PROTEIN SUPPLEMENTATION OF GROWING CATTLE IN CENTRAL QUEENSLAND

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SUMMARY

This paper discusses the responses from a number of sites in central Queensland to protein meal supplements alone or in combination with growth enhancers offered to weaner steers or heifers grazing brigalow or black speargrass pastures in winter-spring.

At all sites supplementation with protein meals alone improved liveweight gains during the feeding period. However this advantage could not be maintained over the following summer period. With weaners grazing brigalow pastures, the addition of a rumen modifier to the protein meal gave only marginal increases over protein meal alone. However the combined treatment of protein meal, rumen modifier and growth promotant gave a marked liveweight advantage over the feeding period, with this advantage being retained in the post supplementation phase.

Protein meal supplementation did not improve pregnancy rates of two year old heifers on black speargrass pasture.

INTRODUCTION

There are indications that future preferred ages of slaughter of cattle will be lower than currently accepted (AMLC *pers. comm.*). The premium Japanese market requires meat from animals with seven permanent teeth or less and minimum carcass weights of 272 kg. In comparison, the preferred domestic carcass weighs 160 to 220 kg from animals with no permanent teeth. To meet and maintain these market specifications, there must be a reliable supply of store cattle and annual postweaning liveweight gains of 150 to 230 kg are required (Venamore *et al.* 1986).

The Capricornia region of central Queensland can be divided into a number of pasture communities (Fig. 1). The two most important ones for cattle production are the brigalow and black speargrass pastures. Mean annual liveweight gains are in the order of 180 kg on brigalow and 100 kg on black speargrass pastures. Thus growth rates of cattle on these two pasture communities are less than desired to meet the market objectives as outlined.

In the experiments described we have concentrated on improving growth and fertility rates of cattle grazing black speargrass and brigalow pastures by extrapolating the supplementation technology developed at Swan's Lagoon Research Station in north Queensland (Lindsay 1984; Anon 1985). At this locality, protein supplements produced increased growth rates of young cattle as well as increasing fertility of heifers.

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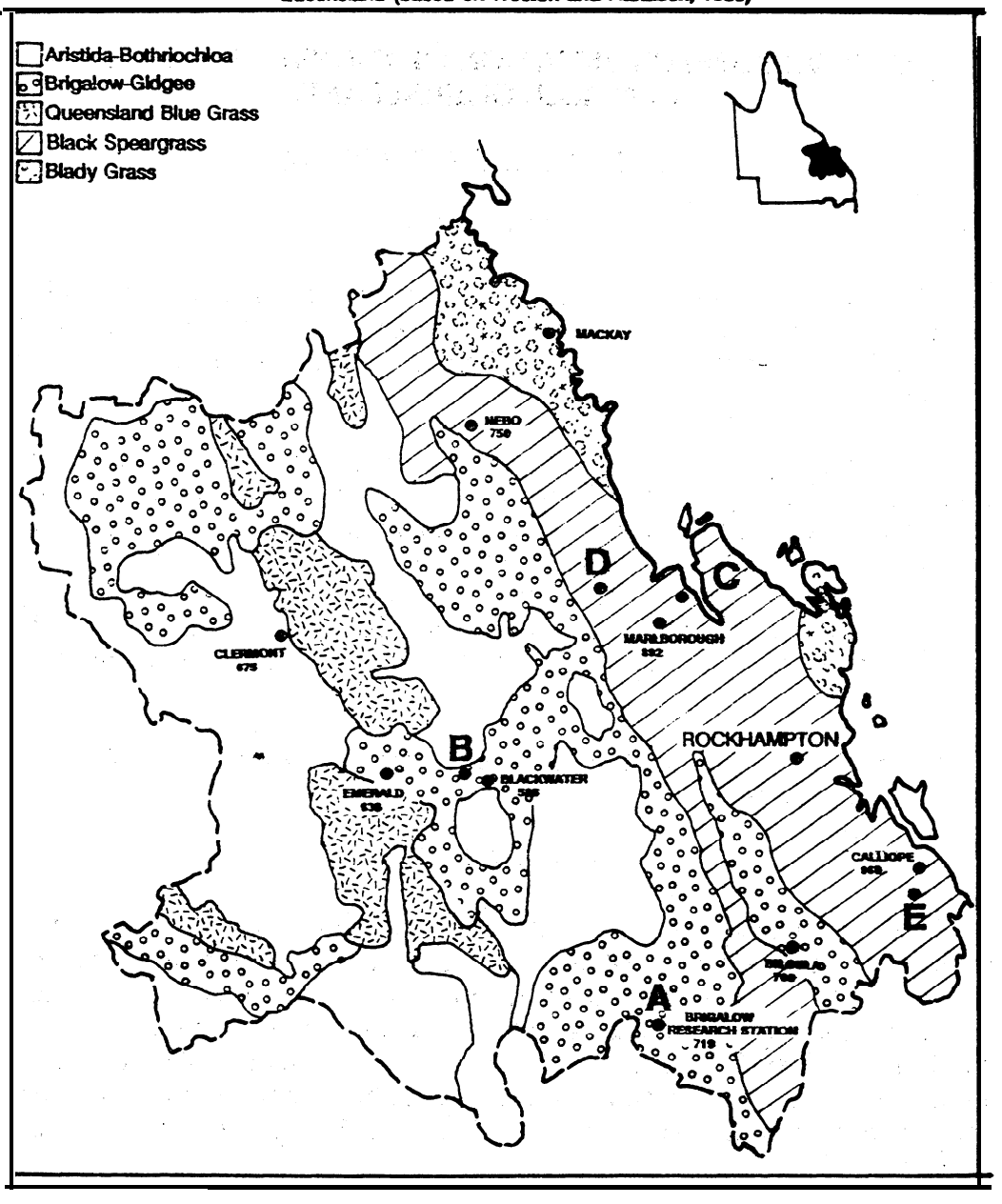
Fig 1. Pasture communities of Capricornia region of central Queensland (based on Weston and Harbison, 1980)



IMPROVING GROWTH RATES ON BRIGALOW PASTURES

Studies were carried out at two sites. Site A (Brigalow Research Station) allowed replication of treatments whilst Site B, a commercial property in the Blackwater district was used as a concurrent producer demonstration of the results but had no replication.

At each site, two drafts of weaners in consecutive years were offered supplement mixtures during winter of 3:1 cottonseed meal and meatmeal by weight. Some supplements had the rumen modifier, Avoparcin (Avotan 100, Cyanamid Australia) included whilst some animals were implanted with a growth promotant, Compudose 200 or Compudose 400 (Oestradiol-17B, Elanco Products Company).

At Site A, there were 80 Africander cross weaner steers in Draft 1 which were allocated into four treatments of C - control of nil supplement; Pr - protein mix; Pr + A - protein mix and Avoparcin and Pr +A+200 - protein mix, Avoparcin and Compudose 200. Supplementation commenced in May 1987 and continued for

142 days. Draft 2 comprised 80 Brahman cross steers. These were allocated into four treatments of C - control of nil supplement; 400 - Compudose 400; Pr+A - protein mix and Avoparcin and Pr+A+400 - protein mix, Avoparcin and Compudose 400. Supplementation started in June 1988 for 147 days. In both drafts, weaners grazed a sward of buffel, Rhodes and green panic grasses at 1 weaner per 2 ha. Average daily intakes of protein mix and Avoparcin respectively were 417 g and 120-200 mg for Draft 1 and 457 g and 200 mg for Draft 2.

At Site B, Draft 1 was 228 Belmont Red and Brahman cross steers allocated to two treatments of C - control of nil supplement and Pr - protein mix. Supplementation started in May 1987 for 135 days. Draft 2 comprised 92 Belmont Red and Brahman cross steers divided into two treatments of Pr +A - protein mix plus Avoparcin and Pr+A+400 - protein mix, Avoparcin and Compudose 400. Both drafts grazed buffel grass pastures at 1 weaner per 2.7-3.2 ha. Average daily intakes of supplements were 500 g of protein mix in Draft 1 and 500 g of protein mix and 200 mg of Avoparcin in Draft 2.

Following supplementation all groups had common grazing.

Draft 1 Results (Table 1)

At Site A, responses to treatment over the control during supplementation were 11 kg, 14 kg and 33 kg for Pr, Pr +A and Pr + A+ 200. Liveweight gain in the four months post supplementation modified these responses to 0, 2 kg and 31 kg respectively. At 16 months post supplementation, these advantages were -5 kg, -4 kg and 39 kg respectively for Pr, Pr + A and Pr + At 200.

TABLE 1. Liveweight changes (kg) of weaner steers during supplementation and post supplementation phases on brigalow pastures.

Site and group	Start of feeding and length (days)	Mean liveweight at start	Treatments[a]	Liveweight change feeding period (May-Oct)	Advantage to treatment (May-Oct)	Liveweight change (Oct-Feb)	Advantage to treatment (May-Feb)
Site A	May 1987	194	C	67	-	90	-
Draft 1	142 d		Pr	78	11	79	0
			Pr+A	81	14	78	2
			Pr+A+200	100	33	88	31
Draft 2	June 1988	222	C	71	-	51	-
	147 d		400	83	12	66	27
			Pr+A	94	23	42	14
			Pr+A+400	113	42	48	39
Site B	May 1987	223	C	58	-	88	-
Draft 1	135 d		Pr	75	17	76	5
Draft 2	June 1988	297	Pr+A	67	-	51	-
	155 d		Pr+A+400	94	27	55	31

C = control of nil supplement; Pr = protein mix (3:1 cottonseed meal, meat meal);
A = Avoparcin; 200 = Compudose 200; 400 = Compudose 400

At Site B, there was a 17 kg response to Pr at the end of the supplementation period which was subsequently eroded to 5 kg (four months post supplementation) and 1 kg (11 months post supplementation).

Draft 2 Results (Table 1)

The treatments in draft 2 were altered to investigate whether the response to treatment Pr + A+ 200 in draft 1 at Site A was from the growth promotant or an additive effect of the three treatment components.

At Site A, responses to treatment over the control at the end of the supplementation period were 12 kg, 23 kg and 42 kg respectively for 400, Pr + A and Pr + A+400. These responses were modified to 27 kg, 14 kg and 39 kg respectively by four months post supplementation.

At Site B, responses to Pr + A+ 400 over Pr+A were 27 kg at the end of the supplementation period and 31 kg, four months post supplementation.

IMPROVING GROWTH RATES ON BRIGALOW/ BLACK SPEARGRASS COUNTRY

At Site C, a commercial property in the Marlborough district, 36 yearling and 38 two year old Brahman heifers were allocated to treatments of C - control of nil supplement or CSM - supplemented with 500 g/day of untreated cottonseed meal. Supplementation was for 71 days, September to November 1986. The treatment was not replicated. Results of this observation are shown in Table 2.

In both age groups, there was a response in liveweight to supplementation by the end of the feeding period. This was 16 kg in yearling heifers and 9 kg in two year old heifers. This advantage was only 3 kg in the yearling heifers, six months post supplementation. We were unable to obtain accurate reproductive or post supplementation liveweight data on the two year old animals.

TABLE 2. Liveweight and liveweight change (kg) of heifers - Site C (Marlborough)

Group	Treatment[a]	Mean liveweight Sept. 1986	Liveweight change Sept.-Nov. 1986	Advantage
Yearling Heifers	C	197	26	-
	CSM	198	42	16
2 year old Heifers	C	291	23	-
	CSM	280	32	9

a C = unsupplemented, CSM = 500 g/head/day cottonseed meal

IMPROVING GROWTH RATES AND FERTILITY ON BLACK SPEARGRASS COUNTRY

At two sites (D in the Marlborough district and E in the Calliope district), two year old heifers were allocated to treatments of C - control of nil supplementation and CSM - supplemented with 500 g/day of untreated cottonseed meal. The treatments were not replicated at either site. At Site D, there were 82 Brahman heifers in all and supplementation was for 84 days, whilst at Site E, there were 94 heifers and supplementation was for 92 days. Animals were supplemented from September to December prior to mating the following summer. Liveweight performance and pregnancy rates are shown in Table 3.

At the completion of supplementation, the advantage to treatment was 24 kg and 22 kg at Sites D and E respectively. By June the following year, this advantage had been reduced to 1 kg and 10 kg respectively at Sites D and E. There was no treatment difference in pregnancy rate at either site.

TABLE 3. Liveweight change (kg) and pregnancy rates (%) of unsupplemented and supplemented two year old heifers on black speargrass pastures.

Site and year	Treatment[a]	Mean liveweight September	Liveweight change feeding period	Advantage to treatment (Sept.-Dec)	Liveweight[b] change (Sept.-June)	Advantage	Pregnancy rate June (%)
Site D							
Marlborough	C	254	34	-	73	-	91
1986-87	CSM	263	58	24	74	1	90
Site E							
Calliope	C	267	10	-	168	-	88
1987-88	CSM	268	32	22	178	10	91

a C = control of nil supplement, CSM = 500 g/head/day cottonseed meal
b Weight of pregnant animals only

DISCUSSION

Results from all sites suggest that feeding protein supplements alone to growing cattle in the winter-spring period will only provide a short term advantage in liveweight gain. This advantage could not be retained at any of these sites monitored, either on high quality improved brigalow pasture or on the lower quality black speargrass pastures. There appears to be a limited role in feeding protein supplements alone unless the short term advantage can be capitalised upon, i.e. short premarket finishing phase or for survival feeding.

There were only small advantages by including Avoparcin in these protein supplements and our results are in agreement with Dodemaide *et al.* 1988. Again, compensatory gain reduced their effectiveness.

There was a marked advantage to the combination of a protein supplement, Avoparcin and Compudose. This may have been, in part, due to Avoparcin causing a more efficient uptake of amino acids in the small intestine as suggested by Macgregor and Armstrong (1982). In addition, Compudose may require additional

protein in the diet to increase productivity (Hunter and Vercoe 1988). Results from the first draft at Site A indicated that compensation had not occurred by 16 months post supplementation although this exceeded the payout period of the growth promotant. The reasons for this are not apparent. We will continue to monitor the growth of these animals until turn off at 620 kg.

The lack of a fertility response at Sites D and E was at variance to that reported in north Queensland where pregnancy rates of 57% and 92% respectively were recorded for unsupplemented and protein supplemented two year old Brahman cross heifers (J.A. Lindsay, *pers. comm.*). Our lack of a fertility response may have been that most unsupplemented heifers were above the target liveweight during mating. For *Bos indicus* cross heifers target weights are 280 to 300 kg to achieve an 80% or better pregnancy rate (Rudder *et al.* 1985).

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