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DRENCHING OF PREGNANT EWES AND ITS EFFECT ON THEIR WOOL PRODUCTION AND LAMB GROWTH RATE

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SUMMARY

The economic response to anthelmintic drenching of pregnant ewes was studied in two trials (1967 and 1968). The production of wool and lamb from ewes given a pre-lambing drench with thiabendazole alone, or in combination with a post-lambing drench, were compared with the production obtained from untreated ewes.

In both trials a small post-parturient rise in worm egg counts occurred in the untreated ewes.

Drenched ewes showed significant responses in wool quality and recorded as less break, less coting, improved style grading and increased fleece value compared with fleeces from undrenched ewes. Non-significant increases in greasy fleece weight were recorded in both trials.

In the second trial the lambs were slaughtered. Drenching of the ewes caused significant increases in weaning weights and dressed carcass weights.

Comparison of financial returns for ewe wool and lamb carcass (for Trial 2) showed a significant increase in values (gross and net) for the drenched compared with the untreated ewes.

THE post-parturient rise in faecal egg count ("spring-rise") in ewes has been reported in New Zealand (Brunsdon, 1964, 1966a, b, 1967) and overseas (Crofton, 1954, 1958; Gibbs, 1967; Arundel, 1969). The magnitude and regularity of this rise have been variable and on occasions it has not been recorded in lactating ewes studied over the spring months (Lewis and Stauber, 1969).

This rapid increase in faecal egg count occurs at a time when lambs are starting to graze pasture and it is considered to be a major factor in initiating the worm burden of the lamb at foot. Following this, the lamb burden increases through repeated contamination of the pasture and subsequent ingestion by the lamb itself.

Several workers have shown that the post-parturient rise can be eliminated or greatly reduced by anthelmintics given either before or after lambing (Nunns *et al.*, 1965; Brunsdon, 1966a; Connan, 1967). In some cases increased productivity of the lambs, following treatment of the ewes, has been noted. This has generally been considered to be

a reflection of the slower build up of the parasitic burden in the lamb. However, in one trial, Lewis and Stauber (1969) recorded a 3 lb liveweight increase in lambs from drenched ewes, when the faecal egg counts of lambs from treated and untreated ewes were at a similar low level. It is possible that some of the increased productivity of the lambs is a reflection of the enhanced milking ability of the ewe by the reduction of her parasitic burden during the early stages of lactation.

Little information exists for ewes on the effect of drenching on wool production. Lewis and Stauber (1969) showed a significant reduction in coting and a suggestion of improvement in style grading, but the response was not recorded in a second trial. In both those trials egg counts of ewes were low and no post-parturient rise occurred.

The present paper reports two trials designed to measure the wool growth response in ewes and the growth rate of their lambs following "strategic" drenching with thiabendazole.

MATERIALS AND METHODS

Two trials were conducted at "Arahura" Research Farm, near Masterton.

TRIAL 1 (1967)

From a mob of 584 mixed-age Romney ewes, 144 that were mated in the period March 22 to April 9, were selected according to wool type (quality range 46/50 and most of 48/50 with majority of B/BB style grade) and absence of returns of oestrus. The ewes were restrictively randomized (on basis of faecal egg count in early pregnancy) to three groups each of 3 replicates ($n = 16$). The ewes were treated as follows:

Group 1: Pre-lambing drench (19 ml thiabendazole) on August 2, two weeks from due date of lambing.

Group 2: Pre-lambing drench and post-lambing drench (19 ml thiabendazole) on August 2 and September 27 (four weeks after peak lambing), respectively.

Group 3: Untreated controls.

All sheep were grazed as one mob until July 7; the sub-groups were then placed in 2-acre paddocks and confined to half the area until August 2 when treatment commenced and the sheep grazed the fresh pasture. At start of lamb-

ing, ewes were moved back to the "spelled" areas and after lambing they had access to the complete areas.

Faecal samples were collected from the ewes at approximately two-weekly intervals from April 26 to December 6 and weekly for seven weeks after lambing. Lambs were sampled on November 8 and 22 and December 6 and 20. Worm egg counts were made by the modified McMaster technique (Whitlock, 1948). Larval cultures were made on a group basis and the first 100 larvae seen in each culture identified.

Weights of lambs were recorded at birth, 6 weeks of age, and at weaning and the latter corrected for effects of age, sex and birth rank (Clarke, 1967) to give 100-day corrected weights.

The ewes and lambs were shorn on December 22, and fleece weights (including belly wool) taken. Ewe fleeces were assessed for "quality bracket", "style grading", "break" and "other faults" and group composite samples of mid-side wool assessed for fibre diameter and clean scoured yield. Wool was valued according to 1968 prices reported by N. Z. Wool Commission (Ewe wool — March sales; Lamb wool — February sales).

TRIAL 2 (1968)

The trial was essentially as in 1967.

Faecal samples from ewes were taken at two-weekly intervals from January 16 to November 27 and weekly for nine weeks after lambing. Lambs were sampled on November 27.

All lambs were slaughtered at Waingawa Freezing Works. Data concerning their growth comprised weights at birth, 6 weeks of age, 100 days of age, pre-slaughter, and carcass weight and grade. The weights taken at 100 days were corrected for birth rank and sex (Clarke, 1967). Carcass weights were corrected for sex (male — female, 0.3 lb) and birth rank (single — twin, 6.0 lb). Prices for each grade of carcass were obtained and values for individual carcass calculated.

The ewes were shorn on November 22 and weights of fleece and oddments taken. The fleeces were graded by Dalgety & New Zealand Loan Ltd., Wellington. Valuations of ewe wool were assessed by N.Z. Wool Commission, using prices for January 17, 1969, and lamb slipe wool values calculated from Thomas Borthwick & Sons (A'asia) Ltd. quotations for December 1968.

In each trial, similar management for each sub-group of ewes was adopted as far as practicable. Ewes which died were replaced. Differences in number of lambs reared per sub-group existed owing to differences in incidence of twins or because of lamb deaths, but no attempt was made to compensate for these.

RESULTS

WORM EGG COUNTS

Ewes

Mean worm egg counts (eggs per gram faeces, e.p.g.) of ewes in Trial 1 are shown in Fig. 1. In Groups 1 and 2, the pre-lambing drench reduced the egg counts to low levels and greatly reduced the rate of increase during the post-lambing period. The post-lambing drench to ewes of Group 2 reduced the egg counts from the low level of 96 e.p.g., to zero for the next two weeks. The counts rose again to a peak of 156 e.p.g., eight weeks after lambing.

Larval cultures indicated that most species of nematodes were present in the ewes throughout the trial. The predominant type of larvae seen in the untreated group was *Cooperia*. This parasite comprised more than 50% of the cultures throughout most of the trial. During the early part of the trial, the next most prevalent larvae seen were

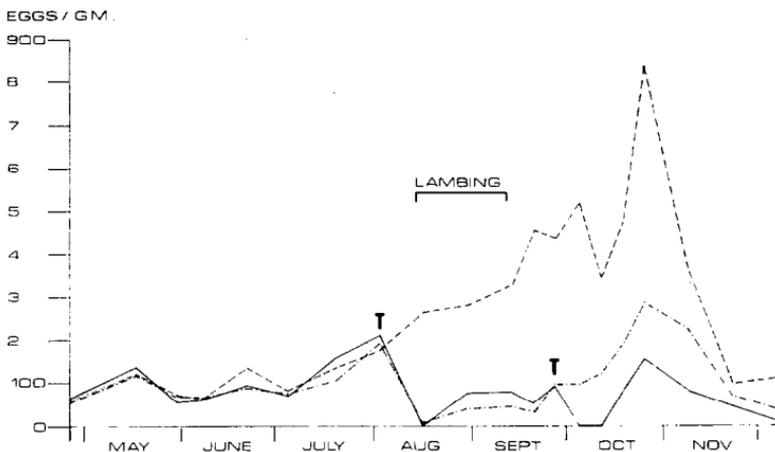


FIG. 1: Mean worm egg counts of ewes in Trial 1.
Group 1 (— · —), Group 2 (—), Group 3 (---)
T = Day of drenching

Oesophagostomum and *Bunostomum*, with smaller numbers of *Chabertia*, *Ostertagia*, *Trichostrongylus* and *Haemonchus*. After September, the proportion of *Ostertagia* and *Trichostrongylus* increased greatly and at the time of the peak egg count (October 25), the percentages were: *Cooperia* 40%, *Ostertagia* 26%, *Trichostrongylus* 27%.

In Groups 1 and 2, there were marked changes in the percentages of larvae seen after treatment. *Ostertagia* and *Trichostrongylus* became predominant and remained so for the remainder of the trial. Only small numbers of *Cooperia*, *Oesophagostomum*, *Chabertia*, *Bunostomum* and *Haemonchus* occurred on occasions.

Mean worm egg counts of ewes in Trial 2 are shown in Fig. 2. The post-lambing rise seen in the untreated ewes was much smaller and two weeks earlier than that recorded in the previous trial. Faecal sampling commenced earlier in the year during this trial.

Larval cultures made during late summer and early autumn showed an even spread of larvae of *Haemonchus*, *Ostertagia*, *Trichostrongylus*, *Cooperia*, *Chabertia*, *Oesophagostomum* and *Bunostomum* in the groups.

From early winter, *Cooperia*, *Ostertagia* and *Trichostrongylus* began to predominate and remained in almost equal proportions for the remainder of the trial. The percentages of parasites at the peak egg count (September 30) were *Cooperia* 28%, *Ostertagia* 35%, and *Trichostrongylus* 28%.

In the treated groups, *Ostertagia* and *Trichostrongylus* became the predominant species present.

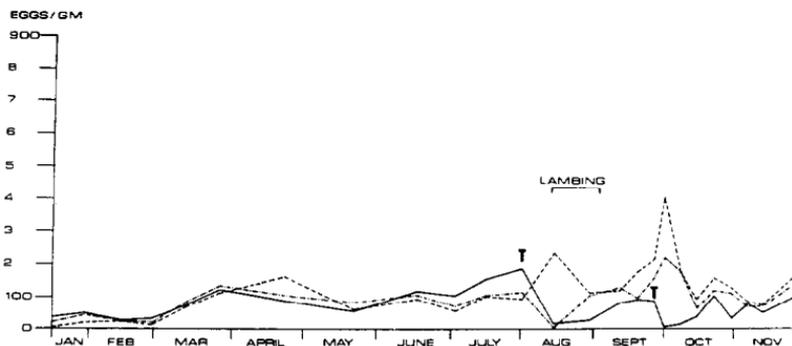


FIG. 2: Mean worm egg counts of ewes in Trial 2.
Group 1 (---), Group 2 (—), Group 3 (---)
T = Day of drenching

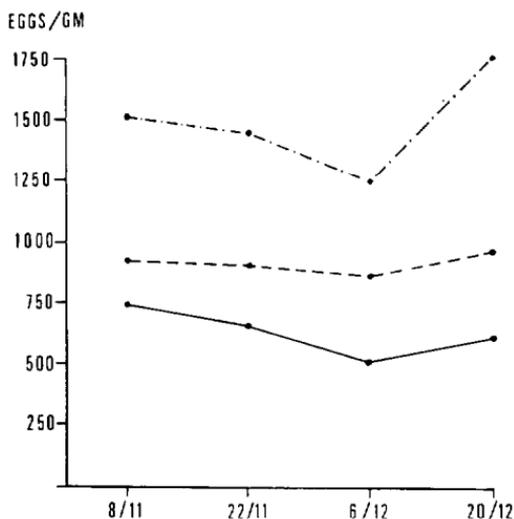


FIG. 3: Mean worm egg counts of lambs in Trial 1. Lambs born to undrenched (· · · · ·), pre-lambing drenched (— — — —), and pre- and post-lambing drenched ewes (— — —).

Lambs

Mean worm egg counts of lambs of Trial 1 are shown in Fig. 3. The average age of lambs at each sampling was 10, 12, 14 and 16 weeks. The lambs from the untreated group of ewes had consistently higher egg counts over the period of sampling with a peak of 1,744 e.p.g. than lambs from drenched ewes. The lambs from the pre-lambing drenched group had a peak count of 953 e.p.g., and lambs from the pre- and post-lambing drenched group, a peak of 744 e.p.g.

The larval differentiation in lambs of each of the three groups in Trial 1 was very similar, with *Ostertagia* being the predominant larvae found. *Trichostrongylus* larvae were also found in large numbers, but only small numbers of *Cooperia*, *Haemonchus* and *Oesophagostomum* were present.

The lambs in Trial 2 were faecal-sampled once; the mean egg counts of the three groups were approximately similar (600 e.p.g.).

EWES WOOL PRODUCTION

Data have been considered only from ewes which reared a lamb to weaning. The numbers of sheep recorded in

TABLE 1: SUMMARY OF FLEECE WEIGHTS, FLEECE DESCRIPTION AND FLEECE VALUES FOR DRENCHED AND UNDRENCHED EWES

	<i>Trial 1</i>				<i>Trial 2</i>			
	<i>Groups</i>			<i>Significance of Difference</i>	<i>Groups</i>			<i>Significance of Difference</i>
	<i>1</i>	<i>2</i>	<i>3</i>		<i>1</i>	<i>2</i>	<i>3</i>	
Fleece weight (lb)	11.3	11.5	11.0	N.S.	9.9	9.7	9.6	N.S.
Percentage of fleeces graded BB, B/BB	51	43	28	Gr. 1 v 3, $P > 0.05$ Gr. 1 + 2 v 3, $P < 0.05$	41	41	28	Gr. 1 v 3, $P > 0.05$ Gr. 1 + 2 v 3, $P < 0.05$
Percentage of fleeces with break	40	46	67	Gr. 1 v 3, $P < 0.05$ Gr. 2 v 3, $P > 0.05 < 0.1$	22	21	42	Gr. 1 v 3, $P < 0.05$ Gr. 2 v 3, $P < 0.05$
Percentage of cotted fleeces	17	8	28	Gr. 1 v 3, $P > 0.05$ Gr. 2 v 3, $P < 0.05$	—	—	—	—
Fleece value (\$)	3.02*	3.07	2.65	SE, 0.52	2.61	2.53	2.33	SE, 0.37
	aA	aA	bB		aA	aAB	bB	

*The results of multiple range tests (Duncan, 1955) at the 5% and 1% levels are indicated by small and capital letters after the means, respectively. For each level of significance, means with the same letter do not differ significantly.

Groups 1, 2 and 3 were respectively 35, 37, 39 (Trial 1) and 46, 44, 48 (Trial 2).

Table 1 summarizes data for fleece weights, wool quality and fault, and fleece values for the three groups of ewes. No significant differences in fleece weights were recorded. In contrast the quality of wool among the drenched ewes was better than in the untreated sheep. Differences in wool quality were reflected in a significant difference in fleece value among treated and untreated ewes.

The values of individual fleeces within each treatment were assessed according to quality number and style grading (valuation of independent appraiser), and fleece weight. In Trial 1 the belly wool was not separated from the fleece which was valued on an unskirted basis. In Trial 2 the value per pound of each fleece was multiplied by the skirted weight to give the skirted value. To each skirted value was then added the weight of belly wool multiplied by the average value of the belly wool for the group. The value of oddments was then added to the group means to give the total value.

LAMB PRODUCTION

Trial 1

The number of single and twin lambs weaned in the three groups were respectively 24, 22 (Group 1), 25, 24 (Group 2), and 27, 24 (Group 3).

TABLE 2: LAMB PRODUCTION (TRIAL 1)

Group	Liveweight (lb)			Wool Production (lb)
	At Birth	At 6 wk	At Weaning (corrected)	
1	10.4	34.3	63.0 a	2.91 bA
2	10.4	35.5	68.3 a	3.18 aA
3	10.6	32.7	63.8 a	2.89 bA
SE			7.6	0.55

Table 2 presents information on the growth of the lambs in the trial. Analysis of liveweight data for these lambs showed that highly significant differences existed between the means of the nine sub-groups. These differences did not follow any particular pattern. Thus it was not valid to use the variance per individual lamb to test the effects of treatment. When the treatments were tested against variability between sub-groups, they did not approach a significant value.

This analysis indicates that factors associated with individual sub-groups, such as pasture composition and productivity of individual paddocks, had such an important effect on lamb growth that any response to lamb drenching (if it existed) was overshadowed.

The mean weights of wool of these lambs shorn soon after weaning are given in Table 2. Analysis of these data indicated that variation between means of sub-groups (paddocks) was not significant. Lambs from ewes of Group 2 produced significantly more wool than those from ewes in Groups 1 or 3. In the analysis no allowance was made for sex or birth rank as any effects were considered to be small.

TABLE 3: NUMBERS OF LAMBS FROM DRENCHED AND UNDRENCHED EWES

	<i>Trial 1</i> Groups			<i>Trial 2</i> Groups		
	1	2	3	1	2	3
Twins born alive	31	46	36	20	19	29
dead	3	0	2	2	3	5
Singles born alive	21	20	22	33	31	24
dead	7	4	3	3	5	6
Lambs weaned	46	49	51	45	46	52
Lambs providing data	46	49	51	43	43	48

TABLE 4: SUMMARY OF GROWTH FOR LAMBS AND THEIR CARCASS VALUES (TRIAL 2)

	<i>Group 1</i>	<i>Group 2</i>	<i>Group 3</i>	<i>SE</i>
Birth weight (lb)	12.5	12.6	11.6	
6-week weight (lb)	40.3	41.2	36.5	
Weaning weight (corrected) (lb)	67.9 abA	69.8 aA	65.4 bB	6.00
Carcass weight (lb)	28.9 a	28.5 a	25.4 b	3.65
Dressing percentage	46.0	44.7	42.8	
Percentage carcasses grading				
First	55.8	39.6	22.9	
Second	39.5	48.8	64.6	
Alpha	4.7	9.3*	12.5	
Carcass value (\$)	3.89	3.85	3.44	

*One carcass (2.3%) was rejected due to arthritis.

Trial 2

Table 3 shows the numbers of lambs produced by the three groups of ewes. There was an unequal distribution of twin lambs between groups and this was allowed for in analyses of data.

Table 4 shows data for growth of lambs together with the carcass grades. Lambs weaned from drenched ewes were significantly heavier at weaning ($P < 0.01$) than from untreated ewes and drenching of ewes also caused differences in lamb carcass weight ($P < 0.05$).

Weights of slipe wool from individual lambs could not be recorded at slaughter. The mean weights and values of slipe wool obtained for each group of lambs were respectively 2.782 lb, 88 cents (Group 1), 2.87 lb, 91 cents (Group 2), 2.64 lb, 83 cents (Group 3).

ECONOMIC RETURN FROM DRENCHING

Although drenching of ewes has shown effects on some measures of productivity, the cost of drenching must be considered in relation to the total economic return achieved. Trial 2 has provided sufficient data for a reasonable estimate of the economic value of drenching. The valuations were made for ewe fleece as in Trial 1 and for lamb carcass value based on carcass weight, grade, and value per pound. Oddments of ewe wool and lamb wool are not included as they were not available on an individual basis. The mean return per ewe (in \$) for ewe wool and lamb for Groups 1, 2 and 3 (corrected for disproportion of twin lambs) were respectively 6.50, 6.36 and 5.77 (SE, 0.67). The returns from Groups 1 and 2 each were significantly greater than from Group 3 ($P < 0.01$); no significant difference was recorded between the two drenched groups of ewes ($P > 0.05$).

Drenching of ewes significantly increased the economic return in this trial. Deduction of the cost of treatment (Group 1, 9 cents per ewe, Group 2, 18 cents per ewe) resulted in a net increased return of 64 cents for ewes in Group 1, and 41 cents in Group 2.

DISCUSSION

In both trials a post-parturient rise in egg counts occurred in the untreated ewes, although the magnitude and timing of the rise differed in each year. In Trial 1 a peak of 837 e.p.g. was reached eight weeks after peak lambing. This peak was followed by a rapid decline to 108 e.p.g.

four weeks later. In Trial 2 the peak of 411 e.p.g. was reached only five weeks after peak lambing and was followed by a rapid decline to low levels.

In each year the group receiving the pre-lambing drench showed a peak in egg counts at the same time as the untreated animals, but, in each case, of a much smaller magnitude. In 1967, the post-lambing drench reduced egg counts to zero for two weeks after treatment, but the count rose again to 156 e.p.g. before declining to low levels similar to the other two groups. In 1968 the post-lambing drench reduced the egg counts to negligible levels at the time the other two groups were showing a peak, but the counts climbed again to a level similar to the other two groups.

Both treated groups in both trials showed small but non-significant increases in greasy wool weight. It was not expected that a large response in wool weight would be obtained as the ewes were drenched at a time of minimal seasonal wool growth.

The quality of the wool involving improvement in style grade and reduction in wool faults showed that significant advantages were gained in the treated groups when compared with the untreated group. The proportion of fleeces showing break was greatly reduced in each treatment group in both years. The data indicate that approximately 40% (Trial 1) and 50% (Trial 2) of the break that occurred in the untreated ewes could be attributed to the effects of worms. In each trial the percentage of fleeces showing break was similar in the groups receiving one or two drenches. It appears that the advantage is conferred by the pre-lambing drench and no additional effect results from the post-lambing drench. However, it is possible that any drench given at about this time gives a beneficial effect that is not increased by subsequent drenches and that a post-lambing drench alone would give similar results to that obtained from a pre-lambing drench alone. This aspect is currently under investigation.

The incidence of cotted fleeces was reduced by drenching ewes in Trial 1. It is generally recognized that cotting of wool occurs in sheep where stresses have been imposed, such as lambing and lactation, poor nutritional conditions and parasitic disease. No cotting occurred in the second trial.

The valuations made of the wool from the ewes showed there was a significant increase in value for each treated group in both trials. The increase in value of 37 cents and 42 cents in Trial 1, and 28 cents and 20 cents in Trial 2,

can only be assessed by taking large numbers of critical measurements, both quantitative and qualitative.

Considerable variation between sub-groups and assumed to be due to paddock differences was a problem encountered in this work. It was unfortunate that, in Trial 1, differences in the amount of pasture available in the trial paddocks became apparent before lambs were weaned. These differences were not present during the early part of the trial and were unlikely to have had any influence on wool production during the critical period of lambing and early lactation. The paddock differences that occurred did not follow any particular pattern, but did impose a nutritional stress on the lambs in some replicates during the period between the recording of liveweights at 6 weeks of age and at weaning. The worst affected paddock was one on which a replicate of Group 1 was located. The weaning weights in this replicate were lower than any other in the trial and had a marked influence on the 100-day corrected weight for the group.

In Trial 2 the variation in lamb liveweight between paddocks was not significant and it was considered that the availability of pasture between paddocks was reasonably uniform. The 100-day corrected lamb weights show a significant advantage of 2.5 lb and 4.4 lb, respectively, for Groups 1 and 2 over the lambs from untreated ewes. An examination of the mean liveweights of single and twin lambs taken separately shows that much of the final liveweight advantage was already present at 6 weeks of age. Previous experience has shown that worm egg counts of 6-week-old lambs on the trial property are normally at very low or negligible levels. Consequently it is unlikely that the weight difference between the treated and untreated groups at this stage would be due solely to the increased rate of larval "pickup" in lambs from untreated ewes. A more likely explanation is that the pre-lambing drench has a direct effect on the thrift of the ewe during lambing and early lactation, resulting in an improvement in the milking ability of the ewe, which is in turn reflected in the growth rate of the lamb.

The data on these lambs obtained at slaughter showed that, while the pre-slaughter liveweights of the Group 2 lambs were higher than those of Group 1, this order was reversed for the carcass weights because of differences in dressing-out percentage. The carcass grading further increased the value of Group 1 lambs compared with Group 2. Both treatment groups graded substantially better than the untreated controls.

Consideration of the economic returns from drenching ewes using the data provided in Trial 2 indicated that significant increases occurred. The group of ewes drenched pre-lambing provided the greatest overall value per ewe although there was no significant difference between either of the drenched groups.

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