Improved production from grazing cattle when given protein

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A four-year study was conducted in which a protein supplement was fed to Hereford heifers so that they could be first-mated at 15 months of age and calve each year thereafter. Protein supplemented heifers had an ADG of 500 g during the winter and were at a suitable live weight for mating at 15 months while the unsupplemented heifers lost weight and were too small for mating. Supplemented heifers calved 12 months before control heifers. In addition, they had higher calving percentages in subsequent years when mated whilst lactating. Protein supplemented heifers also weaned heavier calves than the control group.

'n Vier jaar lange ondersoek is uitgevoer waartydens Hereford-verse met 'n proteïen byvoeding gevoer is sodat hulle op die ouderdom van 15 maande gedek kon word en om elke jaar daarna te kalf. Verse wat die proteïen byvoeding ontvang het, het 'n ADG van 500 g gedurende die winter gehad en het op 15 maande 'n geskikte lewende massa gehad om gedek te word. Daarenteen het verse wat nie die byvoeding ontvang het nie, massa verloor en was te klein om gedek te word. Verse wat die byvoeding ontvang het, het 12 maande voor die verse in die kontrolegroep gekalf. Voorts het hulle 'n hoër kalfpersentasie in die daaropvolgende jare gehandhaaf wanneer hulle gedurende laktasie gedek is. Verse wat die proteïen byvoeding ontvang het, se kalwers het ook swaarder speengewigte gehad as dié van die kontrole groep.

Keywords: Protein supplements, non-degraded protein, grazing beef heifers, calving.

Introduction

Cattle production on the subtropical east coast of Australia is predominantly from medium sized herds (130 beef cows) which are maintained at low stocking rates on family farms (500 ha). The climate of hot, wet summers and cool, dry winters has favoured the predominance of summer-growing grasses in grasslands that were established soon after clearing of the sclerophyll forests some 100 years ago. Cattle graze these grasslands which, on the poorer soils, consist predominantly of narrow-leafed carpet grass *(Axonopus affinus)*. At best, this grass provides a forage which has a 52% digestibility and 1,5% N (Cohen, 1978). However, with the onset of frosts, fogs, heavy dew and light rain in winter the quality of the forage deteriorates and by July cattle are faced with a forage that has a digestibility as low as 34% and N as low as 0,4%. Cattle are unable to meet their maintenance requirements on these pastures and lose weight. As a consequence, calving rates in herds are low (65%) compared with the rate (85%) in herds grazing temperate grasslands in Australia.

An earlier study in the Australian subtropics indicated that steer growth was increased markedly by supplementing the steers during winter with true protein that was slowly degradable in the rumen (Hennessy *et al.*, 1981). This paper

describes a four-year study in which a similar protein supplement was given to heifers in the same environment. The aims were to promote yearling growth so that heifers could be first-mated at 15 months of age and calve each year thereafter.

Materials and Methods

The experiment was sited at Grafton, Australia (latitude 29° 42'S, longitude 152°54'E, altitude 15 m) on 80 ha of unimproved pasture consisting predominantly of carpet grass *(Axonopus affinus)* but containing some native grasses (e.g. *Dicanthium, Andropogon* and *Aristida)* and patches of blady grass *(Imperata cylindica)*. In April 1978, forty-four Hereford heifers (10 months of age and 200 kg live weight) were divided into two treatment groups of four replicates and one control group of three replicates with four heifers per replicate. Heifers in the control group and supplement group 1 were mated at 15 months of age and heifers in supplement group 2 were first-mated at 27 months of age.

From June 1978, heifers in the control group were offered a mineral supplement whilst those in both of the supplement groups were offered 2800 g/heifer of a pelleted protein meal mix every 3,5 days. This mix consisted of 80% cotton seed, 10% meat and 10% fish meal. Minerals were added and the mix was pelleted under pressure which generated frictional heat (up to 77° C) in the die. The pellets contained 65 g N/kg dry matter (DM) with an estimated 53% of the nitrogen being non-degraded in the rumen of cattle fed a low quality roughage.

In November 1978, bulls were placed with heifers for mating over nine weeks in both the control and supplement group 1. Supplementation ceased at the end of mating. In the following July, supplementation recommenced, with the exception of non-pregnant heifers in group 1. These were given access to a mineral supplement as were the heifers in the control group. Pregnant heifers in group 1 were given protein supplements at an amount based on a daily rate of 16 g pellet/$kg^{0,75}$ live weight. Heifers (not joined) in group 2 were given 2800 g/head every 3,5 days as in the first year.

In November of the second year, heifers in all groups were placed with bulls for mating, at the end of which supplementation ceased. Supplementation recommenced in July of the third year for all pregnant stock in groups 1 and 2 and although based on metabolic live weight, 1,4 kg/head/day was the maximum amount offered.

Weaning was in March each year when calves were 200 days of age. Weaning weights were adjusted to 230 days (Table 3).

Pasture cuts were taken every 80 days and analysed.

Results

Pasture quality

The unimproved native pasture had a low nutritional value throughout the experiment. Maximum digestibility of 54% occurred in early summer and maximum nitrogen and phosphorus contents of 12 and 3,4 g/kg DM, respectively, occurred in late summer. Throughout the winter the quality of the pasture available was low. The mean digestibility was 42%, and N and P contents were 6,5 and 1,2 g/kg DM, respectively.

Live weight of heifers

In their first year, heifers in the control group lost weight during the winter (40 g/day) and were too small at mating to conceive. In contrast, protein supplemented heifers increased in live weight by 500 g/day during winter and were a suitable live weight for mating at 15 months of age (see group 1, Table 1). Heifers in group 2, which were not mated until the second year, were 60 kg heavier at first-mating than the earlier-mated heifers of group 1 (Table 1). This difference persisted during the third year but not the fourth, which was a year of below-expected summer rainfall. Live weights of control group cows were from 50 – 90 kg less than those of protein-supplemented cows.

Table 1 Live weight (kg) of heifers at start of mating (November – January)

	Year			
Group	1978	1979	1980	1981
Control	188	254	265	306
Supplemented				
1	247	300	330	398
2	NJ	361	390	416

NJ = Not joined

Calving performance

Supplemented heifers in group 1 calved twelve months before control heifers when mated in the same season. In addition, they had higher calving percentages in subsequent years when mated while lactating (Table 2).

Table 2 Calving percentage (of heifers mated) of Hereford heifers and cows

	Year			
Group	1979	1980	1981	1982
Control	0	67	45[a]	65[a]
Supplemented				
1	91	62[a]	64[a]	85[a]
2	NJ	67	100[a]	85[a]

NJ = Not joined

[a] = calculated as a proportion of lactating heifers or cows

Table 3 Weaning weight (kg) of calves, corrected to 230 days of age

	Year		
Group	1980	1981	1982
Control	–	119	111
Supplemented			
1	150	160	153
2	–	185	173

Weaning weight

Protein-supplemented heifers weaned calves that were approximately 40 kg (group 1) or 60 kg (group 2) heavier than calves of control heifers when compared within the same year (Table 3).

Conclusions

This experiment has indicated a role for supplementary dietary protein for young, breeding cattle grazing the unimproved pastures that are typical of much of the grazing land in subtropical, eastern Australia. Cattle on low quality forages in this region have low intakes that can be increased by protein supplements (Hennessy & Murison 1982). In this experiment, protein supplements are considered to have increased forage intake by heifers, allowing them to increase in live weight and reach a size suitable (Meaker *et al.*, 1980) for mating at 15 months of age. In contrast, unsupplemented heifers did not become pregnant at this age during a nine-week mating period. Secondly, the additional protein prevented cows from losing live weight during lactation, which is a serious problem in British breed cattle in the subtropics. Thirdly, supplemented cows weaned heavier calves than did control heifers or cows.

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