SUPPLEMENTATION TO INCREASE FERTILITY OF BEEF COWS IN A DROUGHT

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Summary

Eighty Hereford and Brahman cross cows which calved in June and August 1970 during a drought period, and which had a mean liveweight of 270 kg, were supplemented with either 1.36 kg cottonseed meal daily for 62 days commencing September 2, or 55 g of urea and 220 g of molasses for the same period. The latter is a standard low-level supplementation used in the Queensland beef industry (Bums 1971).

Examinations were made for ovarian activity on November 3 (at cessation of feeding), on January 26 (approximately nine weeks after seasonal rains commenced), and on May 19. The cows were exposed to bulls from commencement of feeding to March 31.

In November there were significant effects (P < 0.01) on liveweight and condition score in favour of cottonseed meal supplementation (CSM) compared with the urea-molasses group (controls). In January faster weight gain in controls had removed these differences.

Ovarian activity was significantly greater (P < 0.01) in the CSM group in November, and in January difference in ovarian activity still approached significance (P = 0.063).

Pregnancy rate at the end of the mating season was higher in the CSM group, 77 per cent compared with 46 per cent in controls (P = 0.012).

Liveweights in September, November and January were significantly related to ovarian activity and final pregnancy rate, independent of treatments.

I. INTRODUCTION

The Queensland beef industry is subject to periodic droughts as a result of partial failure of the normal summer and autumn rains. In drought, reproductive performance of breeding cattle is reduced, and the level of mortalities is increased (Churchward 1965; Plasto and Strachan 1970).

Nitrogen and energy supplements fed at low levels have had beneficial but marginal effects on reproductive performance of beef cattle (Barr 1971). The object of this trial was to test the effect on reproduction of a short period with a higher level of supplementation at a strategic time in relation to the mating season.

II. MATERIALS AND METHODS

In the winter of 1970, Herefords and Brahman Hereford cross cows on a property in the Brisbane Valley were calving in poor condition as a result of prolonged drought conditions. A quantity of low quality dry spear grass (Hetero-
*Pogon contortus*) was available in paddocks, and cows were rapidly losing weight in early lactation.

On September 1 a group of 80 breeding cattle (74 Hereford and 6 Brahman Hereford cross) were allocated on the basis of calving date to two groups of 40 head. Fifty-two of these cattle had calved in June and 26 in August*, those calving in June being mature, while those in August were cows calving for the first time. The groups were weighed (fasted liveweight), scored for condition on a scale from \( \phi \) to 9, and placed in similar paddocks which had been spelled for some time and had a light cover of mature spear grass. The condition scoring system used was that incorporated in the National Performance Recording scheme for beef cattle based on a scale of \( \phi \) to 9, with \( \phi \) emaciated, 1 poor, 3 backward store, 4 store, 5 forward store, 6 fat, 7 fat prime, 9 overfat, with interpolation between grades. All condition scoring was done by one of us (M.A.B.), and this author is experienced in the use of condition scoring as a technique.

Stocking rate was approximately 1 cow and calf/4 ha. One high grade Brahman bull was added to each group. Oestrus indicators were attached to cows, and observations made every second day for triggered indicators.

One group (CSM) was supplemented with 1.36 kg/d of cottonseed meal fed in open troughs on every second day, while the other (controls) received survival supplementation, 55 g of urea in 220 g of molasses per day fed through standard roller drums (Burns 1971).

On October 7 all cows with triggered indicators were examined and classed as anoestrus or cycling by per rectum examination. A number of indicators were marked by contact with shrubs and gave false positives, and their use was then discontinued.

Cattle accepted both supplements readily during the feeding period of 62 days (September 2-November 2). They were weighed on November 3 (fasted liveweight), scored for condition, and examined per rectum and graded as anoestrus, cycling or pregnant. The criteria for anoestrus were small size and complete lack of tone of the uterus, with small, apparently inactive ovaries, and no palpable evidence of corpus luteum or follicle. Cycling cattle were identified by size and tone of the uterus and the presence of a corpus luteum or follicle in either of the ovaries. The presence of good uterine tone alone would have been sufficient to place an animal in the cycling category, but ovarian activity was almost invariably present as well.

A pregnancy assessed at 6 weeks or more was regarded as positive. Cattle assessed as pregnant under six weeks were classed as cycling, unless the pregnancy was confirmed at a subsequent examination. There were 14 such pregnancies, and 10 were subsequently confirmed and were included as pregnant both for the first time of observation and in the final result, and, in addition, for the calculation of month of conception. Cattle classed as cycling or pregnant were considered to be reproductively active. Month of conception was calculated from assessed foetal age at first positive diagnosis. Similar examinations were made on January 26 and on May 5.

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*Two cows calved in September omitted from liveweight analyses.
†Kamar detectors, Kamar Inc. Pty. Ltd., Steamboat Springs, Colorado, U.S.
Per rectum examinations were carried out by one of us (N.C.E.B.) who is experienced in its use, and has used the technique with similar numbers of cattle (80) subsequently slaughtered and examined with no errors recorded in detection of pregnancy.

The authors have worked as a team for a period of 7 years using these methods. Assessments are made independently There was no bias, since a favourable response from the urea-molasses treatment would have been an equally desired result.

After cessation of supplementation on November 3 the groups were allocated to the general herd which was then being mated. Mating continued until March 31.

Heavy rain was received in November and an extremely wet season continued until March.

Numbers of cattle varied at different observations. One cow in the CSM group was suspected of having pyometron on November 3. This was confirmed on January 26 and the cow was withdrawn. Two cows in the control group died from apparent malnutrition. At each observation some cows were missing because of incomplete musters. The numbers of effective cattle at each observation were as follow: November 3, CSM 36, Controls 37; January 26, CSM 39, Controls 32; May 19, CSM 39, Controls 35.

Liveweights and condition scores were analysed by analysis of variance with co-variance adjustment for initial weight. Reproductive data were tested by the chi-square method.

III. RESULTS

The mean liveweight, condition and reproductive activity of the CSM group were higher than those of the controls at the end of the supplementation period on November 3 (Table 1), but these differences had largely disappeared by January 26.

TABLE 1

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Group</th>
<th>Date of observation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>September 2</td>
</tr>
<tr>
<td>Liveweight (kg)</td>
<td>Control</td>
<td>265</td>
</tr>
<tr>
<td></td>
<td>CSM</td>
<td>275</td>
</tr>
<tr>
<td>Condition score</td>
<td>Control</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>CSM</td>
<td>3.1</td>
</tr>
<tr>
<td>Reproductively active (%)</td>
<td>Control</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>CSM</td>
<td>—</td>
</tr>
<tr>
<td>Detection of pregnancy (%)</td>
<td>Control</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>CSM</td>
<td>—</td>
</tr>
</tbody>
</table>

**P < 0.01  *P < 0.05  ?P = 0.063
Cows that had calved in June showed more reproductive activity on November 3 than the controls and any of the cows that calved in August. By January 26, 89 per cent and 100 per cent of June calving cows were either recycling or pregnant in the control and CSM groups respectively, compared with 23 per cent and 65 per cent (difference significant at 1 per cent level) respectively in the August calving cows. The younger cattle which calved in August had the worst performance with 7 per cent pregnant in the control group and 50 per cent pregnant in CSM (P < 0.05).

Time of conception was related neither to treatment nor to the month of calving.

Since it appeared that liveweight was a significant factor in the events of the trial, data were analysed for the relation between liveweights and ovarian activity and pregnancy, irrespective of treatment (Table 2).

IV. DISCUSSION

Improvement in reproductive performance in the CSM group was clearly evident at cessation of supplementation in November. However, most conceptions did not occur until about six weeks after supplementation ceased. At the examination in January there was no significant difference in detectable pregnancies between the groups, although a considerable proportion of the CSM group must have been in very early pregnancy at that time. It appears that on withdrawal of supplementation, the CSM group tended to lapse into anoestrus until rain again improved nutrition.

From Table 2, the liveweight of cows at time of withdrawal of supplementation on November 3 was a factor in final pregnancy rate (P < 0.01). From this it appears that the major effect of the CSM supplementation was to put more cows above a critical liveweight at that time. The mean liveweight of the CSM group on November 3 (270 kg) more closely approached the mean liveweight of 280 kg for cows at that weighing which eventually conceived (Table 2).

Following rain, the control group made up deficiencies in weight and condition, and reduced the differences in reproductive activity, but it is evident that a higher proportion of cows recorded as-cycling eventually became pregnant in the CSM group. Considering only mature cows, 96 per cent of cattle cycling on January 26 became pregnant in the CSM group, compared with 80 per cent of similar cattle in controls.

In younger cattle, 77 per cent of cycling cattle conceived in the CSM group compared with 31 per cent in controls. There appears to be evidence here of a stress effect on conception, as distinct from ovarian activity, similar to that recorded by McClure (1970) and Plasto and Hall (1970) in conditions of restricted feed intake.

The major effect of liveweight is recorded in Table 2 and it is evident, in particular, that the effect of initial liveweight in September influenced final pregnancy rate, even though both groups of cows had gained considerable weight by January and mating was continued until the end of March. There were more young cattle with low liveweights.
<table>
<thead>
<tr>
<th>Date weighed</th>
<th>November 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anoestrous</td>
<td>Cycling</td>
</tr>
<tr>
<td>September 1</td>
<td>263 (45)</td>
<td>275 (23)</td>
</tr>
<tr>
<td>November 3</td>
<td>249* (47)</td>
<td>276b (23)</td>
</tr>
<tr>
<td>January 26</td>
<td>257a (18)</td>
<td>304e (28)</td>
</tr>
</tbody>
</table>

Results followed by letter a differ from those followed by letters b or c (P < 0.01 and P < 0.05 respectively) for a particular observation. Numbers of cattle on each observation date are shown in brackets.
It would appear that a logical step in breeding herd management in this environment is to aim at adequate weight at parturition, rather than to rely on supplementation to make up deficiencies in this parameter as suggested by Lamond (1970).

Factors such as earlier weaning before the winter stress period to maintain condition and weight in cows, and selection of mating periods to ensure that cows calve in good condition are supported by these liveweight and reproductive relationships.

V. ACKNOWLEDGMENTS

It is desired to acknowledge the assistance and facilities provided by Mr. B. Charlton, and the advice of Mr. B. A. Woolcock in this work. Thanks are due to Mr. T. Swain for statistical analysis.

VI. REFERENCES