

SELECTION, SUPPLEMENTARY FEEDING AND FERTILITY RECORDS OF A BEEF CATTLE BREEDING HERD

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Summary

Selection in a closed breeding herd is based mainly on weight gain from weaning to two years and on type, but some attention is given to fertility in females and to a lesser extent in males.

An analysis of the breeding records from 1962-1967 showed that of 585 cows that were pregnant two or more times, 4% were pregnant in four consecutive years, 13% in three and 5 1% in two consecutive years. Two mating periods, February-March and September-October, proved equally effective except with heifers and in times of drought. Cattle aged two and three years had lower pregnancy rates than older cattle due largely to nutritional stress, vibriosis and the stress of lactation.

Supplementary feed is given in the dry season and comprises 60% hammer-milled grain sorghum or maize, plus equal weights of urea, meatmeal, and salt. This is mixed on the property and given in troughs. Adult cattle consume 16 ozs (454 g) /head/day at a cost of 5 cents/head.

I. INTRODUCTION

Kelly (1959) made an economic survey of the beef cattle industry in North Queensland and described various systems of cattle management. The industry utilizes an area of about one hundred thousand square miles where, with the exception of a narrow coastal strip, cattle are both bred and fattened. The high rainfall of the coastal strip makes possible the establishment of pastures very suitable for fattening steers, and the day is approaching when the drier inland areas will concentrate only on breeding and will send young steers away to fatten thereby making room for more breeders.

In the northern breeding areas, good rains fall from two to four months each mid-summer and the native pastures flourish and the livestock grow well. In general, however, this period soon gives way to another period of eight to ten months duration when little rain of any value falls and the only feed available is dry and of low nutritive value. Usually bulls run with breeding cows all the year round and the majority of matings occur during December and January when storm rains fall and fresh feed is available (Donaldson 1962). Consequently, large numbers of cows calve in October and November when feed supplies are poor and many cows and calves die. On many properties, less than one-third of the females branded ever reach the market for slaughter because so many are required as replacements for the breeding herd.

Since 1950, a general programme of herd and property improvement has been undertaken at Meadowbank, Mt. Garnet, Queensland. Rankine and Donaldson (1968) have described the property and the general cattle management procedures. An integral part of the programme has been a system of herd recording, field

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investigation and liaison with scientists of the Queensland Department of Primary Industries, C.S.I.R.O. and private industry. This paper records some of the results of this liaison and these investigations.

II. GENETIC IMPROVEMENT THROUGH SELECTION FOR PRODUCTION

About 16 years ago, Brahman bulls were introduced into the Shorthorn herd on Meadowbank, and by 1956 it was possible to assess the results. The Brahman infusion looked promising because it increased resistance to cattle tick and improved hardiness, aggressiveness towards dingoes and other qualities necessary for survival in Meadowbank's difficult environment. In 1960, the herd was closed to further introduction of bulls from other properties.

Previously, the selection of replacements for the breeding herd, both male and female, had been based on subjective visual criteria such as conformation, temperament, bone structure, shape of head, length of leg and so on. Above all, replacement bulls had to be in good fat condition. Whether condition reflected a natural ability to do well, or whether it was the result of expensive supplementary feeding was not taken into account. The outcome of this sort of selection was low production and high wastage from the herd.

Selection is now made for three essential characteristics, namely ability to survive, to reproduce regularly, and to grow quickly. This programme has made it necessary to have groups of bull calves of near uniform age so that valid measurements of weight for age can be made and used as a basis for selection. This is done by using two mating periods (Rankine and Donaldson 1968) so that cows calve in November and December or June and July. At branding at about four months of age, approximately 25% of the male calves and all the females are ear-tagged. The male calves are selected initially on the basis of size and conformation, the largest and best looking calves being selected. Usually 40-50 bull calves are kept and reared as a group. After weaning, they are weighed and kept in a yard for several days to quieten them and make them more used to handling. They are fed lucerne hay. They are then put in a weaner paddock for about one month and then moved around other paddocks that are convenient for feeding a supplement (Donaldson 1966) and for mustering for weighing.

At two years of age, the bulls that have shown the fastest rates of gain and are free of defects, such as a large pendulous prepuce, are selected. They are mated with heifers of their own age, and in the general herd. Bulls are usually used for one year (two matings) only. Thus there is an annual turnover of bulls, maximising rate of genetic change. It is difficult to support with data the belief that genetic improvement is occurring, because of the between year and seasonal variations in management, growth rate and reproductive performance. However, in 1956 bullocks were sold for slaughter at 4.5 to 5.5 years of age at a mean carcass weight of 272 kg. In 1967, bullock carcasses weighed 227 kg at 3 years of age: In 1956 no bulls were sold for use in other herds whereas in 1960, 20 bulls were sold and in 1967, 50 bulls were sold.

Increasing emphasis is being placed on fertility in the selection of both males and females on the bases, and by the methods discussed, in the next section. Some culling of heifers is done before mating because of slow growth rate since weaning

and other obvious faults. These faults include lack of breadth and depth of frame and lack of Brahman type qualities such as sleek coat and looseness of skin (these faults are also considered in bull selection). These are qualities which experience and research (Turner and Schleger 1960) have shown to be associated with good performance in the northern environment.

III. REPRODUCTIVE PERFORMANCE

Rankine and Donaldson (1968) reviewed some of the literature relating to the reproductive efficiency of north Queensland cattle herds. The pregnancy percentages for all cows and for lactating and non-lactating cows are shown in Figure 1. These values are the number of cows pregnant expressed as a percentage of the number tested for pregnancy by rectal examination two months after the conclusion of mating. The number of cows tested after each mating is shown at the bottom of the graph with the rainfall registrations for the six months to the end of the mating. The low pregnancy rate in February-March 1963 was attributable in part to an outbreak of brucellosis. Both mating periods produced similar pregnancy rates except for two year old heifers and in times of drought (1964 and 1966). In these years, the September-October mating was ineffective. Cumulative rainfalls over six months were not related to performance of cattle, except following drought.

A total of 4,406 cows have been examined after matings between February-March 1962 and September-October 1966. The percentages in each of the body condition classes 'fat', 'forward store', 'store' and 'poor' were 38, 2 1, 2 1 and 22

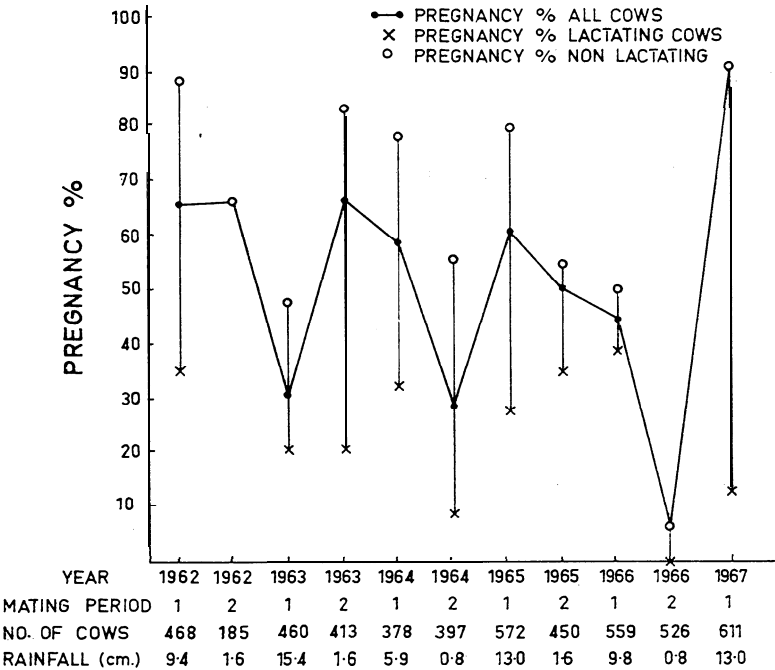


Fig. 1.—The pregnancy percent in various classes of cattle two months after the end of a February-March (Period 1) and a September-October (Period 2) mating, 1962- 1967. The rainfall registrations for the six months ending March or October are given.

respectively. Within each of the classes, the percentage lactating were 4, 19, 69 and 90, and the percentages pregnant were 68, 51, 33 and 20 respectively. In all, 40% of the cattle were lactating and 27% of the lactating cows were pregnant. It should be noted that these are not annual figures but means for each mating. Short mating periods have resulted in low fertility in this environment. This led to the use of the two restricted mating periods per year to achieve calving rates comparable with continuous mating systems, while retaining the management advantages of controlled mating. The distribution of body condition classes indicates that poor nutrition is a serious problem.

The relationship between pregnancy rate and age for cows examined from 1962 up to the February-March mating 1966 is shown in Figure 2. Pregnancy rate rose till four years of age and remained at the 50-60% level until nine years of age and then declined slightly. The lower fertility in heifers can be largely attributed to nutritional stress and vibriosis, and, in the three year olds, to the additional stress of lactation. The mating of heifers in September-October has not been effective and usually all heifers are now mated in February-March (Rankine and Donaldson 1968).

Infertility is, therefore, a major problem in this environment and fertility is becoming a key criterion for the selection of females. Until the last two years selection has not been possible because of low reproductive rates and the large number of replacement females required in a situation where numbers of females were being increased from approximately 300 to 1,000. All non-lactating cows are culled if found non-pregnant when tested two months after mating. As many non-pregnant lactating cows are culled as is possible, starting with the older age groups. Detailed breeding records are kept for each cow and yield information on which to base selection for fertility. Analysis of the records 1962-1966 showed that 585 cows were pregnant two or more times (48 % twice, 42% three times and 10% four times). Of this total 4% have been pregnant in four consecutive years, 13 %

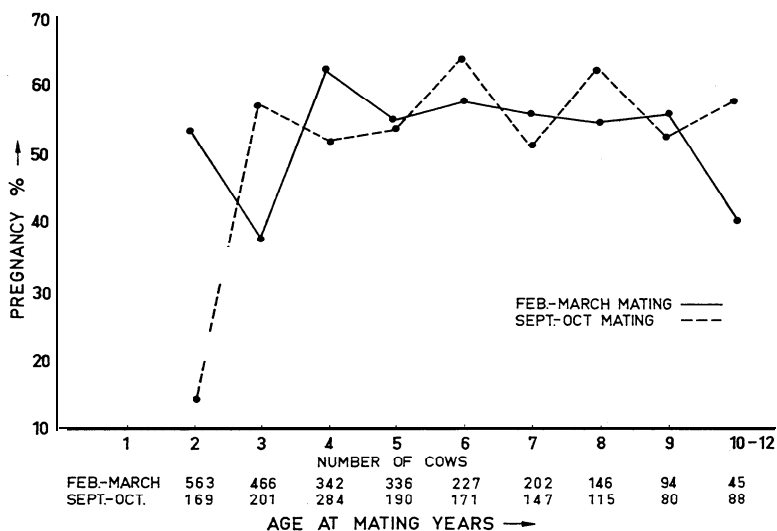


Fig. 2.—The pregnancy rate in cows aged 2-12 years for each of two mating periods.

in three and 51% in two. These results were obtained in an environment characterized by nutritional stress, and diseases such as vibriosis, leptospirosis, brucellosis, infectious and pustular vulvovaginitis.

Male fertility has not been ignored but difficulty has been experienced in placing emphasis on male fertility under the system of bull usage described. Bulls have been examined on a number of occasions and shown to have normal semen quality. Bulls noticed to have low libido are rejected but no system of testing for libido has yet been introduced. Variation in fertility between bulls in single sire mating groups has been observed: the percentage of cows in calf in 10 single sire groups ranged from 27 to 82 % . Donaldson (1962) reported a 19 % 'incidence of lack of sex drive, and of 23% for posthitis and prolapse of the prepuce in bulls of one breed in north Queensland. These figures illustrate the need to select bulls for fertility.

IV. SUPPLEMENTARY FEEDING

Supplementary feeding on Meadowbank was described by Donaldson (1966). The feeding of protein, urea, and phosphate supplements reduced weight loss in weaners at pasture over the dry season, and reduced weight losses and deaths in cows. Vitamin A and cobalt supplementation did not prove beneficial. The feeding system has been further developed and now the mixture comprises 60% hammer-milled grain sorghum or maize plus equal weights of urea, meatmeal and salt. The supplement is fed to cows *ad libitum* in troughs after calving in November until storm rains provide a new growth of grass. This dry ration is licked up at the rate of 16 oz (454 g)/head/day by adult stock and costs (fed at Meadowbank) 5 cents per lb (1 1c/kg). In drought years, a supplement is given before calving and before body condition begins to deteriorate. In a severe drought, when dry standing roughage becomes scarce, the supplement loses effectiveness. In the drought at the end of 1966, 50 pregnant cows out of 180 died as the result of undernutrition and the stress of pregnancy. Deaths occurred in the last two months of gestation but not at calving. It is extremely difficult to evaluate the effects of supplementary feeding because the animals cannot be handled at these times.

Supplementary feeding has markedly reduced losses of cattle during the dry season. However, no increase in reproductive performance has been detected. This may be because the level of supplement is too low or that other environmental factors such as disease still exert an even larger influence on fertility.

Cattle refuse to take the supplement during the wet season.

V. ACKNOWLEDGMENTS

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