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FACTORS AFFECTING THE MILK YIELD OF BEEF COWS IN NORTHERN QUEENSLAND

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Summary

A grazing experiment is reported in which the effects of breed, pasture type and supplement on milk yield of beef cows were studied. Brahman crossbred cows outyielded Shorthorn cows on both native pasture and a mixed sward of native pasture and Townsville stylo ***(Stylosanthes*** *humilis* H.B.K.) during the wet season, and on native pasture during the dry season. Groups receiving molasses plus urea in the dry season had higher milk yields at this time. The feeding of phosphorus in both the wet season and dry season increased milk yield during the wet season.

I. INTRODUCTION

Variations in milk consumption account for a significant proportion of the variation in growth rate of beef calves (Neville 1962).

Arbuckle (1959) published the first report of milk production of grazing beef cows in Queensland. Since then further studies have compared the effects of breeds (Stubbs 1962) and various supplementary feeding treatments (Ryley 196 1) on milk production and calf growth rate.

'The use of Brahman cattle for crossbreeding with British bred animals (Norman 1967), the increasing use of Townsville stylo (*Stylosanthes humilis* H.B.K.) (Winks and Lamberth 1968), and more extensive feeding of protein, non-protein-nitrogen (N.P.N.) and phosphorus supplements (Norman 1957, 1963; Winks, Alexander and Lynch 1970) are all playing a part in increasing beef production in northern Australia.

*This paper reports the effects of these factors on milk production of beef cows in a northern Queensland research station herd.

II. EXPERIMENTAL TREATMENTS

The experiment was conducted at "Swan's Lagoon" Cattle Research Station, Millaroo, near Townsville. Alexander (1968) described the property and Christian and Slatyer (1953) the climate and vegetation of the region, which has a hot, humid wet season of four to five months from December to April, followed by a cooler dry season.

The trial was stocked with 120 Shorthorn and 120 Brahman crossbred (approximately ½ Brahman and ½ British breed) heifers aged from two to three years. Two pastures were used; (i) native pasture stocked at one beast per 4.86 ha and (ii) a mixed sward of native pasture and Townsville stylo (*Stylosanthes humilis* H.B.K.) stocked at one beast per 2.43 ha and fertilised with 126 kg/ha superphosphate annually.

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The supplements fed were molasses (0.23 kg/head/day), urea (57 g/head/day) and phosphoric acid*, (28.5 g/head/day). The sequence of supplementation is shown in Table 1.

TABLE 1

Supplementation treatments

Group	Wet season	Dry season
I	No supplement	No supplement
II	Molasses	Molasses
III	Molasses + phosphoric acid	Molasses
IV	Molasses	Molasses + urea
V	Molasses + phosphoric acid	Molasses + urea
VI	Molasses	Molasses + phosphoric acid + urea

III. EXPERIMENTAL PROCEDURE

On March 16, 1970 the heifers were blocked on breed, property of origin, Iiveweight and stage of pregnancy, and allocated to a 2 x 2 x 6 factorial design. Each cell contained eight pregnant and two non-pregnant heifers. During the calving season from May 25 to November 11, 1970, animals were inspected thrice weekly, calves were individually identified and their birth weights recorded. Calves were weaned on January 20 and March 17, 1971 when the mean age of each group was six months.

Supplements were fed twice weekly with water in roller drum lick feeders (Mutch 1966). Dry season supplementation extended from June 1 to November 13, 1970, and wet season supplements were fed from November 23, 1970 to May 24, 197 1. Between October 8 and October 29, 1970 all cattle on the Townsville stylo pastures received a survival supplement (Anon. 1969) in place of the dry season supplements.

Milk production was measured at 28 day intervals by weighing calves before and after suckling twice during a 24 h period (Neville *loc. cit.).* At these observations bulk faecal samples were collected from the four control groups and analysed for faecal protein, phosphate and ash contents (Moir 1960).

Yields of available pasture were measured on April 1 and November 25, 1970 from 25, 0.4 m^2 quadrats randomly distributed along a diagonal traverse of each paddock. Cattle had access to these areas at all times. Pasture was cut to ground level, sorted into native species and Townsville stylo, oven dried and weighed.

Analysis of variance of a balanced factorial design was carried out using the means of five observations in each period, and the sums of squares between treatments were partitioned to test for treatment effects. A log (base 10) transformation was used for the analysis of variance of pasture yields.

*Commercial black phosphoric acid 63% H_3PO_4.

IV. RESULTS

The results summarised in Table 2 show significant breed differences in the wet season, overall responses to supplementation in both wet and dry seasons; and individual responses to urea in the dry season, phosphorus fed in the wet season and a wet season response to phosphorus fed in the previous dry season.

TABLE 2

***Mean 24 h milk yields (kg) during two periods of supplementation*†**

Variate	Dry season 2.vii.70-22.x.70	Wet season 19.xi.70-17.iii.71
Pasture		
(i) Native pasture	3.33	4.36
(ii) Townsville stylo/N.P.	3.33	4.38
Breed		
(i) Shorthorn	3.26	3.59
(ii) Crossbred	3.41	5.16**
Supplement		
(i) No supplement	2.62	3.97
(ii) All supplements	3.47**	4.45*
(iii) No urea (dry)	3.21	4.30
(iv) Urea (dry)	3.61*	4.38
(v) Other supplements	3.41	4.34
(vi) Phosphorus + urea (dry)	3.70	4.91*
(vii) No phosphorus (wet)	—	4.10
(viii) Phosphorus (wet)	—	4.57*
*P < 0.05	**P < 0.01.	

†Yields are the means of 5 observations during each of the supplementation periods.

There was no overall breed effect during the dry season, but a significant ($P < 0.05$) interaction existed between breed and pasture type with crossbred cows having higher milk yields than Shorthorns (3 .56 v. 3.10 kg) on native pasture.

In March 1970 faecal protein levels on both pastures were approximately 10 per cent, and decreased as the dry season progressed to 5.5 per cent in October. Following the onset of wet season conditions in late October, faecal protein levels rapidly rose to 10 per cent on native pasture and 13 per cent on Townsville stylo. Pasture yields are shown in Table 3.

TABLE 3

***Yields of available pasture* ***

Paddock	Apr. 1970	Nov. 1970
Native pasture area	3.11 ± .03 (1316)	2.95 ± .04 (895)
Townsville stylo area	3.19 ± .03 (1558)	2.75 ± .04 (558)

*Log (base 10) transformation. Equivalent means (kg/ha) in parenthesis.

V. DISCUSSION

The greater milk yield of crossbred cows during the wet season is in agreement with other comparisons (Howes et ***al.*** 1960) between British breeds and Brahman crossbreds. Severe nutritional stress probably explains the failure of the crossbreds to outyield the British breeds on the Townsville stylo area during the dry season. Townsville stylo yields were low in April 1970 because of poor seed production in 1969, a year of below average rainfall (36 *v.* 76 cm), when the pasture was established. Faecal protein levels were comparable on the two pasture areas in October but there was a-marked difference in the availability of dry matter because of the heavier stocking rate. This is supported by the dry season interaction between breed and pasture type with respect to milk yield.

In an early report on the effects on animal performance of phosphorus deficiency (Theiler, Green and Du Toit 1924), it was recognised that impaired milk production was a sequel to a low phosphorus intake. Bisschop (1964) reported increased milk yields in bonemeal supplemented cows, and Ward (1968) obtained greater weight gains from birth to weaning in the calves of cows fed a bonemeal supplement, but this author was unable to state whether the response was due to the supplement eaten by the calves or to increased milk production by their dams. The response to phosphorus reported in this paper appears to be one of the few published reports of the effect of a phosphorus supplement on the milk yield of grazing beef cows. The apparent wet season response to phosphorus fed in the previous dry season is of special interest. There is general agreement that the greatest response to phosphorus supplements occurs in the wet season (Ward *loc.* cit.) but there are practical limitations to the effective wet season supplementation of cattle in northern Australia. There would be more widespread use of phosphorus supplements if they could be effectively fed in conjunction with other dry season supplements.

Ryley (*loc.* cit.) reported increased milk yields in Hereford heifers fed urea in conjunction with a basal ration of sorghum silage, and the increased milk yield obtained in the dry season in the urea fed groups in this trial is further evidence of the beneficial effect of N.P.N. supplements in the grazing situation. There is a need for more research into the use of N.P.N. supplements in grazing situations (Loosli and McDonald 1968), and this paper is the first report from a long term experiment designed to study the effects of N.P.N. and phosphorus supplements on reproductive performance in beef cattle.

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