PRODUCTIVITY OF A *BOS INDICUS* CROSS CATTLE HERD IN THE WESTERN GULF REGION OF THE NORTHERN TERRITORY

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SUMMARY

Two groups involving a total *570 Bos indicus* cross cows were monitored for 6 years in the gulf region of the Northern Territory. All cattle received a dry season supplement of non-protein nitrogen while stocked at approximately 1 cow to 25 ha. In the last 3 wet seasons 1 group was provided with a protein/phosphorus supplement.

Wet season supplementation increased liveweight and condition score in some categories of cows but did not affect reproduction rates. The average conception rate for the herd was 71% with an inter-calving interval of 17.5 months. Most conceptions occurred in December/January coinciding with the onset of the wet season. Cow mortality rates were 18% and losses between pregnancy diagnosis and re-muster averaged 22% with an estimated branding rate of 54%.

Keywords: Bos indicus, cows, Northern Territory, reproduction, supplementation.

INTRODUCTION

The gulf district of the Northern Territory adjoining the Gulf of Carpentaria is 1 of Australia's most remote cattle grazing areas. It lies between latitudes 14°S and 18°S with a dry monsoonal climate; rainfall occurs between December and March. Most of the cattle handling occurs in the cool, dry winters. Cattle herds are characterised by stocking rates of 16 to 70 ha/head, low branding rates of less than 50% (Michell 1985), high breeder mortality and low growth rates (McCosker and Eggington 1986).

The national brucellosis and tuberculosis eradication policy is forcing property managers to change from the traditional hunting of cattle on unfenced areas to property development and improved animal husbandry practices. This leads to increased stocking rates, stock numbers, turn-off, branding rates and in most cases reduced costs of operation per head. However, stations have to incur debt to achieve these levels of property development (Michell 1985). The aim of this study was to determine the productivity of *Bos indicus* cross cattle in the gulf district of the Northern Territory and to evaluate the potential of wet season supplements to improve financial returns in this environment.

MATERIALS AND METHODS

The experiment was carried out on McArthur River Station (16°26'S, 135°05'E). This station has a dry monsoonal climate with cool, dry winters and an average annual rainfall of 749 mm concentrated mostly in December to March. The land systems were a mixture of yellow earth plains and sand stone ridges supporting a native pasture of predominantly *Chrysopogon latifolius* on the plains and *Plectrachne pungens* on the ridges. An area of 100 km^2 was fenced and divided into 2 paddocks of equal area and stocked with 100 yearling heifers/paddock in November 1984. A further 140 mixed aged cows were added to each paddock in May 1985 to achieve a stocking rate of 1 cow/25 ha, with 5 bulls/100 cows for a continuous mating program. Additional cows were added to the herd at the time of muster to maintain the herd sizes. During the 6 year experiment period records were maintained on a total of 570 individual breeders. The cattle herds were mustered using helicopters supported by horses in May 1985, August 1985, June 1986, May 1987, November 1987, May 1988, June 1989 and May 1990. Cows missing for 2 musters were assumed dead. At each muster the individual animals were weighed, condition scored (1 = poor to 5 = fat), pregnancy tested with foetal age estimation and lactational status was determined. Cows were culled for lack of reproductive performance and conformation or physical deformities, and all calves heavier than 120 kg were weaned at each muster. Daily rainfall was recorded at the homestead.

In the wet seasons of 1987/88, 1988/89 and 1989/90 1 herd was supplemented with protein and phosphorus blocks ("Phosrite", Coopers Australia Pty Ltd). Cow intake of the supplement was estimated from the disappearance of the blocks for the period of the wet season. Non-protein nitrogen supplements ("Uramol", Coopers Australia Pty Ltd) were freely available to both herds during each dry season of the experimental period.

For each cow category, the difference between the means of the 2 paddocks during the 3 pre-treatment

years was compared to the difference during the differences during the 3 treatment years using Students' t test. Each muster within the 3 years was used as a replicate. Conception rates and patterns, liveweight, mortality rates, inter-calving interval and calf losses were calculated combining the data collected for both herds.

Table 1. Average liveweight (kg), condition score (l-5) and proportion (%) of cows in the 4 reproductive categories in the pre- and treatment periods, for the supplemented and control herds with the significance level (P) for response to wet season supplementation. Results for the same measurements and categories for the combined herd in May/June (1985-90) and November (1987) are also given

	Supplemented herd		Control herd			Combined Herd	
	Pre-	Treat	Pre-	Treat	P	May/June	November
Cow liveweight							
Dry and non-pregnant	272	367	266	317	0.15	330	247
Dry and pregnant	316	383	332	347	0.042	366	306
Lactating and non-pregnant	266	310	282	293	0.13	296	268
Lactating and pregnant	328	323	313	310	0.96	325	316
Condition scores							
Dry and non-pregnant	3.7	4.7	3.2	4.3	0.38	4.4	3.6
Dry and pregnant	4.1	4.7	4.1	4.2	0.18	4.7	3.5
Lactating and non-pregnant	2.6	3.6	2.8	2.7	0.045	3.2	2.3
Lactating and pregnant	3.6	3.7	3.2	3.1	0.48	3.7	3.2
Reproductive categories							
Dry and non-pregnant	24	7	13	5	0.09	5	26
Dry and pregnant	46	37	42	36	0.51	40	37
Lactating and non-pregnant	27	41	38	49	0.40	44	35
Lactating and pregnant	3	15	12	8	0.19	11	2

RESULTS

Rainfall for the years 1984/90 averaged 457 mm distributed between October to March, considerably less than the long term average of 749 mm (Table 3). In the 2 drought years there was minimal regrowth of perennial grass species and poor germination of the annual species. In those years grazing was further restricted by distances between drinking waters which were available only at bores and a few natural springs.

The average wet season intake of the blocks by the cattle for the 3 years was 216 g/hd.day corresponding to 102 g crude protein, 11 g phosphorus and 0.8 MJ energy/day assuming no calf consumption. This level of supplementation significantly increased the liveweight of non-lactating, pregnant cows at the end of the wet season but no significant effects on the liveweights were recorded in the other reproductive categories. The average difference in condition scores of lactating, non-pregnant cows between paddocks was significantly increased from -0.2 to 0.9 with wet season supplementation. The condition scores of other categories of cows and the reproductive categories of the herd were not significantly influenced by supplementation (Table 1). On average the wet season supplemented group was 23 kg heavier than the control at the end of the wet season.

The average liveweight of the various cow categories are given in Table 1 for May/June (1985-90) and November (1987) musters. Dry season weight losses of 8 and 78 kg for dry and lactating cows respectively were recorded in 1987, the only year that weights were available at the start and end of the dry season. At muster suckling calves below the weaning weight were returned with their dams and gained an average of 0.65 kg/day (n = 30) during the wet season and 0.35 kg/day (n = 12) during the dry season in 1987.

The average conception rate for the herd was 71%, ranging from 64-76% depending upon the season. Two-year-old cows had a conception rate of 72% on average, and there tended to be a decline to 65% for 3-year-old cows, returning to 73% for 4 years and older cows with large between year fluctuations (Table 2). The inter-calving interval for the herd averaged 17.5 months with December/January being the

Table 2. Herd conception rates (%) by cow age (years), mortality rate (%) of cows and reproductive losses (%) between pregnancy diagnosis (PD) and re-muster

Year	Conception by cow age						Losses PD
	2	3	4	>4	Average	Mortality	to muster
1986	77	69	64	77	71	19	18
1987	71	45	70	70	64	13	13
1988	72	79	78	75	76	28	31
1989	66	65	80	74	74	11	25

Table 3. Effect of inter-calving interval (ICI, months) on bi-monthly distribution of cow conceptions for 1987/88, with average bi-monthly rainfall (mm) for the experimental period of 1984/90

ICI	Cows conceiving (%) in the period						Cows
(months)	Dec/Jan	Feb/Mar	Apr/May	Jun/Jul	Aug/Sep	Oct/Nov	in ICI (%)
9-12	58.9	16.1	10.7	5.4	0	8.9	22.7
13-16	32.9	11.8	4.7	1.2	14.1	35.3	34.4
17-20	20.0	8.9	22.2	6.7	4.4	37.8	18.2
21-24	28.6	53.6	10.7	0	0	7.1	11.3
>24	39.4	15.2	6.1	0	0	39.4	13.4
Rainfall	175	220	13	8	0	42	

optimum months for conception corresponding with the onset of the wet season (Table 3). Cows conceiving in December/January and calving in September/October were more likely to conceive again within 3 months of calving than cows that conceived at other times of the year (Table 3), with 90% of the pregnant animals having a condition score of 3 or higher.

Cow mortalities for the period ranged from 11-28% per year with the higher rates occurring in the drought years. Reproductive losses from pregnancy diagnosis to re-muster for 1987 ranged from 13-31% for the end of wet season musters (Table 2), with a higher rate of 40% at the November, dry season muster. Total reproductive losses to branding averaged 24% with an implied branding rate of 54%. This is consistent with an average lactation rate of 57% for the herd. Branding rate could not be validated with confidence due to the high incidence of non-experimental cattle entering the herds.

DISCUSSION

The biological response to the wet season supplement suggests that the strategy was beneficial to the herd productivity. Detailed statistical analysis was limited by the nature of the experiment although significant improvements were seen in some categories of cow liveweight and condition scores. Liveweight gain for the wet season supplemented herd was similar to that reported by McCosker *et al.* (1991) for wet season supplemented cattle in the higher rainfall Katherine environment. There were no significant improvements in herd reproductive rate with wet season supplement; similar findings have been reported for the more favourable Katherine region (McCosker *et al.* 1991).

At the May musters, lactating cows were lighter than dry cows although the differences are smaller than those reported by McCosker *et al.* (1991) for similar categories of cows, and cows lost considerable weight during the dry season if they were lactating, whereas dry cows at this time lost little weight. The liveweight changes between the wet and dry seasons were considerable but of similar magnitude to weight fluctuations in the Victoria River District (Sullivan *et al.* 1992). Average cow liveweights were less than those reported for the Katherine region (McCosker *et al.* 1991) and the Victoria River district (Sullivan *et al.* 1992). Similarly Northern Territory cows were significantly lighter by at least 80-100 kg than those of the northern Queensland spear grass zone (Holroyd *et al.* 1983). Overall, cows in the western gulf region suffered chronic under-nutrition as shown by a failure to reach 380 kg at the

April/May weaning, which has been shown to be associated with reduced reproductive performance (Schlink *et al. 1992).*

Mortality rates were high and increased rapidly with declining rainfall, probably reflecting the low liveweights of the cattle at the start of the dry season and longer grazing distances. However, the calculated mortality rates for the herd should be viewed cautiously as they are based on failure to re-appear at musters and make no allowance for cattle that escaped and were not returned to the paddocks. Fordyce *et al.* (1990) in a study of drought affected cows found declining probabilities of survival with low condition scores and/or lactation at the start of the drought. Frisch (1973) noted that in a drought *Bos indicus* cross cows may not readily reduce milk production, thus increasing the loss of weight during the dry season. In normal years mortality rates were higher than those reported by McCosker *et al.* (1991) but similar to those of McCosker and Eggington (1986) and Sullivan *et al.* (1992). Increased mortality rates in drought years were no higher than can be expected for this class of cattle given the probabilities of survival of cattle in Queensland droughts (Fordyce *et al.* 1990).

Cow conception rates of about 70% with low pregnancy rates for lactating cows at the May muster were similar to reproduction rates reported for other Northern Territory herds. The weaning of calves in May/June did not result in an improvement in conceptions before the next wet season; this is a reflection of low liveweight of cows at weaning (Schlink *et al.* 1992) or a lack of feed at the start of the dry season. High fetal and/or calf losses between pregnancy diagnosis and re-muster are similar to those reported for this region (McCosker *et al.* 1991) but higher than those for drought affected northern Queensland spear grass areas (Fordyce *et al.* 1990). The estimated branding rate of 54% was above the district average where 65% of stations had a branding rate of less than 50% (Michell 1985).

This experiment has shown that wet season supplementation is feasible although the biological responses are small and significant only for some categories of cattle. This herd had a conception rate of 71% with losses between pregnancy testing and re-muster within the district average and a better than average district branding rate. Cow mortality rates are high and low calf growth rates during the dry season allows some opportunities to improve herd productivity. Weaning at a younger age in May in this area would be beneficial both to cow survival and, if correct supplementation strategies are developed, would ensure liveweight gains in the calf beyond that achieved if the calf was left to suckle on the dam in this environment. Calves as light as 60 kg have been transported from this region to the Queensland coast to achieve growth rates greater than 0.6 kg/day on dry rations (Schlink unpublished).

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