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EVALUATION OF A UREA-MOLASSES SUPPLEMENT FOR GRAZING CATTLE

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Summary

48 Hereford cattle (female) were grazed during the winter months on native pasture in the Northern Tableland region of New South Wales and given access to a mixture of urea (3% w/v) and molasses (10% w/v) in a roller drum. In the fifth week of supplementation, the quantity of mixture ingested by individual animals was determined by using an isotope labelling technique. During this week only, the supplement was labelled with tritiated water and the total quantity of radioactivity in the body was determined by assaying the radioactivity in blood water. For each individual, intake of mixture was calculated from the quantity of radioactivity that accumulated in the body as estimated after allowing for the losses of radioactivity due to water turnover in the body. Of the 48 animals 8 did not take measurable amounts of supplement and the other 40 animals consumed from 30 ml to 2.4 l/day. The linear relationship between liveweight change and intake of supplement suggests there was little or no response to urea, but the slight positive slope may have been due to the intake of energy in the molasses.

1. INTRODUCTION

In the Northern Tableland region of New South Wales it is often necessary for pastoralists to supplement livestock during the winter months in order to maintain a high stocking rate throughout the year.

Urea-molasses liquid supplements have been recommended and are being used increasingly, due in part to the advent of safer methods, such as the roller drum, for dispensing the materials. In the supplement, urea has usually been considered to be the important constituent and the molasses has been regarded mainly as an attractant, which implies that the pasture selected by the grazing animal is deficient primarily in crude protein. To be of benefit, the intake of such supplement must result in an increase of either the voluntary intake and/or the digestibility of the forage. Molasses which is usually regarded only as an attractant may provide small amounts of energy and also minerals such as sulphur and cobalt whose effects have often been ignored in evaluating responses.

There has been widespread use of NPN supplements (with molasses or grains) in the Northern Tablelands region. However, there is little evidence for an economic return from supplementation. Comprehensive trials made by the New South Wales Department of Agriculture near Glen Innes in 1971 indicated that there were no responses to NPN supplements in grazing sheep (P. McInnes and C. Davis - personal communication). Similarly in a grazing trial with sheep near Armidale in which intake of supplement was measured, liveweight loss during the winter was only slightly reduced in animals consuming a urea-molasses supplement; however, the response could be entirely attributed to the intake of the concentrate (molasses) part of the supplement (Nolan *et al*. 1974).

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In contrast to results from trials with sheep, there are suggestions that cattle may be more likely to respond to NPN supplements under grazing conditions, and economic responses to urea-molasses supplementation of cattle grazing pastures predominantly of spear-grass (Heteropogon spp.) have been demonstrated (Winks & Laing 1972).

In studies presented here the liveweight changes of cattle given access to a urea-molasses supplement during the winter of 1972 was investigated under grazing conditions similar to those of the above-mentioned trial with sheep in 1971.

II. MATERIALS AND METHODS

The study was made during August and September, 1972, on The University of New England's property "Kirby" Armidale, N.S.W. The experimental area of about 50 ha grew unimproved native pasture. At the start of the trial there was an abundance of dry standing pasture available. Supplementation was provided throughout the trial by allowing cattle continuous access to a roller-drum dispenser containing the supplement and placed near the main watering site.

Forty-eight heifers, aged 2 to 3 years, in the third trimester of pregnancy, 200-300 kg liveweight, were introduced into the experimental area on 23rd August, 1972. During the first week of the experiment a molasses mixture (approx. 0.25 kg/l) was given. During the second week urea was added to the mixture, and the concentration was gradually increased to that maintained for the remainder of the trial. The final mixture contained 70 g dry matter (59 g DOM) and 13.5 g urea-N per litre of water. The dry matter content and calorific value (16.6 kJ/g) of the liquid supplement were estimated as described previously.

Eighteen days after the animals were introduced into the experimental area, the estimates of intake of supplement were made as follows: at 10.00 h on day 1 tritiated water (TOH) was added to the mixture in the trough, so that the final concentration of radioactivity was 33 µCi/l. The cattle had free access for 7 days to radioactive supplement which was replenished and sampled daily. The tritiated mixture was washed from the trough at 11.30 h on the 7th day and was replaced by a similar non-radioactive supplement.

Blood samples were taken at a set time from a tail vein of each animal, the first one day, and the second five days after removal of the radioactive mixture. The blood samples were deep-frozen (-20°C) until analysed for radioactivity by methods described by Nolan et al. 1974.

The liveweights of the animals were recorded on three occasions during the five week experimental period.

The calculations of intake were made from a knowledge of the quantity of TOH in blood water and the rate of turnover of water (Nolan et al. 1974). For this calculation, the quantity of water in the body in litres was assumed to be 65% of the liveweight in kilograms and each animal was assumed to ingest one-seventh of its week's intake once each day.

III. RESULTS

Of the 48 cattle in the trial, 8 did not consume measurable quantities of supplement, while the intakes of mixture by the other animals ranged between 30 ml/d and 2.8 l/d.

The rate of liveweight change (g/d) was significantly ($p<0.05$) correlated with the intake of the supplement (see the figure).

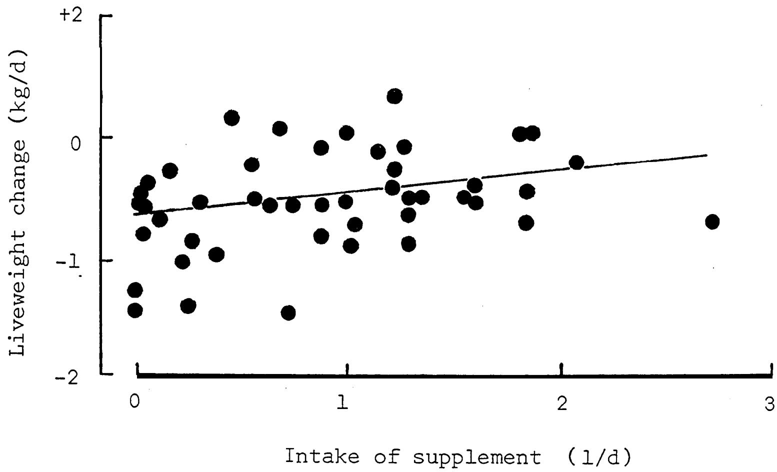

Figure. Relationship between liveweight change and intake of urea-molasses supplement by grazing cattle.

The regression equation (n = 48) was:-

$$W = -667 + 0.177\ (I) \quad (R^2 = 0.10;\ RSD = 387)$$

Where W = change in liveweight (g/d)
I = intake of supplement (ml/d)

IV. DISCUSSION

A major limitation to interpretation of data from grazing trials involving supplementary feeding is the lack of information concerning the quantity of supplement ingested by each animal. The technique used here with cattle was first used to measure the intake of urea-molasses mixtures by sheep. An important aspect of the technique is that it defines response curves (intake of supplement-liveweight change) with large numbers of animals. The errors about these regression curves are largely a function of the errors involved in estimating intake. These errors have been discussed by Nolan et al. (1974), but in brief the greatest error in estimation of intake occurs if animals consumed the total supplement once during the seven day period at the earliest or latest possible times. Such estimates would be approximately 30% higher or lower than the intake calculated assuming equal daily ingestions of the supplement. Since the animals were observed to visit the trough daily, the actual error, although it cannot be estimated, will be very much smaller. Other errors that may occur are due to variations in body water content of the animals but this again is small and if greater accuracy is required body water content could be estimated in subsequent studies.

From the regression analysis it is possible to differentiate between responses to various constituents of the supplements. These aspects have been discussed by Nolan et al. (1974) but the basis of the arguments is briefly restated here. For animals fed below maintenance, it is suggested that for grazing sheep or cattle 1.5 extra units of DOM as molasses could prevent one unit of liveweight loss, provided intake of pasture material was unaffected by supplementation. Any N in excess of that required to ferment the molasses, however, could potentially result in an increase in voluntary intake and/or an increase in digestibility of the pasture material. In this event it was suggested that an intake of 23 g N may be required to stimulate an extra intake of 1.5 kg of pasture DOM, thereby preventing 1 kg of liveweight loss. .

The energy as sugar in each litre of the urea-molasses misture used in the present trial (containing 60 g DOM and 13.5 g N per litre) could have prevented a liveweight loss of 42 g provided the intake from the pasture was unchanged by supplementation. If the additional N stimulated a maximum theoretical increase in DOM intake from the pasture (833 g) then 556 g liveweight could have been spared per litre of mixture consumed.

The relationship between intake of the mixture and the sparing of liveweight loss is shown in the figure. The regression, although significant, indicated that N provided in the supplement had little or no effect on liveweight change. This conclusion is similar to that arrived at the year before with sheep under similar conditions (Nolan et al. 1974). The trial reported here indicates that this supplement was of little benefit for cattle during the winter months in the New England region. It has been suggested that cattle are less able than sheep to select a diet of adequate N content, and thus may respond to NPN supplements under conditions in which sheep would not respond. However this is not indicated by the present trials.

Under the conditions of this experiment, it is likely that energy in the pasture was the first limitation to animal production rather than N, or any of the minerals contained in molasses (S, Co, Mn, Mg etc.), since these were available in the supplement. The slight positive slope of the regression (figure) was probably due mainly to intake of energy provided in the molasses.

V. ACKNOWLEDGEMENTS

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VI. REFERENCES

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