WINTER SUPPLEMENTATION OF MERINO EWES

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SUMMARY

The performance of Merino ewes fed at a constant intake of 1.5 lb lucerne hay daily has been compared with that of ewes fed at levels increasing from 0.7 lb to 2.5 lb daily over 12 to 14 weeks of late pregnancy.

Total feed intakes for the period of supplementation were the same. Mean daily intakes of digestible organic matter (D.O.M.) were estimated to be 340 to 420 g and 150 to 620 g for ewes fed at constant and variable levels, respectively.

Constant level ewes were more susceptible to pregnancy toxaemia than ewes fed at variable level but no consistent differences in lamb and wool production were noted. Where rations were fed weekly and twice-weekly, liveweight changes, lamb and wool production were similar to that following daily feeding but pregnancy toxaemia occurred where hay was fed weekly at a constant level.

IN preliminary work at Tara Hills High Country Research Station, Omarama, it was found that 1.5 lb of good-quality lucerne hay approached the minimum daily intake needed to maintain a 100 to 110 lb pregnant Merino ewe. While a more liberal ration (3 lb daily) resulted in steady increases in liveweight, no measurable effect was seen in the survival or subsequent growth of lambs or in wool production.

It was therefore decided to examine the performance of ewes at near-maintenance levels of winter feeding to find a safe and effective way of feeding a limited hay ration.

EXPERIMENTAL

Three trials were conducted at Tara Hills, the objectives being as follows:

1963: A comparison of feeding equivalent amounts of hay at a constant level and feeding at an increasing scale.

1965: A comparison of daily and weekly feeding of equivalent amounts of hay at constant and increasing scales of feeding.

1966: A comparison of daily and twice-weekly feeding of equivalent amounts of hay at constant and increasing scales of feeding as in 1965.

In all trials, the rations were designed so that the total amount of hay fed to each group under comparison was the same. Feeding treatments lasted from 12 to 14 weeks, starting in July and ending prior to the start of lambing in early October. In 1963, hay feeding continued throughout lambing and was compared with the effect of pasture feeding for 5 weeks over the period of lambing for ewes under the winter feeding systems. In 1965 and 1966, ewes were lambed separately on comparable pasture but run together from tailing in November until weaning in February. Where feeding levels varied, each feeding period was of either 3 or 4 weeks' duration.

Liveweights were recorded following a 24 hr fast whenever feeding levels were changed. The performance of ewes was recorded in terms of incidence of barrenness, numbers of lambs born, lamb survival to tailing and lamb weaning weight. Wool production was measured as greasy fleece weight immediately following the end of supplementation and at weaning 4 months later. During the trials, ewes were confined on sparse native pasture which was virtually bare ground. Its contribution to intake was considered to be negligible.

Lucerne hay was fed in racks with wooden floors to reduce waste. All hay was eaten except at the highest level of variable feeding when a small residue was sometimes left.

The digestibilities of the three hays were 59.4% (1963, *in vivo* calculation), 71.2% (1964, *in vitro* calculation) and 68.8% (1966, *in vitro* calculation).

RESULTS

1963 Trial

The design of this experiment is shown in Fig. 1. The daily quantities of hay offered to the ewes were: 1.5 lb (constant-level group); 0.7, 1.0, 1.5 and 2.5 lb in periods 1, 2, 3 and 4, respectively (variable-level group).

Two groups of 70 mixed-aged ewes with a mean July bodyweight of 110 lb were fed, on average, 1.5 lb hay per head daily for 13 weeks. A random half of each group then grazed lucerne-grass pasture during lambing and

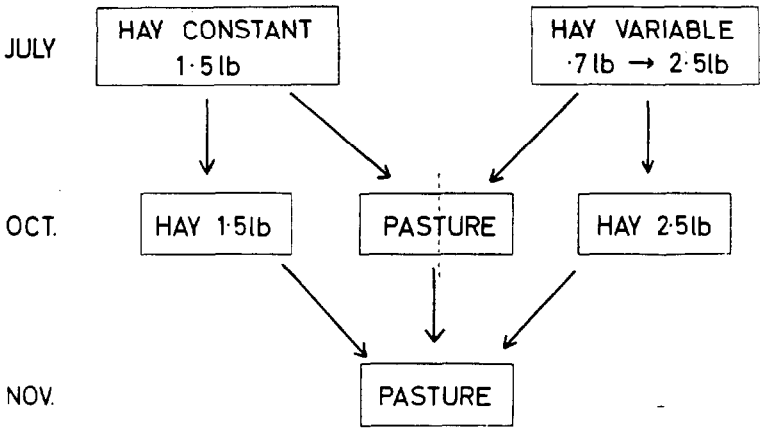

Fig. 1: Design of 1963 trial.

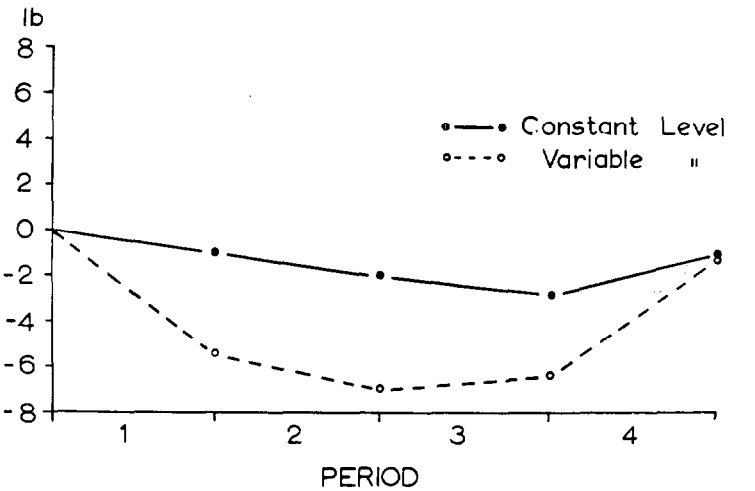

Fig. 2: Liveweight changes in ewes—1963 trial.

half remained on their respective "period 4" hay rations. After 5 weeks, all ewes were brought together on lucerne-grass pastures until weaning in February.

Figure 2 shows that both hay feeding systems barely maintained liveweight over late pregnancy, but when

TABLE 1: SUMMARY OF PRODUCTION RESULTS IN THREE NUTRITION TRIALS WITH MERINO EWES

Trial and Treatment	*No. of Ewes Mated*	*No. of Ewe Deaths*	*No. of Ewes Barren*	*Lambs Tailed %**	*Lamb Weaning Wt. (lb)*	*Mean ± S.D. of Wool Weight for 16 mth (lb)*
1963: Constant level—hay	35	2	2	120.0	58.2	13.5 ± 2.0
—pasture	35	3	0	105.6	60.5	13.5 ± 2.1
Variable level—hay	35	2	1	88.6	63.1	14.2 ± 1.9
—pasture	34	1	1	88.2	62.6	14.0 ± 1.7
1965: Constant level—daily	64	2	2	90.6	53.8	15.2 ± 2.3
—weekly	64	6	2	106.2	53.5	15.8 ± 1.6
Variable level—daily	64	1	1	95.3	53.9	14.8 ± 1.9
—weekly	64	2	0	96.9	54.4	16.3 ± 2.8
1966: Constant level—daily	64	2	0	115.7	48.0	16.6 ± 1.8
—2 × weekly	64	3	0	107.8	46.1	16.5 ± 2.1
Variable level—daily	64	1	0	115.7	48.0	16.8 ± 1.9
—2 × weekly	64	1	0	110.9	48.2	16.8 ± 1.7

*Percentage of ewes mated.

allowance is made for the weight of uterine contents both rations were below the requirements for tissue maintenance in the ewes. In this trial 16% of the Merino ewes carried twin foetuses, and undoubtedly energy intake for these animals was very low. In period 4, three ewes fed at constant level died of pregnancy toxaemia. In spite of the higher average daily intake and a weekly liveweight increase of 1.5 lb in period 4, two ewes in the variable-level group also died of pregnancy toxaemia.

Table 1 present a summary of the data for lamb and wool production. Numbers of twin births and lambs surviving to weaning were greater for ewes on constant level of diet than for variable level. Barrenness amongst ewes was similar for all treatments. Lambs from ewes fed at a variable level were significantly heavier at weaning ($P < 0.05$) than those from the constant-level group. The higher wool production of ewes offered a constant level of feeding approached statistical significance.

The type of feed available during lambing did not, however, cause differences in production.

1965 Trial

In this trial, the effects on ewes of intermittent feeding and daily feeding of constant and variable rations were examined. Lucerne hay was fed to aged Merino ewes under 4 feeding systems for 14 weeks. The experimental design was a 2 × 2 factorial as outlined in Table 2. Apart from an unscheduled increase in the hay ration during period 4 for the ewes fed at constant level, all groups received the same total quantity of hay.

Daily-fed ewes ate their ration completely each day. The weekly-fed constant-level group had hay available

Table 2: Hay Feeding Schedule: 1965 Trial
(lb/head/day)

	Daily Feeding		*Weekly Feeding*	
Period	*Constant Level*	*Variable Level*	*Constant Level*	*Variable Level*
1	1.5	0.75	10.5	5.25
2	1.5	1.25	10.5	8.75
3	1.5	1.75	10.5	12.25
4	1.5	2.25	10.5*	15.75

*Increased to 15.75 lb.

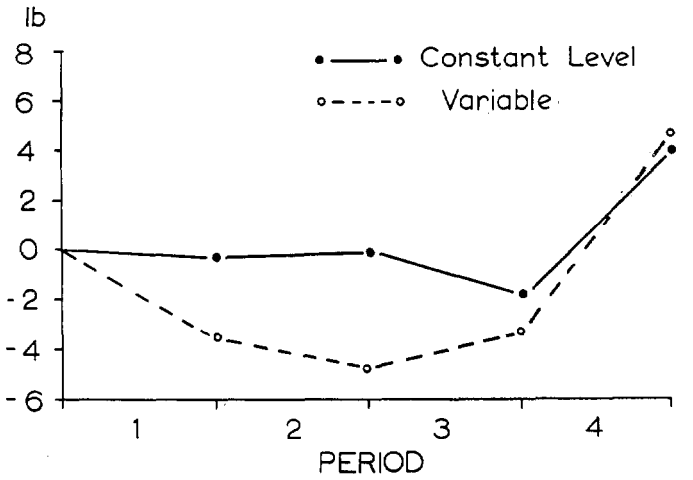

Fig. 3: Liveweight changes in ewes relative to levels of feeding—1965 trial.

for three days each week only. The variable weekly group had hay available for two days in period 1, for three days in periods 2 and 3 and for four days in period 4. Feeders were moved regularly and wastage was negligible in all cases.

The mean liveweight of ewes at the start of feeding was 110 lb. The changes in liveweight are shown in Fig. 3.

Changes in liveweight due to variation in feeding level show an expected pattern, a constant intake maintaining liveweight until the rise in late pregnancy. The maximum loss under variable feeding approached 5 lb, but recovered to be equal to the constant level at the end of period 4.

No differences in liveweight gain due to length of feeding interval were observed (Fig. 4), although significant interaction occurred between feeding levels and intervals between offering of hay, the liveweight increase under variable feeding being greater where hay was fed daily.

Six ewes died during the trial. Two deaths were of undetermined causes (variable-level groups) and four deaths from pregnancy toxaemia (constant-level weekly group during period 4). No further cases of pregnancy toxaemia were seen after the hay ration for the latter group was increased by 50% for the remainder of the period. The group, as a whole, lost an average of 2.4 lb

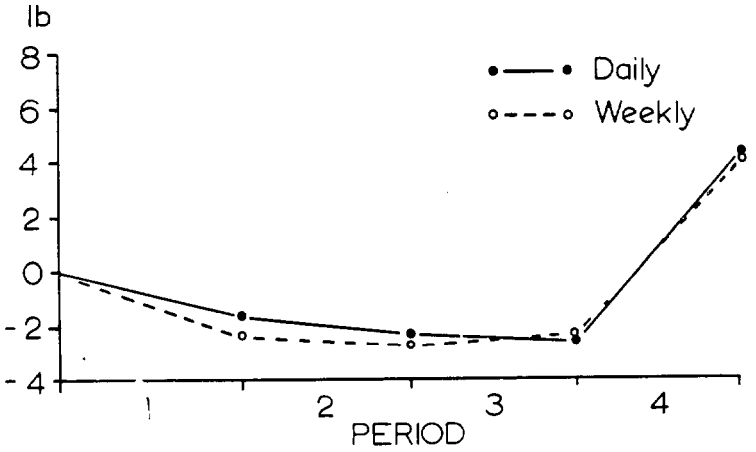

Fig. 4: Liveweight changes in ewes relative to intervals of feeding—1965 trial.

liveweight in period 3 preceding the outbreak and the ewes which died had lost an average of 5.5 lb. Although weight losses of this order were common at this stage, the affected ewes were probably twin bearers and hence susceptible to nutritional stress. Hay was available to this group for 3 days only each week and 4 days' fast of maintenance levels of intake could well have precipitated the condition in susceptible ewes.

Production data from the trial are given in Table 2.

Although 18% of all lambs died at birth or before tailing, no clear-cut differences were seen between feeding groups. Lamb growth to weaning was similar in all groups.

Ewes fed weekly produced significantly ($P<0.05$) more wool than daily-fed ewes.

1966 Trial

The design of this trial was essentially the same as the 1965 trial except that ewes were fed twice weekly. The mean liveweight of ewes in July was 120 lb. Daily-fed sheep ate their ration completely each day. Twice-weekly-fed sheep were without hay for 1 to 2 days depending on the level of variable feeding.

The pattern of liveweight change for four feeding periods is shown in Figs. 5 and 6.

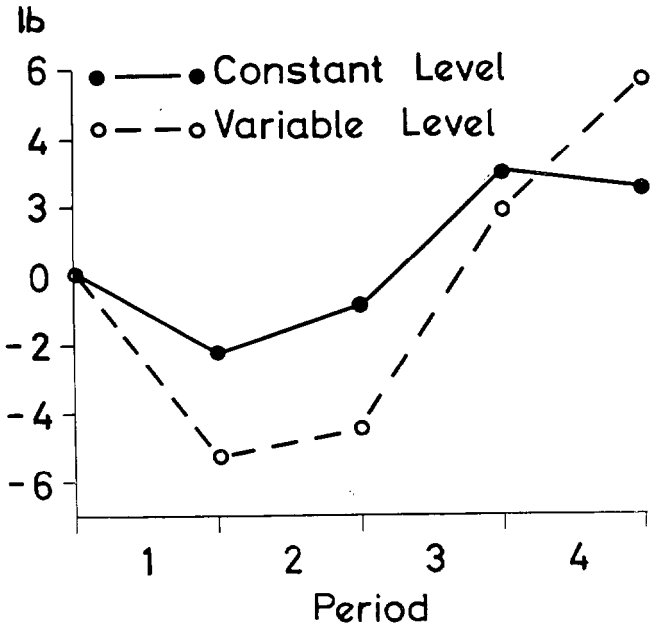

Fig. 5: Liveweight changes in ewes relative to levels of feeding—1966 trial.

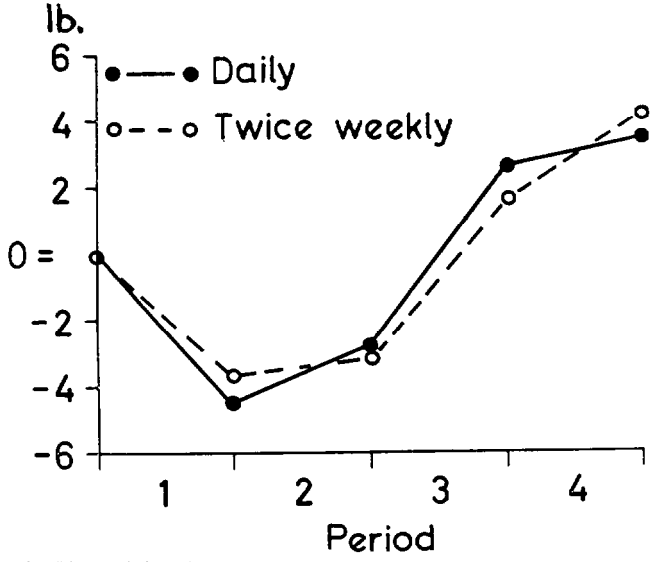

Fig. 6: Liveweight changes in ewes relative to intervals of feeding—1966 trial.

The difference in gain at the end of supplementation between constant- and variable-feeding levels, 3.2 lb, was significant ($P<0.01$) but the effect of daily and intermittent feeding was similar. There were no interactions between the levels and intervals of feeding for ewe liveweight gain or for lamb weight at tailing,

Symptoms of pregnancy toxaemia were not observed although the ewes in the constant-level groups were thought to be in a susceptible state. Seven ewes died during lambing from undetermined causes. Table 2 presents data on production for this trial and shows that there were no effects between treatments.

DISCUSSION

In these trials, ewes have been wintered at low levels of energy intake, levels which are not uncommon under adverse conditions in New Zealand tussock country where ewes are unsupplemented. From the equations, D.O.M. intake (lb) for maintenance $=0.062$ Weight$^{0.69}$ lb, Coop (1962) has estimated the maternal requirement for a 110 lb sheep under close grazing to be 720 g D.O.M. daily. Russel *et al.* (1967), studying pregnant ewes in pens, have calculated the nutritional requirements for a 110 lb ewe in late pregnancy with an average-sized single foetus to be 900 g D.O.M. daily, and 1,250 g D.O.M. daily for one with average-sized twin foetuses. These workers also quote data suggesting that intakes of ewes on hill grazing are of the order of only 350 to 500 g D.O.M. daily, but rising, presumably by supplementation, to 700 to 800 g in the month before lambing.

The mean daily intakes in the present series of trials were 340 to 420 D.O.M. for ewes fed at constant level and 150 to 620 g for variable level of feeding. These estiates indicate dangerous levels of undernutrition, dangers which were in fact expressed in some treatments by outbreaks of pregnancy toxaemia and which might well have been more extensive if the ewes had been subjected to additional non-nutritional stresses.

Individual liveweight changes within groups were exceedingly variable, in extreme cases approaching ± 20 lb of the mean liveweight gain for the period of supplementation. Some ewes were reluctant feeders on hay and lost weight even in the relative abundance of the later stages of variable rationing. These sheep, either timid or non-acceptors of a sole supplementary diet, become a management problem only if occurring in appreciable numbers.

In all three trials, treatments involving variable levels of feeding gave least concern for the condition of the ewes, and, as a management factor, where only limited quantities of supplement are available, appeared the most advantageous.

The effects of intermittent feeding and daily feeding were similar in respect to ewe liveweight gain, lambing performance and wool production. This could be expected where nutritional intake was essentially the same. However at constant levels of intake, feeding at weekly intervals appeared a precarious practice since apart from the recorded mortalities from pregnancy toxaemia, the ewes were lethargic and lost the characteristic vitality of the Merino breed as pregnancy advanced. Weekly feeding at variable levels gave little cause for concern. Even though liveweight responses to treatment were variable, it is doubtful whether differences in individual feed consumption normally associated with aggression or reticence at the hay rack were reduced following intermittent feeding, as Australian drought feeding work with sheep has suggested. Standard deviations for mean liveweight gain during the period of supplementation were comparable for daily and weekly feeding.

Some anomalous production results are unexplained. In the 1963 trial, a large difference in the number of lambs alive at tailing, between ewes fed at constant and variable levels, was the compounded result of a higher birth rate and lower death rate in lambs associated with the constant level of feeding. Further examination of these data, in relation to the subgroups fed on hay or on pasture diets over the lambing period, showed the results were not consistent and it is thus difficult to associate the differences in percentage of lambs tailed with treatments applied either pre-lambing or during the lambing period.

The patterns of liveweight change in the ewes of the 1965 trial provide no information for the higher wool production of the animals fed at weekly intervals. That weekly-fed sheep outproduced daily-fed sheep during both the treatment and post-treatment periods suggests imperfections in the random selection of these groups rather than an enhancement of the efficiency of feed conversion to wool under intermittent feeding.

The major conclusion to be drawn from these nutritional trials is that, where economy is sought in supplementary feeding of pregnant ewes, and rations close to or below true maintenance requirements are being fed,

an increasing scale of rationing is safer than feeding at a constant level. Although lamb and wool production are unaffected by such differences in feeding, the occurrence of pregnancy toxaemia should be reduced. However, increasing the rations of ewes already in a susceptible condition may not always be effective in preventing pregnancy toxaemia.

It is also clear that ewes can be fed at weekly intervals without apparent ill effect where rations are scaled to meet the demands of pregnancy. At constant levels of intake, the practice may result in increased mortality among ewes. Some saving of labour must result from intermittent feeding of the stock.

ACKNOWLEDGEMENTS

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