs from these ewes . This beneficial effect on lamb growth is continued between birth and weaning as a result of decreased parasitic challenge to both ewes and lambs and increased milk production of ewes as reported by earlier investigators (Leyva *et al.* 1982).

As a result of this trial more attention should be given to pasture contamination by adult animals during the autumn and winter particularly as low levels of pasture contamination of pasture in a rotational grazing system can result in high levels of infective pasture larvae over the winter (Familton and McAnulty 1994). The use of CRC resulted in a substantial decrease in the frequency of anthelmintic administration to lambs from treated ewes. Analysis of further data from the trial is to be undertaken.

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