THE EFFECT OF LIMESTONE ADDED TO OAT GRAIN ON THE GROWTH OF YOUNG SHEEP GRAZING WHEAT STUBBLE

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SUMMARY

Fifty Merino weaner sheep grazing on a wheat stubble at Wongan Hills were fed *ad lib.* either oat grain mixed with limestone (2% w/w) or just oat grain during the summer and autumn of 1985. The addition of limestone to the oat supplement increased the growth of the sheep from 39 g/day to 83 g/day ($P<0.001$) during the first 70 days of feeding. A summer thunderstorm resulted in a brief germination of pasture which preceded an increase in the consumption and utilization of the oats by the sheep not receiving limestone. In a trial conducted concurrently at Merredin, in which the sheep were fed a restricted amount of oats, there was no beneficial effect of adding limestone.

INTRODUCTION

Recommendations to correct calcium deficient diets by adding 2% finely ground limestone (Franklin 1948; Peet *et al.* 1984) are based on pen trials and there are no published reports showing that grazing sheep will respond to the addition of calcium.

In the wheat growing districts of Western Australia, sheep graze harvested crop residues from December until the following May. When the better quality feed has been eaten, cereal grains low in calcium are fed to maintain weight or promote growth for out-of-season markets. The calcium levels in wheat straw and oat grain (Leche *et al.* 1982) appear too low to meet the 0.44% DM recommended for young sheep (NRC 1975) or even the minimum dietary requirement of 0.18% of (Mitchell 1947). This paper reports the results of experiments in which 2% (w/w) finely ground limestone was added to oat grain and fed to young sheep grazing wheat stubble.

MATERIALS AND METHODS

The experiments were conducted during the summer of 1985 at Wongan Hills and at Merredin. At each site one hundred 6-8 month old Merino sheep were randomly allocated to one of two groups. One group was fed oats to which 2% limestone (w/w) was added while the other group received oats alone. The sheep, which grazed wheat stubble paddocks of approximately the same area, were alternated between the paddocks weekly to remove the effects of any variation in the quantity or quality of the stubble residue.

Oat supplementation started in early February and concluded in April. In the Wongan Hills trial the sheep had *ad lib.* access to the oats while at Merredin the sheep were fed a restricted ration which increased from 250 g/day to 450 g/day and finally 600 g/day at 21 day intervals.

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The limestone used in the experiments was feed grade containing 28% calcium with a particle size less than 70 um. It was mixed with the oat grain as the feeder bins were filled. The bins were cleaned out weekly and the residues weighed.

Wheat stubble and oat grain were analysed for calcium and phosphorus content by standard techniques. The sheep were weighed and blood samples collected for *serum* calcium analysis at regular intervals. After the termination of grazing at Wongan Hills the sheep were grazed together until shearing at which time they were shorn and the fleeces weighed.

In early March, at Wongan Hills, there was a germination of residual wheat grain, grasses and clover plants following a 30 mm fall of rain. The green herbage died off within ten days.

RESULTS

For the period of feeding from January to April the average growth rate of the sheep at Wongan Hills, which had *ad lib.* access to the oat supplement with limestone was 113 g/day compared with 76 g/day for the controls ($P<0.001$). The change in the live weight, graphed in Fig. 1, shows that prior to the rain in early March the addition of limestone to the oats increased the growth from 39 g/day to 83 g/day ($P<0.001$). During the six weeks following the germination the growth rate of the sheep fed limestone (143 g/day) was not significantly different from the 125 g/day of the control group ($P>0.05$).

The addition of limestone to the oats fed to the sheep at Merredin did not affect the growth rate which was 11 g/day and 10 g/day for the treatment and control groups respectively. The initial weights of these sheep were 37.0 kg and 36.2 kg.

The calcium and phosphorus contents of the wheat stubble from Wongan Hills *were* 0.14% and 0.05% from Merredin 0.15% and 0.03% while the oat grain fed was 0.1% and 0.26% and 0.15% and 0.22% respectively. The mean serum calcium levels in the Wongan Hills sheep receiving limestone was 2.5 mmol/l compared with 2.0 mmol/l, in the controls ($P<0.05$), just prior to the March germination. Two weeks after germination the serum calcium levels in the control sheep had increased to 2.3 mmol/l. At Merredin there were no differences in the *serum* calcium levels between the limestone group, 2.5 mmol/l, and the control group, 2.4 mmol/l, after two months of feeding.

In the period prior to the germination, grain intake by the sheep with *ad lib,* access to oats without limestone was 550 g/day compared with the intake of the Limestone group which was 700 g/day. Following the germination the intake of these groups rose to 900 g/day and 870 g/day respectively, The mean clean fleece weight of both groups of sheep in the Wongan Hills trial was 3.1 kg (s.e. $\pm$ 0.46).

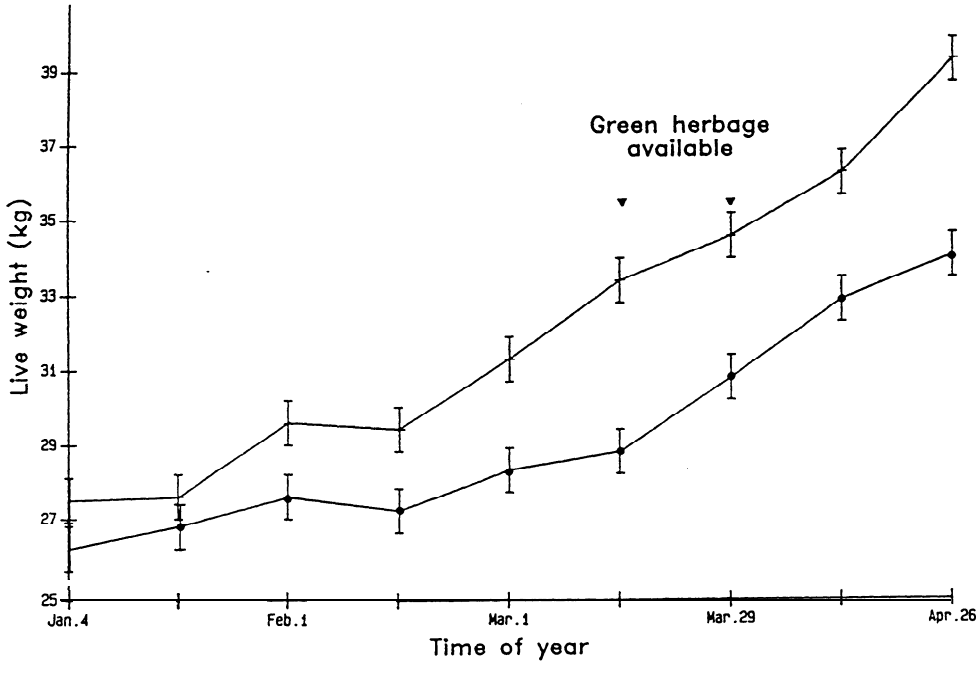

Fig. 1. Mean live weights of young sheep grazed on wheat stubble and given *ad lib.* access to an oat supplement either with (+---+) or without (●---●) the inclusion of 2% ground limestone

DISCUSSION

The results of these two trials reflect the variation in response to the addition of limestone to an oat supplement when fed to grazing sheep. This study identifies some of the factors which could affect the magnitude of the response.

Green herbage contains high levels of calcium (Leche *et al.* 1982), and even though it was *only* available for 10 days it clearly provided a boost to the calcium intake of the sheep along with other nutrients. In a trial in which they fed oats *ad lib.,* Suiter and Croker 1980 reported a similar growth and intake response following the availability of green feed.

The control group increased its consumption of oats relative to the limestone group following the rain and also showed an improvement in the efficiency of conversion of the oats to live weight from 12.1 to 7.5, Peet *et al. (1984)* reported a similar increase in the intake and efficiency of use of the oat grain when they fed limestone in pen studies with sheep. The oats in this study contained 0.07% calcium and 0.31% phosphorus.

In the trial at Merredin the serum calcium concentrations of the treatment and control groups were similar. This may have been due to both a higher-level of calcium in the oats and the ability of sheep to adapt to low intakes of calcium (Smith and St. Laurent 1970). Feeding the oats at restricted levels prevented the expression of any differences in appetite.

The results of these trials are confounded by the variation in the calcium content of the oats and the level of feeding. We therefore conclude that if *oats* with 0.1% or less calcium are fed *ad libitum* to young sheep grazing wheat stubble at a level sufficient for growth, the addition of 2% limestone will result in a more efficient utilization of the oats and a higher growth rate unless the sheep have access to some green herbage. However, the lack of response when limestone was added to oats with 1.5% calcium in our trials does no preclude a response if these oats had been fed at higher levels.

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