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SOME FACTORS INFLUENCING THE GROWTH OF LAMBS ON IRRIGATED PASTURE

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SUMMARY

The effects of several management practices on the growth of lambs grazing irrigated pastures were investigated in trials during three seasons. The practices studied were:

- (1) Selenium administration of ewes and lambs;
- (2) Anthelmintic drenching of ewes and lambs;
- (3) Time of weaning;
- (4) Level of feed availability.

Selenium administration to ewes pre-lambing or during lactation gave inconsistent results for increase in lamb growth, but when given to lambs increased liveweight gains were obtained, and these increased in magnitude as the season progressed.

Lambs from ewes drenched to control internal parasites pre-lambing or during lactation did not consistently grow faster than those from untreated ewes. Drenching of suckling lambs did not significantly increase their liveweight gains by the time of weaning, but significant increases in gains often occurred in weaned lambs. It is suggested that in farm practice "strategic" drenching of ewes and suckling lambs on irrigated pasture may be wasteful and should be replaced by treatment based on the level of infestation of parasites.

At the time of late weaning (15 weeks), lambs early weaned at 10 weeks were never heavier than unweaned lambs; they were as heavy only when on high level feeding after weaning. When the trials were closed three months later, there was little difference between early- and late-weaned lambs if feeding after weaning had been at the high level.

There were no interactions between level of feeding and control of internal parasites. The results stress the importance of an adequate level of feeding to both suckling and weaned lambs.

THE PATTERN OF GROWTH in the lamb is the result of the interplay of many factors—genetical, nutritional and environmental. In a given farming situation, not all of these can be changed rapidly by managerial decision. For example, to alter radically the genetic composition of the ewe flock, by the substitution of another breed or of a different strain within the existing breed, involves either

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a considerable time-lag or the possibility of heavy financial loss. However, some nutritional factors, such as feed availability, can often be changed quite readily; as can some factors of the environment, such as the level of internal parasitic infestation. The experimental work, on which this paper is based, was restricted to the study of the effects on the growth of lambs of some of those factors that can readily be modified by management.

BACKGROUND TO SPECIFIC PROBLEM

Borderdyke irrigation of pasture on the light plains land of mid-Canterbury gives a longer growing season by eliminating summer and autumn droughts, a low variability in pasture production between seasons and an average annual output of some 10,000 lb dry matter (D.M.) per acre. These three features engender the confidence necessary for farming at high rates of stocking with sheep—the first essential for high outputs of sheep products per acre. Experimental work at Winchmore Irrigation Research Station has shown an output of 250 lb lamb meat and 70 lb wool per acre on a self-contained farmlet producing prime lamb (McPherson, 1953).

On that unit, mortality rates of both ewes and lambs were satisfactory; but the growth rate, percentage drafted off the mother and carcass weight of the lambs were rather low. It can be said that this was due to the high stocking rate, many workers having shown that as stocking rate increases, output per acre rises but performance of the individual animal declines. This has been demonstrated to be true of Winchmore trials (Scott and Walker, 1963). However, observations during experiments seemed to support the strongly-held opinion of farmers and farm advisers that lambs on irrigated pasture often appear to lack the "bloom", and fail to make the progress in growth rate of those grazing on non-irrigated areas. Moreover, it was necessary to improve the performance of the lambs if output per acre was to be increased. Therefore, it was decided to investigate the effects of some of the factors known to influence lamb growth.

EXPERIMENTAL

TREATMENTS

The factors studied were:

- (1) Selenium administered to ewes before lambing.

- (2) Anthelmintic to ewes before lambing.
- (3) Anthelmintic to ewes during lactation.
- (4) Selenium to lambs.
- (5) Anthelmintic to lambs.
- (6) Level of feeding during lactation.
- (7) Time of weaning.
- (8) Level of feeding after weaning.

STATISTICAL DESIGN

Three factorial design trials were laid down in 1962 and repeated in 1963 and 1964. All combinations of treatments were not possible, but those considered likely to produce interactions were brought together in at least one of the trials each season.

LIVESTOCK AND MANAGEMENT

Lambs from a mixed-aged (4-tooth to full mouth) flock of Romney ewes, mated to Romney rams, were used. Lambs born as singles were used in two of the trials each season, and twins in the third.

Selenium was given to the appropriate ewes prior to mating and repeated before lambing. In one trial, the treatment to ewes was continued at fortnightly intervals during lactation, and selenium was also given to their lambs. The "pre-lambing anthelmintic" treatment specified drenching before mating and again before lambing, but, because the ewes were run as one mob during tupping and pregnancy, it was necessary to drench the appropriate ewes at 3-weekly intervals from before mating until lambing. Similarly, the appropriate ewes were drenched at 3-weekly intervals to give an effective "anthelmintic to ewes during lactation" treatment; and the "anthelmintic to lambs" treatment was repeated on the appropriate lambs at the same interval. Thiabendazole was used in all cases.

The two "levels of feeding" treatments were based entirely on feed availability. "Low" was pasture about 1 in. in height, on which it was estimated, by mowing, that there was always less than 200 lb D.M. per acre available to the sheep; "high" level was pasture over 1½ to 2 in. in height, on which it was estimated that there was always more than 300 lb D.M. per acre available. The levels of

TABLE 1: SUMMARY OF TREATMENT EFFECTS ON LAMB LIVEWEIGHTS

Treatment Comparisons		Reponses—Lamb Liveweights (lb)		
		At Birth	At Weaning	At Close of Trial
PRE-LAMBING EWE TREATMENTS				
(1) Selenium	Signif./total comparisons	3/12	2/8	1/8
v No Selenium	Range of differences (lb)	-1.2 to +1.1	-1.2 to +4.4	-1.0 to +4.7
(2) Anthelmintic	Signif./total comparisons	3/12	1/8	2/8
v No Anthelmintic	Range of differences (lb)	-0.3 to +1.1	-0.6 to +9.4	-1.1 to +6.4
EWE TREATMENTS DURING LACTATION				
(3) Anthelmintic	Signif./total comparisons	—	1/3	1/3
v No Anthelmintic	Range of differences (lb)	—	-0.8 to +4.7	-1.4 to +7.6
LAMBS TREATED BEFORE WEANING				
(4) Selenium	Signif./total comparisons	—	3/6	3/6
v No Selenium	Range of differences (lb)	—	+1.8 to +5.4	+3.8 to +9.1
(5) Anthelmintic	Signif./total comparisons	—	0/6	3/6
v No Anthelmintic	Range of differences (lb)	—	-1.6 to +3.1	-0.7 to +12.4
		<i>Early Weaning</i>	<i>Late Weaning</i>	
LEVEL OF FEED DURING LACTATION				
(6) High	Signif./total comparisons	3/3	6/6	3/6
v Low	Range of differences (lb)	+3.0 to +6.9	+4.0 to +14.0	-0.9 to +7.4
			<i>Late Weaning</i>	
TIME OF WEANING				
(7) Late	Signif./total comparisons	—	3/3	1/3
v Early	Range of differences (lb)	—	+4.4 to +4.5	+1.8 to +3.5
			<i>Late Weaning</i>	
FEEDING LEVEL AFTER WEANING				
(8) High	Signif./total comparisons	—	3/3	3/3
v Low	Range of differences (lb)	—	+4.0 to +5.2	+5.4 to +15.6

*Treatment comparisons significant at 5% level or better.

pasture were regulated by differential stocking rates, the low level plots being stocked at 13 ewes with single lambs per acre, and the high level treatments at 6.5 ewes and single lambs per acre. On the trial with twin lambs, the stocking rates were adjusted to give approximately the same number of lambs per acre. These levels were continued after weaning.

Weaning was carried out by removing the ewes when the lambs were approximately 10 weeks old (early weaning) and 15 weeks (late weaning). The trials were closed about three months later, usually in late March.

RESULTS

A summary of the numbers of treatment comparisons and those which were statistically significant, and the ranges of differences in liveweights of treated lambs, is given in Table 1. More detailed results will be published elsewhere.

DISCUSSION

In Canterbury, selenium therapy, anthelmintic drenching to control internal parasites, and early weaning are three practices often recommended and adopted when the growth rate of lambs is unsatisfactory. Although its role is so important as to be axiomatic, the influence of feed availability can easily be overlooked. Concentration on feed quality can divert attention from consideration of quantity.

SELENIUM THERAPY

Selenium therapy has greatly improved the performance of lambs in mid-Canterbury and in many other parts of the province. In the present trials, pre-lambing administration to ewes gave inconclusive results as measured by the growth of the lambs. The significant effects on birthweights, and on liveweights at weaning and when the trials closed, were positive, but too few in number and small in magnitude to justify the use of selenium. Selenium administration to the breeding ewes must be based on the improvement it produces in lambing percentages, wool weight and wool grade.

When given to the lambs, selenium increased liveweight gains and these increased in magnitude throughout the season. By the time the trials were closed, responses to selenium were nearly all statistically significant and large enough to be biologically important and economically profitable.

CONTROL OF INTERNAL PARASITES

Although *Haemonchus contortus* is not found in the area where these trials were carried out, internal parasitism has often been implicated in cases of lack of progress in growth of lambs. Drenching of ewes before lambing is recommended on farms in the surrounding district, and results, on the farm scale and in field trials, are claimed to be excellent. However, several field and pilot trials at Winchmore had failed to show any benefit from anthelmintic given to suckling lambs, but none of these had included treatment of the pregnant or lactating ewes. It was thought that this could explain the discrepancy in results.

It was postulated that, if the suckling lamb gave a positive response to anthelmintic drenching only when its dam had been drenched, this must be due to one or more of the following factors:

- (1) Improved mothering ability in the ewe due to the control of parasites during pregnancy.
- (2) Improved mothering ability due to control of parasites during lactation.
- (3) A lower level of ingestion of infective larvae due to reduced contamination of the herbage by the treated ewe.

One of the bases in the design of the trials was an endeavour to measure the effect of each of these possibilities.

The results of the trials show that lambs from ewes drenched pre-lambing and/or during lactation, did not consistently grow faster than lambs from untreated control ewes. Thus, little information was gained as to the relative merits of the above three postulates. The attempt to investigate their effects weakened the design of the remainder of the trial.

Lambs drenched to control internal parasites were no heavier at the time of early weaning than untreated controls; at the time of late weaning they were slightly heavier only when (a) 50% had been weaned, and (b) their dams had been treated during pregnancy and lactation; but by the end of the trials the growth response to anthelmintic had increased to a level that was statistically significant.

Thus, from the results of these trials, no consistent improvement in the growth of lambs would be expected

from drenching pregnant and/or lactating ewes, or from drenching suckling lambs; but drenching weaned lambs should prove beneficial.

Moreover, the uncertainty of, and irregularity in, response in these trials suggests that strategic drenching of the ewe and suckling lamb may be a wasteful procedure. Treatment based on the level of infestation would seem a more logical approach. When internal parasitism is suspected as a cause of poor growth in lambs before weaning, the services of a veterinarian to determine whether treatment is justified may well prove very profitable, especially where a rigorous control policy has already been practised. It appears from the literature that diagnostic techniques are far from perfect and an improvement in these would be of great value. The disparity between the results of this trial and those of others in nearby areas underlines the importance of the statement by Brunsdon (1966) of the need for greater knowledge of the biology, host/parasite relationships and factors affecting control, of the internal parasites of sheep.

EARLY WEANING

Early weaning has resulted in increased production on many Canterbury farms. When feed is scarce, the amount available to the lamb is increased by the removal of the competition of the ewe. The resulting benefit to the lamb seems to have led many to believe that weaning *per se* increases lamb growth rate.

In these trials, late-weaned lambs were never lighter than early-weaned at the time of late weaning (15 weeks), even when the level of feeding of the unweaned lambs had remained low. Only when the level of feeding of weaned lambs was raised to the high level were they as heavy as their unweaned controls. However, by the time the trials were closed, there was little difference between early and late weaning when feeding after weaning was high. These results suggest that if future feed supplies are not jeopardized, lambs for slaughter will benefit from being left with their mothers for at least 15 weeks, but replacements may be weaned at 10 weeks without adverse effect if well fed after weaning.

LEVEL OF FEEDING

High and low levels of feeding were included in the trials primarily to study interactions with (a) anthelmintic drenching and (b) time of weaning, in the lambs.

Interactions with time of weaning have been outlined above, and, although many authors have stressed the importance of plane of nutrition in the host reaction to internal parasites, no strong interaction between level of feeding and anthelmintic drenching occurred in these trials. The results emphasized the importance of an adequate level of feeding in the suckling and weaned lamb.

APPLICABILITY OF FINDINGS

It seems reasonable to assume that the factors studied in these trials will have similar results—although varying in magnitude—on farms on the existing and proposed irrigation areas of Canterbury and Otago, where these are situated on similar free-draining soils and have a summer climate of low rainfall, low humidity and high temperatures. It is likely that most of the findings will apply to non-irrigated areas where soils and climate are similar; but they will have no validity in the high rainfall areas, especially when summer rainfall and humidity, and soil conditions, differ markedly.

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