USE OF PASTURE **SILAGE** AS A SUMMER SUPPLEMENT FOR EWES

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Abstract

This paper reviews a number of trials conducted at Ruakura, where pasture silage was supplemented to ewes on restricted summer grazing. Early trials showed that such supplementation increased total intake and gains. Further improvements were obtained by wilting or chopping the silage. Initially flushing responses were disappointing, but subsequent work showed high quality pasture silage to be ideal for such purposes (up to 50-70 extra eggs shed and 50-60 extra lambs born/100 ewes to silage groups) and for improving wool growth. This response was related to the amount of silage fed (from 0.25 to 0.75 kg DM/day), and was obtained with as little as 10 days feeding. The practical implications are discussed.

Keywords: Sheep, nutrition, silage, flushing, ovulations, lambs born

INTRODUCTION

In summer and autumn there are generally both quantitative and qualitative problems in attempting to meet sheep requirements from pasture, due to a decrease in pasture production, and a seasonal decline in digestibility (Ratray, 1978). This is more obvious in dry districts or seasons, where the amount of green material per hectare and in the sward falls drastically short of that required for reasonable live-weight gains prior to mating and optimum subsequent ovulation and lambing performance of ewes (Ratray *et al.*, 1980c; Smeaton *et al.*, 1981). Often ewes are light at this time of the year and lose weight prior to and during mating.

For these reasons a series of replicated experiments using mixed-age Coopworth ewes was run over recent years at Ruakura to examine the possible use of silage as a supplement at this time of the year to maintain or improve the performance of breeding ewes.

Some of the results of these trials have been reported elsewhere, but this paper will summarise the major findings together, where applicable, with additional lambing performance data.

RUAKURA EXPERIMENTS

Effect of Supplementation, Chopping and Wilting

In the first two years (Ratray, 1977; Ratray *et al.*, 1978a) the influence of *ad libitum* supplementation of limited pasture (1.5-2.0 kg DM pasture allowance/ewe) with either low DM flail harvested silage; wilted silage (24-48 hr wilted); or precision or double chopped silage was examined. In all trials, except 1976, silage feeding ceased at the commencement of synchronised mating.

The results are summarised in Tables 1 and 2. All silage supplements increased total intake ($P < 0.05$) and gains ($P < 0.01$) over the non-supplemented group. Silage intake was further increased ($P < 0.05$) by both wilting (75% in 1976,

Table 1: INFLUENCE OF PASTURE SILAGE SUPPLEMENTATION AND OF WILTING AND CHOPPING SILAGE ON INTAKE AND GAINS OF GRAZING EWES^a:

1976 Trial ^b
(n = 70/group)

	Silage intake (kg DM/ewe/day)	Pasture intake (kg DM/ewe/day)	Gains ^c (kg/ewe)
Pasture only	0.0	1.2	-0.7
Pasture + low DM silage ^d	0.4	1.1	0.5
Pasture + long wilted silage ^e	0.7	1.0	2.6
Pasture + chopped wilted silage ^{ef}	1.0	0.8	3.7

^a Initial fasted weight 52kg; ^b 6 weeks; ^c Fasted basis (24 hrs);
^d 16.4% DM; ^e 32.2% DM; ^f 2 cm lengths.

67% in 1977) and chopping (43% in 1976, 20% in 1977). Some substitution of pasture dry matter occurred,

This pasture sparing effect could be quite important in avoiding over-grazing. For example, in 1977 pasture utilisation decreased from 77 to 59% and post-grazing pasture mass increased from 500 to 920 kg DM/ha as silage intake increased.

Silage intakes were higher and pasture intakes lower in 1977 than 1976, when it was a drier year and the proportion of green material in the sward was very low. Ewe live-weight gains generally followed silage intakes, and silage B was superior to silage A (Table 2).

Ovulation rate and lambing performance were not measured in 1976. In 1977 although the unsupplemented group had a lower conception rate ($P < 0.05$) than all the silage-supplemented groups, ovulation rate and lambing performance were not influenced (Smith *et al.*, 1978). This suggested that pasture silage may have some quality limitation making it unsuitable as a flushing feed for ewes (Rattray *et al.*, 1978b).

Silage Plus Other Supplements

To investigate this possibility several other supplements (Rattray *et al.*, 1978a) were fed, in addition to double chopped wilted (24% DM) silage (so that total supplement fed was 1.0 kg DM), to ewes grazing limited pasture (2.0 kg DM pasture allowance/ewe/day). Another group was offered liberal grazing (4.5 kg DM pasture/ewe/day). The results including wool responses (Elliott, 1978) are summarised in Table 3.

Live-weight gains and wool growth were greater ($P < 0.01$) for all the supplemented and the lenient grazing groups than for the unsupplemented restricted grazing ewes. Wool growth appeared to respond further to the extra protein in lupins ($P < 0.05$) and the higher level of pasture ($P < 0.01$).

All supplemented and lenient pasture groups had a significantly higher proportion of multiple ovulations ($P < 0.001$) and births ($P < 0.05$) (Smith *et al.*, 1979). In this trial silage alone was as good a flushing feed as any of the other

Table 2: INFLUENCE OF PASTURE SILAGE SUPPLEMENTATION AND OF WILTING AND CHOPPING SILAGE ON INTAKE, GAINS, OVULATION RATE AND LAMBING PERFORMANCE OF GRAZING EWES^a: 1877 TRIAL^b

(n = 84/group)

	Silage intake (kg DM/ewe/day)	Pasture intake (kg DM/ewe/day)	Gains ^c (kg/ewe)	Ovulation rate ^d (eggs/100 ewes present)	Conception rate ^d (/1 00 ewes mated)	Lambs born ^d (/1 00 ewes lambing)
Pasture	0.0,	0.9	-0.5	121	55	117
Pasture + low DM silage A ^e	0.6	0.9	2.6	125	73	110
Pasture + long wilted silage A ^f	1.0	0.6	3.2	131	71	118
Pasture + long wilted silage B ^g	1.0	0.6	4.2	127	76	138
Pasture + chopped wilted silage B ^h	1.2	0.4	4.3	122	75	124

^a Initial fasted weight 45 kg; ^b 6 weeks; ^c Fasted basis (24 hr); ^d One synchronised oestrous cycle only;

^e 18.4% DM, ^f 33.0% DM; ^g 36.8% DM; ^h 34.8% DM; ⁱ 10 cm lengths

Table 3: INFLUENCE OF SULPHUR, **LUPIN** GRAIN AND BARLEY GRAIN IN ADDITION TO PASTURE SILAGE ON THE INTAKE, GAINS, WOOL GROWTH, OVULATION RATE AND LAMBING PERFORMANCE OF GRAZING EWES^a: 1978 TRIAL^b

(n = 80/group)

	Silage intake (kg DM/ewe /day)	Supplement intake (kg DM/ewe /day)	Pasture intake (kg DM/ewe /day)	Gains (kg/ewe)	Wool growth ^c	Ovulation rate ^d (eggs/ 100 ewes present)	Conception rate ^d (/100 ewes mated)	lambs born ^d (/100 ewes lambing)
19 Restricted Grazing (RG)	0.0	0.0	1.2	-5.8	100	104	65	104
RG + silage ^e	1.0	0.0	0.8	3.0	146	170	85	159
RG + silage + S (0.12%DM)	1.0	0.0	0.7	2.9	140	155	74	156
RG + silage + lupins ^e	0.8	0.2	0.8	3.7	160	166	75	163
RG + silage + barley ^e	0.8	0.2	0.7	3.6	146	151	75	155
Lenient grazing	0.0	0.0	1.9	2.1	184	161	60	154

^a Initial fasted weight 49 kg; ^b 6 weeks; ^c Relative to RG; ^d One **synchronised** oestrous cycle only

^e Protein content (Kjeldahl N x 6.25). silage 17.9%. lupins **30.3%**, barley **12.9%**

Table 4: EFFECTS OF LEVEL AND DURATION OF SILAGE SUPPLEMENTATION TO GRAZING AND OF SOLE DIETS OF SILAGE ON INTAKE, GAINS, WOOL GROWTH, OVULATION RATE AND LAMBING PERFORMANCE OF EWES^a: 1979 TRIAL^b

(n = 50/group)

	Silage ^d intake (kg DM/e/d)	Pasture intake (kg DM/e/d)	Gains (kg/ewe)	Wool ^e growth	Ovulation rate (eggs/100 ewes present)		Lambs ^f born (/100 ewes lambing)
					Cycle 1	Cycle 2	
Grazing	0.0	0.64	-6.7	100	120	120	110
(0.8 kg DM	0.25	0.51	-4.8	—	130	120	117
pasture	0.5	0.52	-0.5	124	146	150	137
allowance	0.73 0.98	0.54 0.43	3.1 1.6	135	138 164	158 170	154
/ewe/day)							150
							117
Grazing 0.6 DM	0.0 0.24	0.72 1.07	3.1 -0.1	108 —	148 116	136 136	124
pasture	0.48	0.64	0.8	115	152	136	122
allowance	0.74	0.61	3.8	—	162	170	142
/ewe/day)	0.99	0.71	5.0	114	166	174	144
Penned							
Flail cut ^d	0.91	0.0	1.5	100	133	151	136
Chopped wilted	1.65	0.0	7.8	155	170	179	151

^a Initial fasted weight 48 kg; ^b 7 weeks; ^d All wilted chopped silage (33% DM, 10 cm length) except flail harvested (17% DM); ^e Some groups only measured (n = 12/group). Grazing groups relative to top treatment. Penned groups relative to flail cut (Sumner *et al.*, 1980); ^f Synchronised oestrous cycle 2.

treatments. It was not resolved whether silage quality or the contribution of green pasture to the diet was implicated.

Silage as a Sole Diet

To examine whether green pasture was essential in the flushing response, and whether silage quality had an effect, two groups of ewes were penned on sawdust and fed *ad libitum* sole diets of either direct flail harvested or chopped wilted pasture silage as a subsidiary to a larger field trial (Ratnay *et al.*, 1980b). The results are summarised in Table 4. The chopped wilted silage had significantly greater gains ($P < 0.01$), wool growth ($P < 0.01$), multiple ovulations in both cycle 1 ($P < 0.01$) and 2 ($P < 0.05$) and lambs born ($P < 0.10$). The ovulation and lambing responses were similar to the supplemented grazed groups at similar intakes. Pasture silage alone does appear to be a satisfactory flushing feed, but feed quality, as it affects intake or gain, is also important.

Amount of Silage Fed

Increasing amounts of wilted, chopped pasture silage (0, 0.25, 0.5, 0.75 and 1.0 kg DM/ewe/day) were fed to groups of ewes at two restricted but contrasting levels of grazing (pasture allowances of 0.8 and 1.6 kg DM/ewe/day) (Ratnay *et al.*, 1980b). The proportion of multiple ovulations (Ratnay *et al.*, 1980b) and births was linearly related to silage intake ($P < 0.01$) and ewe live-weight gains ($P < 0.01$) (Table 4), but there did appear to be some levelling of response above 0.75 kg silage DM. Embryonic mortality was very low in this trial with 9 extra lambs being born for each 10 extra ova shed, where 5-6 is generally the average (Smith *et al.*, 1982).

Duration of Silage Feeding

Table 4 shows that ovulation rates responded to silage supplementation at the first synchronised oestrous cycle as well as to the second, and that the responses were in line with the gains (Ratnay *et al.*, 1980b). In the previous trials silage had been fed for at least 42 days, but the response here was to 28 days' supplementation.

The response to shorter intervals of silage supplementation was examined in another trial (Ratnay *et al.*, 1980a; Smith *et al.*, 1981), where either of two silage types were supplemented at 1.0 kg silage DM/ewe/day to ewes on restricted grazing (1.5 to 2.0 kg DM pasture allowance/ewe/day) for either 0, 10, 20 or 40 days before a synchronised mating (Table 5). Gains increased with duration of silage feeding ($P < 0.01$). Ovulation rate did not respond but lambs born increased ($P < 0.05$) with as little as 10 days' feeding. Silage type only influenced embryonic wastage ($P < 0.01$), which was higher on the wilted material. Duration of feeding did not influence embryonic wastage.

This response in synchronised ewes to a period of supplementation, as short as 10 days, indicates that some ovulation or lambing increase in unsynchronised ewes could be obtained with 20 days' supplementation.

CONCLUSIONS

The use of pasture silage appears to be an ideal method of transferring high quality feed from the period of spring surplus to the period of summer-autumn deficit (Fiatray, 1978). It has several advantages over the use of hay. It is cheaper; it is made earlier in the growing season with higher digestibility pasture and it can allow some recovery prior to summer drought (Marsh, 1978; Ratnay, 1978;

Table 5: EFFECT OF SILAGE TYPE AND DURATION OF FEEDING ON GAINS, OVULATION RATES, LAMBING PERFORMANCE AND EMBRYO LOSS OF EWES^a ON RESTRICTED GRAZING: 1980 TRIAL

(n = 50/group)

Silage	Duration ^b (days)	Silage Intake (kg DM/e/d)	Pasture intake (kg DM/e/d)	Gains ^c (kg/ewe)	Ovulation rate ^d (eggs/100 ewes present)	Lambs born ^d (/100 ewes lambing)	Embryo Wastage ^e (%)
Direct, flail harvested ^a	0	0.8	1.0	0.2	152	128	17
	10	0.9	0.9	2.0	153	142	12
	20	0.8	0.9	2.9	160	156	7
	40	0.8	0.9	4.0	164	154	9
Chopped, wilted ^f	10		1.1	0.5	152	124	18
	20	0.8	0.9	3.0	164	135	28
	40	0.7	0.9	4.2	160	139	18

^a Initial fasted weight 48 kg; ^b Days fed prior to synchronised mating; ^c Gains over 40-day period;

^d Synchronised oestrous cycle; ^e 16.7% DM; ^f 22.5% DM, 10 cm length.