CALF MANAGEMENT STRATEGIES AND REPRODUCTIVE PERFORMANCE IN A NORTHERN AUSTRALIAN CATTLE HERD

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SUMMARY

One hundred and sixty seven Droughtmaster cows with calves were used in two experiments to evaluate the effect of early weaning and creep feeding on cow reproduction rates. Weaning of calves that weighed 48-92 kg instead of the conventional weaning weight of about 180 kg improved cow live weights and increased pregnancy rates by *48%* at weaning. The early weaned calves were raised on Stylosanthes hamata (cv. Verano) hay plus a maize based supplement containing no additive, 70 mg/hd/d monensin or 70 mg/hd/d avoparcin. Calf growth rate and feed efficiency were not significantly affected by the rumen modifiers. The creep feeding of calves did not significantly alter cow or calf live weights. There was a 20% increase in cow pregnancy rates with creep feeding of calves even though phosphorus deficiency was observed in a creep-fed group.
Keywords: Weaning, creep feeding, pregnancy rates, monensin, avoparcin.

INTRODUCTION

A branding rate of above *80%* is regarded as normal breeding performance in cattle herds (Osborne 1960), but this is rarely achieved with cattle in northern Australia where branding rates range from *40* to 67%; the lower rates reflect the harsher northern environment (Bureau of Agricultural Economics 1974). Additionally, reduced breeding performance is associated with loss of body condition during lactation. Two strategies available to reduce weight loss with consequent improvement in reproductive performance involve early weaning and creep feeding of calves. Boorman and Hosegood (1986) demonstrated that weaning at three months of age in continuously mated herds improved average branding rates from 47X to 59%, and had an immediate improvement on cow survival rates. Creep feeding with a high quality supplement can increase calf weaning weights by up to 40 kg but can have a detrimental effect on their subsequent adult performance (Martin et al. 1981). Conception rates of Herefordsthat were depressed by application of nitrogen fertilizer to fescue pastures were restored to control values by creep feeding despite the absence of a body weight advantage (Stricker et al. 1979).

This paper reports the results of experiments to investigate the effects of early weaning and creep feeding on cow conception rates, on growth rates in the creep fed calves and on responses of the weaned calves to dietary manipulation under northern Australian conditions.

MATERIALS AND METHODS

Experiment 1

Sixty-three first-calf Droughtmaster cows with calves at foot were randomly

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allocated to two predominantly native pasture paddocks. Two bulls were released into each herd in early January; 21 days later 30 calves were weaned with a minimum live weight of 48 kg from one paddock. Bulls were removed from both paddocks 75 days after the early weaning. Cattle were weighed at 28 day intervals and herds rotated between paddocks on weighing days. The calves in the control herd were weaned 124 days after the early weaning date when all cows were examined for pregnancy and foetal age by rectal palpation.

The 30 early-weaned calves were housed under cover on concrete floors as a single group for 5 days before being divided into 6 groups of 5 for the 70 days of the experiment before being released into the field. The calves were fed a roughage of chopped Stylosanthes hamata (cv. Verano) hay (2.47 gN/kg and 55.7% in vivo DM digestibility with sheep) and provided daily with 2 kg/hd of a supplement (79% maize, 12% formaldehyde treated sunflower seed meal, 4% meat meal and 5% molasses). The three treatments imposed were; control, 70 mg avoparcin/hd/d and 70 mg monensin/hd/d fed in the supplement. Supplements and roughage were provided daily and residues removed weekly. Samples of feed and residue were taken for dry matter and nitrogen determination. Rumen samples were removed by stomach tube at the end of 70 days for estimation of volatile fatty acids by gas chromotography, on Chromosorb "W" column 60-80 mesh (HMDS treated).

Experiment 2

One hundred and four lactating Droughtmaster cows of mixed age with calves at foot were exposed to 4 bulls for 21 days and then randomly allocated to four paddocks to achieve similar stocking rates. Herds 1 and 3 were on improved grasses and herds 2 and 4 native grasses, and one bull was run in each herd after allocation. The calves in herds 3 and 4 were creep fed by allowing unrestricted access to the same supplement as offered to the control group in experiment 1 and the cattle were weighed at approximately 28 day intervals. Bulls were removed 73 days after allocation and at 123 days the cows were pregnancy tested and their calves weaned. Ten cows from each herd were sampled at 28 days after allocation to permit estimation of blood urea and phosphorus levels by colorimetric autoanalyzer techniques.

RESULTS

Experiment 1

Weaning calves with a minimum live weight of 48 kg resulted in improved cow liveweights after 28 days and this weight difference was further increased until the termination of the trial (Table 1). Cow pregnancy rate ($P<0.01$) in the early weaned group was 90 compared with 61% in the unweaned controls. In addition,

Table 1. Live weights, pregnancy rates and mean foetal age for weaned and non-weaned first-calf cows

	Early Weaning		Conventional weaning
Number cows	30		33
Initial wt (kg)	368 ± 41		366 ± 41
End mating [day 75 wt] (kg)	431 40	*	397 40
Day 124 wt (kg)	453 40	*	407 49
Pregnancy rate (%)	90	**	61
Foetal age (months)	3.6 0.2	*	2.6 0.6

* Significantly different at **$P < 0.01$; *$P<.05$ (Chi^2 test)

conception was on average one month earlier in the early weaned cows. Fifty percent of the conceptions took place within one month of calf removal in the early weaned cows compared with 9% in the non-weaned group.

Mean daily growth rate in unweaned calves was 0.88 kg for the period of the pen study. This growth rate was matched by those of the calves on the control diet but was more than for those receiving the rumen modifiers. The rumen modifiers did not significantly affect any of the animal production variables measured (Table 2) but there were significant increases in the proportion of propionate in the rumen volatile fatty acids.

Table 2. Effect of rumen modifiers on early weaned calf performance and rumen propionate molar proportions in experiment 1

	Control	Avoparcin	Monensin	Pooled SEM
		(Pen means)		
Number calves	10	10	10	
Initial wt (kg)	76.4	76.3	76.3	15.3
Wt gain (kg/hd/d)	0.86	0.83	0.77	0.12
Roughage intake (kg DM/hd/d)	1.45	1.12	1.08	0.43
Suppl. intake (kg DM/hd/d)	1.72	1.71	1.58	0.10
FCR (kg feed/kg gain)	3.69	3.37	3.46	0.13
Rumen propionate molar proportion (%)	16.9a	18.1b	22.8c	0.9

Means in rows with different subscripts are significantly different ($P < 0.05$)

Experiment 2

Estimates based on a one tailed Chi squared test indicate that pregnancy rates were significantly increased ($P<.05$) by creep feeding of calves despite significantly lower levels of plasma phosphorus in herd 4 (Table 3).

Table 3. Cow and calf production data, creep feed intake and cow plasma phosphorus in experiment 2

	Non creep		Creep	
	Herd 1	Herd 2	Herd 3	Herd 4
	(means ± SD)			
Number cows	29	26	29	20
Initial cow wt (kg)	434 ± 43	429 ± 30	435 ± 45	450 ± 50
Wt change end mating (kg)	52a 18	35b 12	47a 17	32b 18
Wt change weaning (kg)	66a 19	27b 13	56a 19	-7c 17
Foetal age (months)	3.2a 0.7	3.2a 0.5	3.5a 0.6	2.8b 0.5
Pregnancy rate (%)	45	62	83	50
Plasma phosphorus (m M/l)	1.7a 0.3	2.0a 0.4	1.8a 0.3	0.8b 0.2
Calf wt change (kg)	108 19	105 16	112 12	107 19
Creep feed intake (kg/hd/d)	0	0	1.68	1.84

Means in rows with different subscripts are significantly different ($P<0.05$)

DISCUSSION

This study shows a positive response in cow reproductive performance to calf management strategies. Early weaning improved the pregnancy rate from 61 to 90% in Droughtmaster cattle and also brought. forward the average date of conception by one month. These findings confirm the trend reported by Eduvie and Dawuda (1986) who showed that non-suckling Bunafi cows had pregnancy rates of 72.7% compared with suckling animals of 21.2% at 80-90 days post-partum. In this experiment it. is not possible to differentiate between the influences of improved cow weights and cessation of suckling on reproduction performance. Creep feeding of calves also increased pregnancy rates in confirmation of the report of Stricker et al. (1979).

All early weaned calves survived the rapid transition from a milk based diet to a solids diet and the control group had growth rates similar to calves remaining with the cow. The rumen modifiers gave a non-significant improvement in feed efficiency with a slight depression on calf growth rates. This is contrary to the findings of Jack et al. (1986) of improved calf growth rates with both avoparcin and monensin. Creep feeding did not improve calf growth rates, but this result falls within the range of responses reported by Martin et al. (1981) for a ten year study of creep feeding.

Early weaning strategies are being applied to cattle herds in northern Australia with preferential treatments to the early weaned calves but there has been no attempt within the industry to implement creep feeding. If creep feeding is undertaken the cattle management practices of Boor-man and Hosegood (1986) will need to be applied to ensure cow survival.

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