

THE RESPONSE OF MERINO EWES FED OATS SUPPLEMENTED WITH UREA, FISHMEAL OR LUCERNE CHAFF

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SUMMARY

Iso-nitrogenous supplements of urea, fishmeal or lucerne chaff increased the voluntary intake of Merino ewes fed oats during lactation and significantly increased the live weight of the ewes and lambs at four weeks post-partum. A significant difference in live weight of the lambs was still present at five months of age.

INTRODUCTION

Oats is the most widely used grain for feeding stock in Victoria but little is known of its effectiveness when fed as a sole ration during drought. The low crude protein content (7 to 9%) of Victorian oats observed at this laboratory over a 14 year period suggests that supplements of nitrogen may be required to maintain production of lactating ewes fed solely on oats. The results of Clements et al. (1979) indicate that roughage should be added to grain diets fed to lactating ewes. The work described in this paper was designed to determine the effects of adding iso-nitrogenous supplements of urea, fishmeal or lucerne chaff to low-protein oats fed to Merino ewes during late pregnancy and early lactation.

MATERIALS AND METHODS

Sheep and Management

Peppin Merino ewes aged four years were mated with Border Leicester rams in May, 1979. Following a six week mating period the ewes were maintained on a low plane of nutrition for the next six weeks which resulted in a mean liveweight loss of 8 kg. During the last three weeks of this period the ewes were supplemented with oats at the rate of 250 g/h/d. At this time (eight weeks before lambing) the ewes were transferred to bare earth pens and offered oat-based diets as the sole ration. The ewes were allocated by stratified randomization on the basis of live weight to one of four groups each of 28 to 29 animals. All ewes were drenched with a broad spectrum anthelmintic before entering the pens and vaccinated with enterotoxaemia vaccine two weeks before lambing.

Diets

The four groups of ewes were offered one of four diets: oats (7.2% crude protein), oats + urea, oats + fishmeal/barley pellets or oats + lucerne chaff. The urea, fishmeal pellets and lucerne chaff comprised 1.7%, 17% and 30% respectively of the diets which were each calculated to contain 12% crude protein.

The urea was dissolved in water and sprayed on the oats during mixing in a paddle mixer. The fishmeal pellets, lucerne chaff and a mineral and vitamin supplement were mixed with the oats before feeding. All diets were offered daily in covered, galvanized troughs and residues were collected at weekly intervals.

During pregnancy the ewes were offered an amount calculated to provide 1.5 times the maintenance requirement of each group of ewes. As the ewes lambed

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they were transferred to one of another four bare earth pens and offered the respective rations ad libitum. All ewes completed four weeks lactation in the pens and were then returned with their lambs to irrigated perennial pasture where they were run together as one mob. The lambs were weaned at 14 weeks of age, drenched with a broad spectrum anthelmintic, and transferred to a fresh paddock of irrigated, perennial pasture.

Measurements

The ewes were weighed at the end of mating, on entry to the pens, at one day post-partum and at four weeks post-partum. The lambs were weighed at birth and at four and 20 weeks of age. The ewes were dye-banded eight weeks before lambing, at parturition and at four weeks post-partum. They were shorn in February, 1980 and wool growth over the pregnancy and lactation periods calculated from the intervals between dyebands. The lambs were shorn at five months of age and fleece weights recorded.

The digestibility of the diets fed ad libitum was determined with six wethers per diet. The liveweight and wool growth data was examined by analysis of variance.

RESULTS

Lambing was completed within three weeks. Eleven of the ewes were not pregnant and 16 produced twins. The results presented (Table 1) refer to ewes with single lambs except for the information on intake and lamb survival which includes those with twin lambs.

The dry matter digestibilities (means and standard errors) of the four diets, oats, oats plus urea, oats plus fishmeal and oats plus lucerne chaff were 60.5 ± 2.3 , 66.5 ± 0.4 , 70.8 ± 1.7 and $68.1 \pm 0.6\%$ respectively.

Ewes

All four groups of ewes consumed their restricted rations during pregnancy but supplementation with urea or fishmeal increased voluntary dry matter intake during lactation from 0.9 kg/h/d to 1.7 and 1.8 kg/h/d respectively and provision of lucerne chaff further increased dry matter intake to 2.3 kg/h/d (Table 1). The low voluntary intake of the ewes fed oats only was reflected in their mean live weight at four weeks post-partum which was 10 to 13 kg lighter than those of the ewes fed oats supplemented with urea, fishmeal or lucerne chaff.

A significantly lower ($P < 0.01$) rate of wool growth during pregnancy and lactation (6.7 and 6.0 g/h/d) was recorded for the ewes fed oats alone; a corresponding increase ($P < 0.01$) in wool growth to 12 and 13 g/h/d was achieved by the ewes fed oats plus fishmeal.

Lambs

The chi-square test for lambs survival showed no significant difference between groups. The percentage of lambs surviving the first seven days (Table 1) was lower than expected but appeared to be associated with problems such as blocked teat canals and deformed udders rather than with diet. The mean live weights at four weeks of age of the lambs raised by the ewes fed oats supplemented with urea, fishmeal or lucerne chaff (13.4, 12.5 and 13.2 kg respectively) were five to six kg greater than those of the lambs reared by ewes fed oats only ($P < 0.01$). The difference in live weight was still present at five months of age ($P < 0.01$) and was associated with a significantly lower ($P < 0.01$) greasy fleece weight of the lambs (Table 1).

TABLE 1 Mean intake (kg DM/h/d), live weight (kg) and wool growth (g/h/d) of the ewes; survival (%), live weight and fleece weight (kg) of the lambs

Attribute	Diet			
	Oats	Oats + urea	Oats + fishmeal	Oats + lucerne chaff
Feed intake during lactation [†]	0.9	1.7	1.8	2.3
Ewe live weight				
Six weeks pre-partum	36.2	38.8	38.1	37.3
One day post-partum**	35.9 ^a	42.3 ^b	42.5 ^b	37.9 ^a
Four weeks post-partum**	35.4 ^a	46.4 ^b	47.4 ^b	48.2 ^b
Ewe liveweight change during lactation**	-0.5 ^a	+4.1 ^b	+4.9 ^b	+10.3 ^c
Ewe wool growth				
Pregnancy*	6.7 ^a	10.3 ^b	12.1 ^c	9.5 ^b
Lactation*	6.0 ^a	11.2 ^b	13.3 ^c	11.4 ^b
Lamb survival [†]	70	67	82	65
Lamb live weight				
Birth	4.3 ^a	4.9 ^a	4.9 ^a	4.5 ^a
Four weeks**	7.2 ^a	13.4 ^b	12.5 ^b	13.2 ^b
Five months**	22.0 ^a	28.0 ^b	27.8 ^b	27.5 ^b
Lamb fleece weight at five months of age**	0.92 ^a	1.23 ^b	1.23 ^b	1.20 ^b

[†] Includes ewes with twins - all other data refer to ewes with single lambs or single lambs.

Different superscripts within rows denote significance ($P < 0.05$)*, ($P < 0.01$)**

DISCUSSION

Drought feeding of pregnant and lactating ewes requires that the level of nutrition is adequate to ensure survival of the ewe and lamb and to sustain growth rates which enable the lambs to attain live weights suitable for early weaning at four to six weeks of age. The plane of nutrition provided by the ad libitum feeding of oats supplemented with minerals and vitamins was marginal in these respects as the mean live weight of the ewes (35 kg) was only maintained at near the minimum level for survival (Clark 1977) and the liveweight gain of the lambs was below that required for them to attain the live weight (8-10 kg) considered necessary for early weaning (Clark 1977). In addition there appeared to be no evidence of compensatory growth when the lambs were run on irrigated perennial pasture as their mean live weights and fleece weights were still significantly lower at five months of age (Table 1). To this extent the effect was a permanent one similar to that observed by Schinckel and Short (1961) who found that the subsequent live weight and wool growth of Merino sheep can be affected by early post-natal nutritional differences. These results differ from that obtained by Hodge and Bogdanovic (1978) who found that although supplementation of oats (8.5% crude protein) with urea increased voluntary food intake of crossbred ewes during lactation the growth rate of single lambs was not improved. We consider that this disparity in results is mainly associated with differences in body condition of the ewes at parturition and thus in the availability of body reserves for milk production.

It is clear that the intake and performance of the ewes in this study were limited in the first instance by a deficiency of nitrogen. Provision of nitrogen as urea increased the mean voluntary intake of dry matter per ewe by 89% and this was associated with significant increases in liveweight gain of the ewes and lambs. Indeed the increase in liveweight gain of the lambs was such that their mean live weight at four weeks of age (13 kg) was well in excess of that required for weaning. Iso-nitrogenous supplements of protein as contained in the fishmeal-barley pellets or the lucerne chaff made no additional contribution to the liveweight gain of the lambs but the higher intake of the oat-lucerne chaff diet was reflected in the ewes gaining significantly more live weight during lactation.

The increase in intake of the oat-urea diet must have been associated with the provision of nitrogen to the rumen micro-organisms but the responses to the fishmeal and lucerne chaff could have been due also to the provision of other limiting nutrients and/or the supply of by-pass proteins. Certainly the increased wool growth of the ewes fed fishmeal suggests that a significant proportion of the protein escaped fermentation and may have promoted intake in a similar way to that observed by Kempton and Leng (1978). However if this effect did occur it substituted for rather than added to the increase in intake achieved by supplementing with urea.

The similar growth rates of the lambs raised by the ewes fed the oat-urea or oat-lucerne chaff rations suggest that the milk production of ewes fed oats is less influenced by the addition of roughage than is the case with wheat (Clements *et al.* 1979).

We conclude that the performance of lactating ewes fed oats during drought may be reduced to an unsatisfactory level by a deficiency of nitrogen and this can be alleviated as effectively with urea as it can by the provision of the proteins contained in fishmeal or lucerne chaff.

ACKNOWLEDGEMENTS

This work was carried out with funds provided by the Australian Wool Corporation. We thank Mr. R. Jardine, Biometrician, for assistance with the statistical analyses.

REFERENCES

- CLARK, A.R. (1977). "Drought management and feeding of sheep"
3rd ed. N.S.W. Dept. Agric. Bull. A. 264.
CLEMENTS, B.W., GLEESON, A.R. and NICHOLLS, P.J. (1979). Aust. J. Exp. Agric. Anim. Husb. 19: 419.
HODGE, R.W. and BOGDANOVIC, B. (1978). Proc. Aust. Soc. Anim. Prod. 12: 85.
KEMPTON, T.J. and LENG, R.A. (1978). Proc. Aust. Soc. Anim. Prod. 12: 131.
SCHINCKEL, V.G. and SHORT, B.F. (1961). Aust. J. Agric. Res. 12: 176.