

SUPPLEMENTATION TO REDUCE LACTATIONAL ANOESTRUS IN FIRST-CALF  
HEIFERS GRAZING NATIVE PASTURES IN THE SUBTROPICS

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SUMMARY

Thirty, 3-4 years old Hereford heifers suckling their first calf were offered supplements of either cottonseed meal or a molasses-cottonseed meal-mineral mix, over 100 days from late winter to early summer (period 1) and 63 days in late summer (period 2) whilst grazing native pastures in a subtropical area. Brahman bulls were placed with heifers for nine weeks in each supplementation period and were rotated among paddocks every three weeks during the mating periods.

Cottonseed meal-supplemented heifers were 40 kg heavier ( $P < 0.05$ ) than non-supplemented heifers at the end of both the first and second periods. From the two joining periods, 60% of cottonseed meal-supplemented heifers were pregnant compared with 20% in the molasses-mix and 10% in the non-supplemented groups, respectively. Calves weaned were heavier (137 kg;  $P < 0.01$ ) from cottonseed meal-supplemented heifers than from non supplemented heifers (105 kg) but were not significantly heavier than calves weaned from the molasses-mix supplemented heifers (126 kg). The results show the practical benefits of protein meal supplements for young lactating heifers grazing native grass pastures during winter and early summer in the subtropics. (Keywords: Heifers, lactation, cottonseed meal, molasses, pregnancy).

INTRODUCTION

The north coast of New South Wales is an important beef cattle area containing approximately 20% of the N.S.W. herd. However, production, both per animal and per hectare, is low because cattle typically graze native or unfertilised grass dominant pastures which have a low nutritive value. Nutrition is lowest during winter and this condition often extends into early summer (November-December) when storm rains usually initiate new season plant growth. In some years, a summer drought occurs which extends into February, the month of highest expected rainfall. In spite of the low quality of the pastures during late winter-early summer, most beef herds are managed to calve between July-November, the timing of which makes it difficult for young cows to continue lactation, maintain their live weight, and commence oestrus prior to remating.

Protein meal supplementation of heifers and cows has increased substantially their production at grazing (Hennessy 1983), and maintenance of their live weight and milk output in pen studies (Lee et al. 1985). However, many graziers believe there is an important role in the subtropics for the low cost, low nitrogen supplement, molasses.

The objective of the experiment reported here was to compare the effectiveness of supplements of either cottonseed meal or a molasses mix, with cottonseed meal, as simple management activities for improving conception rates of heifers suckling their first calf.

MATERIALS AND METHODS

Animals and pastures

Thirty Hereford first calf heifers, (3-4 years old;  $275 \pm 15$  kg live weight) with their first calves (Angus x Hereford;  $15 \pm 8$  days old) were obtained from a

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property situated on native pastures similar to the experimental site. The heifers and their calves were allocated at random into six groups over which three supplementation treatments were applied. Groups were allocated to paddocks on a native pasture site at a stocking rate of 1 heifer/2 ha. The pasture consisted predominantly (70%) of carpet grass (*Axonopus affinis*), with incursions of blady grass (*Imperata cylindrica*) and lesser contributions from sedges (*Cyperus* spp.) and native grasses (e.g. *Dicanthium*, *Andropogon* and *Digitaria* spp.).

#### Treatments and feeding regimen

There were three treatments a) nil supplement; b) molasses mix (85% w/w molasses, 12.3% cottonseed meal, 1.7% urea and 1.7% monoammonium phosphate) and c) cottonseed meal. Supplements were offered twice-a-week in open troughs equivalent to a daily rate of 1.86 kg/heifer for the molasses mix and 1.5 kg/heifer for cottonseed meal. The estimated daily intakes by heifers of metabolisable energy (MJ) and nitrogen (g) from the supplements were 17 and 50 respectively from the molasses mix and 15 and 90 from the cottonseed meal supplement.

#### Management and recordings

Heifers and calves grazed native pastures on the experimental site from September to May (230 days) and were weighed c. each 30 days. When calves were a mean of 50 days of age their milk consumption was estimated by a weigh-suckle-weigh technique, following periods of separation from their dam. Heifers were supplemented for 100 days from September into December and for 63 days from February into April. Pasture samples were taken on four occasions and analysed for nitrogen (Kjeldahl technique, using a Se catalyst) and digestibility (in vitro technique, Alexander and McGowan 1961). Bulls were placed in with heifers for c. 63 days in each supplementation period and pregnancies determined after both periods by an ultrascan imagery (Vetscan®) (BCF Technology, Scotland). Pregnancy can be detected with assurance after day 28 from implantation (D. Fowler pers. comm.).

### RESULTS

Cottonseed meal supplements significantly ( $P < 0.05$ ) increased live weight of heifers by the end of 100 days supplementation in early summer, and maintained their advantage through the second period (Table 1). During this period, molasses-mix supplemented heifers had a faster albeit non-significant gain than heifers in the other groups. The pregnancy rate was significantly higher ( $P < 0.01$ ) in cottonseed meal-supplemented heifers than for other heifers (Table 1).

Table 1 Live weight of heifers (kg) and the proportion pregnant (%) at the end of each supplementation period for each treatment group

	Live weight		Pregnancy	
	Period 1 (Dec.)	Period 2 (Apr.)	Period 1 (Dec.)	Period 2 (Apr.)
Control	291 <sup>a</sup>	302 <sup>a</sup>	0	10 <sup>a</sup>
Mol-supplement	310 <sup>b</sup>	332 <sup>b</sup>	0	20 <sup>a</sup>
CSM-supplement	331 <sup>b</sup>	343 <sup>b</sup>	10	60 <sup>b</sup>
SE of difference	18*	22*	-	10**

Column means with unlike superscripts differ significantly, \*  $P < 0.05$ , \*\*  $P < 0.01$

Over all groups, the mean live weight of pregnant heifers at the end of period 1 was 332 kg compared with 323 kg for non-pregnant. Within the cottonseed meal-supplemented group, the live weights of pregnant (343 kg), and non-pregnant heifers (345 kg), were similar but in the molasses-mix supplemented group, non-pregnant heifers were heavier (334 kg) than the pregnant heifers (324 kg). When pregnancy was assessed (26 April), the foetuses in molasses-mix supplemented heifers were aged at 60 days compared with 49 days for the foetuses in cottonseed meal supplemented heifers that conceived during period 2.

The low nitrogen contents and estimated digestibility of the pasture samples (Table 2) indicate the potentially low nutritive value of the native pasture. This was noticeable for January to mid February when temperatures were high, little rain was recorded (50 mm) and heifers in all groups lost weight.

Table 2 Nitrogen content and estimated digestibility of pasture samples

	September	November	January	February
N content (g/kg DM)	8	8.2	7.4	6.8
Digestibility	48	52	54	47

Supplementation of heifers increased ( $P < 0.05$ ) the growth rate of their calves up to weaning; calves weaned (at 200 days) from cottonseed meal-supplemented heifers were heavier than those weaned from non-supplemented heifers ( $137$  v  $105 \pm 11$  kg) but were not different from those weaned from molasses-supplemented heifers (126 kg). These differences reflected differences in milk consumption. At  $50 \pm 10$  days of age, calves from cottonseed meal-supplemented heifers consumed  $2.7 \pm 0.7$  kg milk/d, which was greater ( $P < 0.05$ ) than  $2.0 \pm 0.6$  kg/d consumed by calves on molasses-supplemented heifers, or  $1.2 \pm 0.3$  kg/d by calves on non-supplemented heifers.

#### DISCUSSION

Only 10% of the lactating heifers when grazing native pastures without supplementation became pregnant during two joining periods, each of nine weeks. This highlights the difficulty faced by graziers in breaking the lactational anoestrus of breeders on native subtropical pastures and points to the first-calf heifers as a group most affecting the profitability of the cattle breeding enterprise: In contrast, supplementation with cottonseed meal increased heifer live weight and resulted in 60% of the heifers conceiving within two joining periods extending over 18-weeks. The live weight response by heifers to supplementation with a molasses-cottonseed meal mix was less pronounced than to cottonseed meal alone, but at the end of supplementation there was no significant difference between these two groups in their live weights. Barr and Burns (1972) also reported higher pregnancy rates in heifers supplemented with cottonseed meal than supplemented with urea-molasses (25% w/w) when grazing a low quality pasture in the subtropics.

In general, the relationship between live weight and reconception confirms a finding in the district that lactating Hereford heifers should not be less than 337 kg live weight to facilitate pregnancy (Sparke and Lamond 1968). There was no significant difference between the mean live weights of molasses-mix and cottonseed meal supplemented heifers. However, there was a large difference between groups in pregnancy rate, in favour of cottonseed meal supplemented heifers. This suggests an additional beneficial effect of cottonseed meal in directly enhancing fertility of cattle, which was independent of the effect on live weight. This may have resulted from the action of amino acids on the neuro-endocrine system

(Ferguson 1975) or to changes in fermentation, following cottonseed meal-supplementation, in which increases in the proportion of propionate and branched-chain fatty acids in the absorbed end-products altered the oestrus cycle to favour conception (Randell 1982). These aspects require further study to elucidate the nature of the response. Nonetheless, supplementation of first-calf heifers with cottonseed meal is a simple husbandry practice which can markedly increase their pregnancy rate when they are mated under unfavourable nutritional conditions. At present day prices, the potential cost of an extra calf due to cottonseed meal supplementation, less the increased value of the suckled calves, was \$84 compared with a cost of \$272 per calf for molasses mix-supplementation.

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#### REFERENCES

- ALEXANDER, R.H. and McGOWAN, M. (1961). J. Br. Grassl. Soc. 16: 275.
- BARR, N.C.E. and BURNS, M.A. (1972). Proc. Aust. Soc. Anim. Prod. 9: 159.
- FERGUSON, K.G. (1975). In "Digestion and Metabolism in the Ruminant", p.448, editors I.W. McDonald and A.C.I. Warner, (U.N.E. Publ. Unit: Armidale).
- HENNESSY, D.W. (1983). S. Afr. J. Anim. Sci. 13: 9.
- LEE, G.J., HENNESSY, D.W., WILLIAMSON, P.J., NOLAN, J.V., KEMPTON, T.J. and LENG, R.A. (1985). Aust. J. Agric. Res. (in press).
- RANDELL, R.D. (1982). Tech. Rep. No. 82-1, Texas A. and M. University, Overton, U.S.A.
- SPARKE, E.J. and LAMOND, D.L. (1968). Aust. J. Exp. Agric. Anim. Husb. 8: 425.