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LEVEL OF UREA FOR GRAZING YEARLING CATTLE DURING THE DRY SEASON IN TROPICAL QUEENSLAND

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Summary

In a grazing experiment with Brahman crossbred and Shorthorn cattle, three levels of urea, 26, 49 and 69 g/head/day, fed with 0.21 kg molasses/head/day, were compared with no supplement. The control group lost 0.01 kg/day over the 83 day feeding period, while supplemented groups gained 0.14, 0.19, and 0.23 kg/day, for the low, medium and high urea levels respectively. No significant differences in post-feeding growth rates were observed between treatment groups, and all treated groups were significantly heavier than controls 7 months after cessation of supplementation.

Urea supplementation in the previous dry season had no effect on response to the urea supplements.

Brahman crossbreds gained significantly faster than Shorthorns during the feeding period (0.10 v. 0.03 kg/day), but post-feeding gains were comparable in both breeds.

I. INTRODUCTION

Data on the seasonal performance of beef cattle on native pasture in northern Australia have been reported by Alexander and Chester (1956). Severe weight losses coincide with the period of low pasture quality in the winter-spring dry season. Supplementation of weaners grazing mature native pasture during the dry season with 0.25 kg molasses and 49 g urea has improved liveweight performance (Winks, Alexander, and Lynch 1970) and reduced mortalities. (Winks, unpublished). There is a paucity of information on the optimum level of urea to feed. Increased responses in dry matter intake and liveweight performance with higher levels of urea feeding have been shown in pen studies (Morris 1958; Ryley 196 1; Campling, Freer, and Balch 1962) and in the grazing situation (von La Chevallerie 1965).

This paper describes the results of a trial in which three levels of urea were offered in a molasses supplement to grazing yearling beef cattle during the period of low pasture quality.

II. MATERIALS AND METHODS

The experiment was carried out at the "Swan's Lagoon" Cattle Research Station, Millaroo, near Townsville. The climate and pastures have been described by Winks, Alexander, and Lynch (1970).

Yields of available pasture were determined by quadrats on September 2 and November 16, 1970. Material from 25 x 0.4 m^2 quadrats, randomly located along a diagonal in each paddock, was cut to ground level, oven dried and weighed, and treatment mean yields calculated.

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A draft of F1 Brahman-Shorthorn and Shorthorn cattle aged 19 months was randomized on the basis of sex, breed and previous treatment to eight groups each containing 4 crossbred heifers, 2 crossbred steers, 4 Shorthorn heifers and 2 Shorthorn steers. Half of each sub-group had received a molasses-urea supplement in the 1969 dry season. These groups were randomly allocated to two replicates of the following treatments: no supplement; molasses (0.23 kg/head/day) plus urea (28 g/head/day) supplement; molasses (0.23 kg/head/day) plus urea (56 g/head/day) supplement; and molasses (0.23 kg/head/day) plus urea (84 g/head/day) supplement. Supplements were fed through roller-lick feeders (Mutch 1966). The water content of the mixture was adjusted at twice-weekly intervals in an endeavour to maintain the predetermined levels of intake. A stocking rate of 1 beast/2.7 ha was employed.

During the experimental period, July 27 to October 12, 1970, and the post-feeding period until May 13, 197 1, liveweights were measured at four-weekly intervals using a standardized procedure of mustering and weighing. Initial and final weights were the mean of weighings on three consecutive days.

Bulked faecal samples were collected from the control group at four-weekly intervals and analyzed for faecal nitrogen and phosphorus (Moir 1960).

A covariance analysis of a balanced factorial design was used.

III. RESULTS

The yields of available pasture dry matter determined on September 2 were comparable for all groups ranging from 732-983 kg/ha D.M. At the final sampling on November 16, yields of available fodder were of the same order being 766-944 kg/ha D.M.

Consumption of supplements was below the desired level being 0.21 kg molasses/head/day for all groups and 26, 49 and 69 g urea/head/day for the low, medium and high level of urea groups, respectively. The protein and phosphorus levels in the dry matter faeces of the control group declined from 7.5 per cent to 5.8 per cent protein and from 0.18 per cent to 0.13 per cent phosphorus during the feeding period.

During the feeding period, all groups receiving urea gained significantly more liveweight than the control group ($P < 0.01$), and the highest urea level supported higher gains than the lowest level ($P < 0.01$) (Table 1). Within the Brahman crossbreds, there were no significant differences in the gains of the groups receiving the different urea levels, but in Shorthorns, gains with the high urea level were greater than with the medium ($P < 0.05$) and the low level ($P < 0.01$), with no difference between these two rates. Brahman crossbreds made significantly greater gains than did Shorthorns ($P < 0.01$). Treatment during the 1969 dry season had no effect on rate of gain.

Post-feeding performance was assessed 2, 4, and 7 months post-feeding, and, in all cases, there were no significant differences in the gains of the various groups. Final liveweights, 7 months after feeding ceased, were lower in the control group than in the low ($P < 0.05$), medium and high urea groups ($P < 0.01$). There was no effect of breed or 1969 dry season treatment on post-feeding growth rate. Brahmans were significantly heavier than Shorthorns ($P < 0.01$) at the end of the period, and animals which received no urea in 1969 were heavier in May 197 1 than those which had received urea ($P < 0.05$).

TABLE 1

Weight changes of cattle during the feeding and post-feeding periods

Treatments	Initial liveweight 27.vii.70	Mean weight changes* (kg/day) Feeding period 83 d.	Post-feeding period 2 mo.	Post-feeding period 7 mo.	Final liveweight 12.v.71
BRAHMAN CROSS					
Pasture	252.9	—0.045	0.883	0.731	404.1
Pasture + molasses + 28 g urea	247.4	0.250	0.754	0.712	419.1
Pasture + molasses + 56 g urea	248.9	0.286	0.791	0.717	424.6
Pasture + molasses + 84 g urea	251.0	0.299	0.800	0.711	426.5
SHORTHORN					
Pasture	246.3	—0.068	0.887	0.687	386.3
Pasture Molasses + 28 g urea	249.9	0.060	0.841	0.676	398.2
Pasture + Molasses + 56 g urea	250.6	0.098	0.830	0.651	396.7
Pasture + molasses + 84 g urea	250.8	0.169	0.764	0.666	406.0
STANDARD ERROR OF MEAN		0.028	0.054	0.029	6.34
Brahman	248.1	0.220	0.807	0.718	418.6
Shorthorn	254.8	0.065	0.830	0.670	396.8
STANDARD ERROR OF MEAN		0.018	0.038	0.021	4.21
No urea 1969	249.0	0.145	0.829	0.710	411.6
Urea 1969	260.3	0.140	0.808	0.677	403.8
STANDARD ERROR OF MEAN		0.012	0.023	0.012	2.72

* Weight changes are all corrected for initial weight, in the case of the feeding period for initial weight at 27.vii.70, and in the case of the post-feeding period for the weight at the commencement of that period at 12.x.70.

IV. DISCUSSION

Control animals virtually maintained liveweight during the feeding period. Faecal protein levels indicated that animals were selecting a maintenance diet initially, but that this had deteriorated to a sub-maintenance level towards the end of the feeding period (Moir 1960).

The liveweight responses to urea and molasses were similar to those reported by Winks, Alexander, and Lynch (1970). Responses per unit of urea fed diminished as the level of urea fed increased, approximately 68 per cent of. the response occurring with the first 26 g. Morris (1958), Ryley (196 1), Campling, Freer, and Balch (1962), and Lesch and Pieterse (1966) recorded similar findings with intake of dry matter, with declining increases in intake where increasing levels of urea were fed.

Breed of animal was important in evaluating the supplements. The differences in responses between breeds may be related to the rates of gain obtained. Alexander, Sullivan, and Stokoe (1970) postulated that a maximum level of performance exists in cattle grazing native pasture above which the provision of a supplement cannot be expected to confer a weight advantage. They suggested that this level of gain fell between 0.15 and 0.50 kg/day. The results from this study would seem to be in agreement with this hypothesis.

The failure of animals receiving urea for the second time to show superior responses during the dry season indicates that previous history did not affect the response to the supplement. Animals which received urea in both years were significantly heavier by 16 kg at the final weighing than animals which received no supplement in either year.

The relatively good dry season performance of the control group should have been conducive to high levels of compensatory growth (McDonald 1968; Alexander, Daly, and Burns 1970), but compensatory growth did not occur. At Katherine, compensatory gain was observed only in cattle where body frame growth was virtually completed (Norman 1967), but previous findings at "Swan's Lagoon" (Winks, Alexander, and Lynch 1970; Winks, unpublished) are at variance with this concept.

The superior liveweight performance of the Brahman crossbreds agrees with other breed comparisons in the tropical regions of Australia (Mawson 1956; Dowling 1960; Norman 1967). The superiority of the crossbreds occurred mainly in the dry season; in contrast to the findings of the above workers where the major differences occurred in the wet season.

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VI. REFERENCES

Alexander, G. I. and Chester, R. D. (1956). *Queensland Journal of Agricultural Science,* **13:** 69.

Alexander, G. I., Daly, J. J., and Burns, M. A. (1970). *Proceedings of the Eleventh International Grassland Congress,* 793.

Alexander, G. I., Sullivan, J. J., and Stokoe, Mrs. J. (1970). *Proceedings of the Australian Society of Animal Production,* 8: 45.

Campling, R. C., Freer, M., and Balch, C. C. (1962). *British Journal of Nutrition,* **16:** 115.

Dowling, D. F. (1960). *Proceedings of the Australian Society of Animal Production,* 3: 184.

Lesch, S. F., and Pieterse, P. J. S. (1966). *South African Journal of Agricultural Science,* 9: 881.

Mawson, W. F. (1956). *Queensland Agricultural Journal,* **82:** 173.

McDonald, I. W. (1968). *Nutrition Abstracts and Reviews,* 38: 381.

Moir, K. W. (1960). *Queensland Journal of Agricultural Science,* **17:** 361.

Morris, J. G. (1958). *Queensland Journal of Agricultural Science,* **15:** 181.

Mutch, C. B. (1966). *Queensland Agricultural Journal,* 92: 630.

Norman, M. J. T. (1967). *Australian Journal of Experimental Agriculture. Animal Husbandry,* 7: 217.

Ryley, J. W. (1961). *Queensland Journal of Agricultural Science,* **18:** 409.

von La Chevallerie, M. K. S. L. (1965). *Proceedings of the South African Society of Animal Production,* 4: 120.

Winks, L., Alexander, G. I., and Lynch, D. (1970). *Proceedings of the Australian Society of Animal Production,* 8: 34.