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A SEASONAL MATING SYSTEM FOR BEEF CATTLE IN CENTRAL QUEENSLAND

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Summary

In a central Queensland Hereford herd, data collected over a period of six years showed that when cows were mated from October to March an average pregnancy rate of 94 per cent for the herd was obtained with no significant variation between years.

Rate of conception, as assessed at pregnancy diagnosis, varied significantly between years in all age groups. The mean proportion of cows pregnant by the end of December was 49 per cent. Relationship between rainfall during the previous November-April period and conceptions to the end of December indicated that 93 per cent of the variation could be attributed to rainfall.

A significantly larger ($p < 0.01$) number of two-year-old maiden heifers had conceived by the end of December than either three-year-old or mature lactating cows. At the end of mating there was no significant effect of age on pregnancy rate.

I. INTRODUCTION

It has been shown by a number of workers that seasonal mating is desirable in the Queensland beef industry because of its effect on calf growth, and the liveweight of breeding cows. Sutherland (1961) reported that calves born following an October to December mating were approximately 45 kg heavier at 270 days of age than were calves born following a January to June mating.

In addition, Stubbs (1966) reported an adverse effect on the liveweight of cows which suckled calves over the winter-spring period. Cows from which calves were weaned in May and June had a liveweight advantage of 26 to 40 kg compared with cows which suckled calves until August and September.

Alexander (1968) showed that weaning of calves at eight months of age was preferable to weaning at six months of age in terms of liveweight, irrespective of post-calving treatment to $10\frac{1}{2}$ months of age.

It would appear, then, that ideally calves should be at least eight months of age when weaned at the time of pasture deterioration in April and May (Gunn 1967; Perry 1968), thereby maximizing weaning weight and conserving the liveweight of breeders over the dry season. In order to satisfy these requirements cows should conceive from October to December and calve from July to September, and breeding herd management should be aimed at maximizing conceptions over the chosen period.

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Using three years' data from a herd in central Queensland, Stubbs and Mayer (1966) concluded that a large percentage of cows could be expected to conceive by December. The purpose of this paper is to report the breeding performance as measured by animals pregnant and rate of conception in a commercial herd in central Queensland, in which observations were made over a six year period ending June 1970.

II. MATERIALS AND METHODS

The studies were made at "Memooloo" which is approximately 45 km south-east of Comet, and -53 km north-north-east of Rolleston. The land systems on "Memooloo" are Humboldt with small areas of Junee (Story, Galloway and Gunn 1967). Long term rainfall at "Memooloo" averages 611 ± 177 mm with a concentration in November to April of 449 ± 164 mm. May to October rainfall is even more variable averaging 162 ± 74 mm. This rainfall pattern is common to large areas of Central Queensland (Fitzpatrick 1967).

The area of 5250 ha used for breeding cows comprised nine paddocks ranging from 12 1 ha to 89 1 ha. One-third of the area has a mixture of improved grass species (*Panicum* ***maximum var.*** *trichoglume* and ***Cenchrus*** *ciliaris*) and native species ***(Bothriochloa sp.,*** *Aristide* ***sp.*** and ***Heteropogon sp.).*** The remainder of the area consists of undeveloped country carrying ***Acacia*** *harpophylla,* ***Eucalyptus cambageana,*** and ***Terminalia*** *oblongata* with a scanty ground cover of the native species just mentioned, and timber treated country consisting of ***Eucatyptus dichromophloia, Eucalyptus melanopholoia*** with a ground cover of mainly ***Heteropogon contortus.***

The breeding herd used in the study consisted of Hereford cows and heifers. Ages ranged from two to eleven years.

Breeding management was based on a mating from October to March, with strategic weaning during the critical dry period which extends from May to October in most years. Time of weaning was determined on the basis of seasonal conditions. In adverse years weaning was completed in April, while in favourable years it was delayed until June. Time of weaning was a managerial decision based on the absolute level and changes in the availability of pasture, and the body condition of the breeding cows. Calves were weaned when the apparent availability of pasture was insufficient to maintain lactating cows.

From 17-20 per cent of cows were culled each year, either because they were recorded as non-pregnant at an examination (per rectum) after completion of mating, or because of age, physical defects or poor mothering ability.

The breeding cows required supplementary feeding for survival during the drought period April 1969 to October 1969. This was the only period supplementary feeding was considered necessary.

Bulls were tested for semen quality using the method of Watson (1964) for collection of semen by electro-ejaculation, and evaluated on the basis of colour, density, motility, and live-dead ratio. During the study no bulls were rejected because of poor quality semen. The bulls were used in proportions varying from 2 per cent to 3 per cent in multiple sire mating paddocks.

TABLE 1

***Pregnancy** rates **in a Central Queensland beef herd over a six-year period** for **breeders** of various ages*

Description of Breeding Cow	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	Means
Two year old maiden							
No. mated	20	164	107	87	119	84	97
Pregnant by Dec. 31st (%)	80	65	65	70	66	11	59
Pregnant by Mar. 31st (%)	95	89	94	94	92	96	93
Three year old lactating							
No. mated	26	45	120	116	88	118	85
Pregnant by Dec. 31st (%)	81	49	30	39	83	20	43
Pregnant by Mar. 31st (%)	100	98	83	95	100	95	94
Mature lactating							
No. mated	137	257	291	307	286	270	258
Pregnant by Dec. 31st (%)	57	41	47	45	79	15	47
Pregnant by Mar. 31st (%)	93	96	94	94	96	91	94
All age groups							
No. mated	183	466	518	510	493	472	440
Pregnant by Dec. 31st (%)	63	50	47	48	77	16	49
Pregnant by Mar. 31st (%)	95	94	91	94	96	93	94

Stocking rate was varied according to seasonal conditions, and ranged from a breeding unit (cow and progeny) to 4.0 ha to a breeding unit to 10.1 ha.

Each year pregnancy rates and conception pattern were determined by ageing of the foetus on examination per rectum, six to eight weeks after the termination of mating.

The chi-square test was used to determine the significance of the differences in pregnancy rates, and least squares regression techniques were used to relate rainfall with pregnancy rates to the end of December.

III. RESULTS

The pregnancy rates recorded are summarised in Table 1.

(a) Pregnancy rates to the end of December

Over the six-year period the mean pregnancy rate of 59 per cent for two-year-old maiden heifers was significantly higher ($p < 0.01$) than the rates of 43 per cent and 47 per cent recorded for three-year-old lactating, and mature cows respectively.

All age groups showed significant ($p < 0.01$) differences between years.

(b) Pregnancy rates to the end of March

At the termination of mating at the end of March, there were no significant differences between age groups. In the case of the two-year-old maiden animals and mature lactating cows, the differences between years were not significant. The three-year-old lactating cows showed significant ($p < 0.01$) differences between years. Annual variation was not significant over the whole herd.

(c) Effect of rainfall on pregnancy rates to the end of December

The regression of whole herd pregnancy rate to the end of December on the rainfall from May-October was not significant.

However, the following, regression equation relating pregnancy rates (P) and rainfall for November to April (R) was significant ($p < 0.05$):

$$P = 4.59 + 1.266R$$
$$(r^2 = 0.93)$$

IV. DISCUSSION

In a number of breeding herds in central Queensland, the calf which results from conception early in the mating period is regarded as a superior animal because of its higher weaning weight, and potential for early turn-off.

The results show that a proportion of such calves. could be obtained in all the years of these observations, but that in all years the mating period had to be extended past December in order to achieve an acceptable level of pregnancy.

The higher fertility of maiden heifers compared with all other groups is regarded as an effect of lactation stress on the older cattle, resulting in lower body condition at commencement of mating. Barr (1971) has reported an interaction of lactation and body condition in delaying conception in beef cattle. An additional factor is the calving spread associated with a mating period of six months.

Heifers are available at commencement of the mating season if sufficiently well grown, while cows conceiving late in the previous season would have little opportunity to conceive again before December. Using the present system, however, there is ample opportunity following seasonal rains in November and December for smaller heifers to reach maturity, for cows in poor condition to overcome the effect of lactation on an improving plane of nutrition, and for late calving cows to re-commence the reproductive cycle and conceive.

The differences between years in the proportion of cows conceiving by the end of December can be largely explained by the correlation between November to April rainfall with subsequent pregnancy rates. Subject to adequate summer (November-April) rainfall, the low stocking rates involved were accompanied by the development of a reserve of surplus grass at the end of the growing season. In the dry climatic conditions which prevail from May to October, this surplus provides sufficient feed to enable cattle to improve the quality of their intake by selection to the extent of a maintenance ration (Story 1967). If the initial surplus is not sufficiently large, the better quality feed is soon depleted, and nutritional stress with accompanying loss of weight and body condition commences early in the dry season; thus, by the commencement of the mating season, cows have depleted their reserves of body condition. Donaldson, Ritson and Copeman (1967) showed that pregnancy rates were higher in cows in good body condition than those in poor condition.

The marked difference between years in pregnancy rates at March 31 in three-year-old lactating cows was associated with the 1966/67 mating season. This group of cows had a markedly lower liveweight when their first calves were weaned than comparable groups in other years. These breeders were yearlings in the 1965 drought and their growth had been adversely affected. It is probable that the reduced breeding performance observed in 1966-67 was a residual effect from this drought year.

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