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SILAGE FOR FLUSHING EWES

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Abstract

The ovulation rate of Coopworth ewes (45 kg fasted weight) fed a maintenance allowance of drought pasture over flushing and mating was compared in two successive years with similar ewes whose feed was supplemented with wilted fine chop pasture silage or wilted and baled pasture silage ("balage"). Supplements increased ovulation rates from 1.2 up to 1.78 ovulations/ewe. The ovulation rate was closely related to supplement intake, which in turn was associated with quality, especially DDM. There was no difference in supplement intake, ewe liveweight gain or ovulation rate, between silage and balage when they were made from the same pasture. Ewes offered 6.5kg DM/e/d of high quality irrigated pasture, increased their ovulation rate to the same level as those fed *ad lib* silage. Ovulation rate did not increase until 17 to 21 days after supplementary feeding began.

Keywords: Wilted silage, flushing, ovulation rate

INTRODUCTION

Lambing percentage can be increased by both high liveweight at mating and by liveweight gain ("flushing") immediately before and during mating (Coop 1966, Rattray *et al.* 1980, Kelly & Thompson 1981). However frequent droughts in the eastern South Island make flushing of ewes on pasture difficult. Pasture hay is rarely of high enough quality to provide liveweight gain, and lucerne hay is unsuitable because it is likely to contain ovulation suppressing oestrogens (Smith and Jagusch 1980). Rattray (1977) and Rattray *et al.* (1978 & 1979), have shown that wilted pasture silage is readily eaten by sheep in sufficient quanitities to provide a flushing effect. Despite the proven effectiveness, its relative cheapness, and the spring pasture surplus on most dryland sheep farms, silage is seldom used.

The experiments compared wilted silage and balage (wilted silage made into large round bales), with irrigated and drought pasture and determined the effect of duration of flushing at different levels of supplementary feeding.

EXPERIMENTAL

Trials were run in 1981 and 1982 with the treatments and ewe numbers listed in Table 1.

Feeding and Mating

Experimental feeding levels began on 6 March 1981 and continued for 45 days, with mating to entire rams during the final 14 days. In 1982 feeding levels were imposed for 34 days from 12 March. Oestrus was controlled by an intra-vaginal progesterone device so that approximately 25% of the ewes ovulated every 4 days. Oestrus was detected by vasectomized rams fitted with mating harnesses.

Rattray *et al.*, 1980c). In addition current silage handling machinery makes it a more attractive and practical proposition than previously.

The material used in the Ruakura trials was between 65 and 75% digestible (Rattray, 1977; Rattray *et al.*, 1980b). Because the emphasis is on ewe gain rather than maintenance highest quality material should be aimed for. For this reason wilting and chopping are recommended for better gains (and subsequent reproduction) from the higher intakes and/or nitrogen retention.

In most cases silage alone gave a good flushing response. The response increased with the amount of silage fed up to 0.75 kg silage DM/ewe/day and in an unsynchronised ewe mob 20 days of supplementation should suffice.

Tentative assessments of the economics of silage supplementation (Dawson, 1978; Rattray *et al.*, 1980c) for lamb production suggested a response of 7-10 lambs weaned/100 ewes would cover the costs of the operation. However 0.5 kg DM/ewe/day for 20 days would cost considerably less than these estimates. In addition these calculations did not consider any wool response.

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The experiments compared wilted silage and balage (wilted silage made into large round bales), with irrigated and drought pasture and determined the effect of duration of flushing at different levels of supplementary feeding.

EXPERIMENTAL

Trials were run in 1981 and 1982 with the treatments and ewe numbers listed in Table 1.

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Table 1: FEEDING TREATMENTS, LEVEL OF FEEDING AND EWE NUMBERS

Feeding Treatments	Level of Feeding	Number of Ewes 1981	1982
1. Control (drought pasture)	Maintenance	50	100
2. Wilted Silage	*ad lib*	50	50
3. Wilted Balage	*ad lib*	50	100
4. Irrigated Pasture	6.5 kg DM/e/d	100	–
5. Wilted Balage	half *ad lib*	–	100

Notes:

1. All treatments, except irrigated pasture in 1981, received the same allowance of drought pasture as the controls.
2. 1981 – one replicate; 1982 – two replicates

All treatments were shifted to new pastures twice weekly in 1981 and once weekly in 1982. Pasture areas were the same for all treatments (except irrigated pasture in 1981) and were adjusted to give nil liveweight gain on the control treatments. Herbage intake was estimated in 1982 by cutting four, 0.25m^2 quadrats to ground level before and after grazing on each treatment.

Ovulation Rate & Liveweight

The ovulation rate was recorded by laparoscopic examination (Kelly and Allison, 1976) of each ewe 4-6 days after oestrus (identified by harnessed rams). In 1981 each ewe was recorded once during the mating period following flushing. In 1982 ovulations were recorded in each of the two oestrus cycles occurring during the feeding period. Fasted liveweights were recorded on days 0 and 31 in 1981 and days 0, 18 and 35 in 1982.

Silage and Balage

These supplements were made from ryegrass/clover pasture as detailed in Table 2. In both years the wilted pasture was chopped with a precision-chop

Table 2: SILAGE AND BALAGE

	1980/81		1981/82	
	Silage	Balage	Silage	Balage
Cutting Date	Nov 18	Dec 2	Nov 16	Nov 16
Wilting time (hrs)	24	26	48	48-60
DM % (March)	34	66	30	28
DDM % (March)	73	62	68	66
pH	–	–	4.2	5.3
Total N (% DM)			2.13	2.07
Ammonia N as % of total N			15.0	14.5

machine, packed into a pit and covered with a black polythene sheet. A "soft-centred" McKee baler was used in 1981 with the bales being stacked end to end and wrapped in black polythene sheets. The sealing was not air tight. In 1982 half size bales were made with a "tight centred" New Holland baler and each was enclosed in an individual black polythene bag and tied with twine.

RESULTS

The results of the 1981 trial are presented in Table 3. Ewes fed *ad lib* silage or irrigated pasture gained over 6 kg liveweight in 31 days flushing and their ovulation rate was approximately 0.6 ovulations/ewe higher than those on a maintenance allowance of drought pasture. The ewes fed balage (made from a different pasture) consumed less supplement, gained less weight and had a slightly lower ovulation rate.

Table 3: HERBAGE ALLOWANCE, SUPPLEMENT INTAKE, LIVEWEIGHT GAIN DURING FLUSHING AND OVULATION RATE, 1981.

Treatments	Herbage Allowance (kg DM/e/d)	Supplement Intake (kg DM/e/d)	Fasted L.W.G. 6/3 to 6/4 (kg/ewe)	Ovulations/ ewe
Control	1.5	–	0.2	1.20
Silage	1.5	1.7	6.7	1.78
Balage	1.5	1.3	3.9	1.68
Irrigated Pasture	6.5	–	6.2	1.77

Table 4: HERBAGE ALLOWANCE, PASTURE AND SUPPLEMENT INTAKE, FASTED LIVEWEIGHT GAIN AND OVULATION RESPONSE, 1982.

Treatments	Herbage Allowance (kg DM/e/d)	Intake Pasture (kg DM/e/d)	Intake Supplement (kg DM/e/d)	Fasted LWG 11/3 to 16/4 (kg/ewe)	Ovulations/ewe 1st cycle	Ovulations/ewe 2nd cycle
Control	0.9	0.77	0.03[1]	–0.6 C	1.16 A	1.24 c B
Ad lib Silage	0.9	0.54	0.83	4.2 A	1.20 A	1.42 b A
Ad lib Balage	0.9	0.40	0.81	3.9 A	1.22 A	1.51 a A
Restricted Balage	0.9	0.59	0.44	1.7 B	1.28 A	1.42 b A

[1] = Hay

The results of the 1982 trial are presented in Table 4. The intake of *ad lib* silage and balage, liveweight gain and ovulation rates (2nd cycle) were all lower

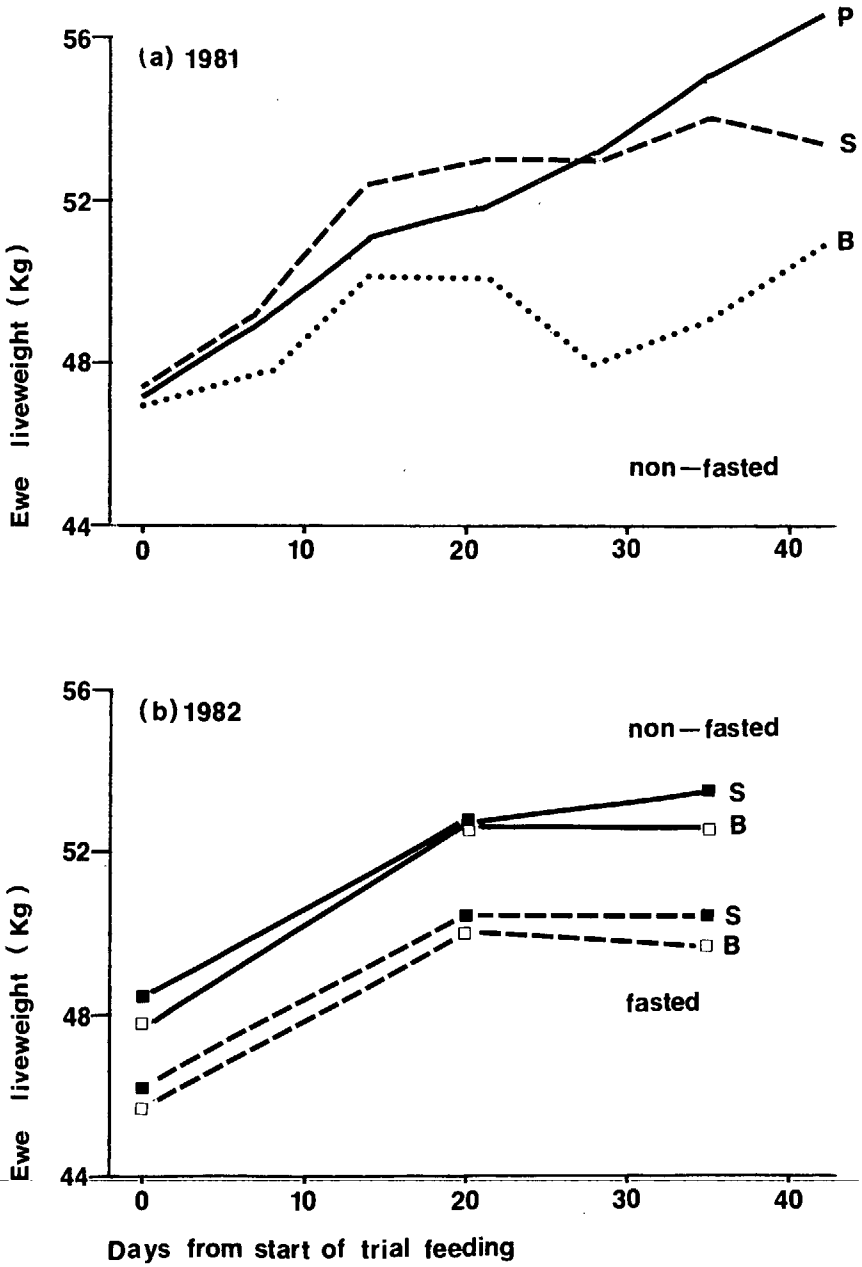

Fig. 1 Pattern of liveweight gain with *ad lib* feeding.
P = irrigated pasture; S = silage; B = Balage

than 1981. Halving the amount of balage fed, reduced intake and liveweight gain in proportion, but had a smaller effect on ovulation rate in the second cycle. Supplementary feeding had no effect on ovulation rates in the first cycle.

Fig. 1 shows that the rate of liveweight gain of ewes fed *ad lib* silage and balage was not uniform. This was most clearly shown by the fasted weights in 1982, where the ewes gained weight rapidly in the first 17 days but gained nothing in the subsequent 17 days. Unfasted weights in both years followed the same pattern. In contrast the ewes on irrigated pasture in 1981 gained weight steadily throughout the trial.

Condition scores were recorded in 1982. At the start of the trial they averaged 2.8 on all treatments and by the end had increased to 3.0, 3.4 and 3.7 on the control, restricted and *ad lib* treatments respectively.

Changes in the ovulation rate of ewes during the 1982 feeding period are shown in Fig. 2. (the *ad lib* silage treatment contained too few ewes to be included). Each point represents the mean ovulation rate of approximately 40 ewes (i.e. those tupped on the two replicates of each treatment over a 4-5 day period). Ovulation rates were low and tended to decline during the first cycle but rose sharply at the beginning of the second cycle in the ewes fed *ad lib* balage, followed 4-5 days later by a slightly smaller rise in the ewes on restricted balage. Both groups maintained this higher level for the remainder of the second cycle. The control ewes gradually regained the ovulation rate they had at the

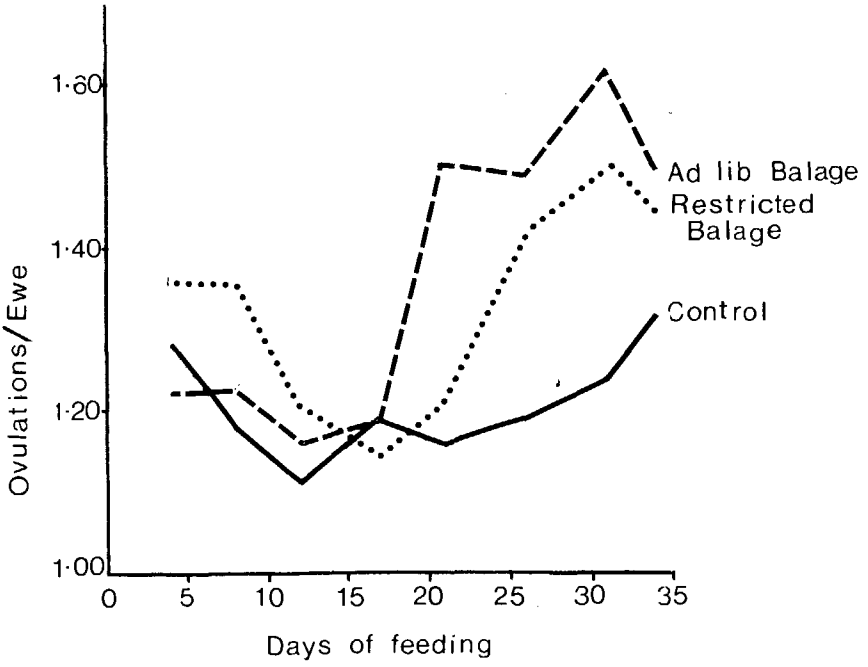

Fig. 2 Relationship between ovulation rate and duration of supplementary feeding.

start of the trial.

The regression of ovulation rate (during mating in 1981 and the second cycle in 1982) against fasted liveweight (at the beginning of mating in 1981, and the beginning of the second cycle in 1982) indicates a 7.6% (1981) and 4.5% (1982) increase in ovulation rate for every kilogram increase in liveweight. The regression equations were –

1981 $Y = -2.117 + 0.076X$
1982 $Y = -0.807 + 0.045X$

Y = mean ovulations per ewe in treatment
X = mean liveweight (fasted) at the start of tupping

DISCUSSION

Silage as a Flushing Feed

Both trials demonstrated that feeding silage or balage to ewes during the flushing period can significantly increase ovulation rate. In the 1981 trial, good quality silage was as effective as a high allowance of irrigated pasture. However, both trials indicate that increases in ewe liveweight and ovulation rate are related to the level of feed intake. It is assumed that the high level of intake of silage in 1981 was due to its high digestibility compared to silage in 1982 and balage in both years (Table 2).

Length of Flushing

The 1982 trial demonstrates that a given level of feeding has its effect on the ovulation rate of the subsequent oestrus cycle. The decline in ovulation rate during the first oestrus cycle occurred when ewe liveweights were increasing rapidly but followed a decline of 7 kg in mean ewe liveweight in the 4 weeks prior to the start of the trial. The rise in ovulation rate of the ewes on the two balage treatments occurred when liveweights were static but followed rapid liveweight gain in the previous 17 days (Fig. 1). The small rise in ovulation rate of the control treatment ewes in the second cycle was associated with constant liveweight both before and during this cycle (Table 4) and is probably a seasonal effect. Kelly (pers. comm.) has calculated from his observations in Otago and Southland, that ovulation rate increases by 0.1 ovulations/ewe for each 17 days delay during April and May.

The difference between years in the regression relationship of ovulation rate and pre-mating liveweight suggests that there was a greater dynamic flushing response in 1981, in addition to the effect of static liveweight. It may be that this difference was due to the faster rate of liveweight gain and/or the longer flushing period in 1981, but this has to remain speculation because these trials were not designed to differentiate between static and dynamic effects.

In both years the increase in ovulation rate per kilogram change in liveweight is higher than the 0.03 obtained from commercial flocks by Kelly and Johnstone (1982) but is similar to responses obtained at Woodlands Research Station (Thompson pers. comm.). From the practical farming point of view it does indicate that it is possible to obtain worthwhile gains in ovulation rate from 3 weeks flushing with medium rates of liveweight gain but maximum ovulation rate requires longer flushing at high rates of gain.

Balage vs Fine Chop Silage

The 1982 trial indicated that these different methods of making silage had no effect on the feeding value of moderate quality material. Consequently we have no hesitation in advising farmers, who wish to use existing haymaking machinery to make balage, that the system works. However, we also found it to be relatively expensive (cost of baling and bags) and laborious. Our conclusions were that pit silage was easier and cheaper to make than balage when both were done on contract.

CONCLUSIONS

Silage is a practical and effective flushing feed for sheep in the drought-prone areas of the South Island.

Balage is feasible and a satisfactory feed but is more expensive than pit silage. The minimum period of increased feeding necessary to obtain a flushing effect is 17 days but longer feeding may give additional ovulation responses.

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