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NUTRITION OF WEANER BEEF HEIFERS; GROWTH, PUBERTY AND YEARLING MATING ON HILL COUNTRY

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SUMMARY

Three trials were carried out in 1978, 1979 and 1980 in which weaner beef heifers of two breeds were offered two pasture allowances over the autumn-winter period to generate different mean liveweights at yearling mating. Pasture offered during the autumn-winter period ranged from 2 to 8 kg DM/100 kg liveweight. All groups were offered 6 kg DM/100 kg liveweight during the spring and mating periods.

Liveweight gain was closely related to pasture allowance and average liveweights of 235 to 285 kg at the start of yearling mating resulted. Over the range 250 to 285 kg there was little effect on in-calf rate.

The attainment of puberty was more dependent on liveweight than age so that poorly-fed heifers reached puberty later than well-fed ones. The Hereford x Friesian heifers grew faster than their Angus contemporaries.

INTRODUCTION

Level of nutrition after weaning affects liveweight at yearling mating and also the time taken to reach the weight and age at which puberty occurs. This can effect the subsequent pregnancy rate in yearling heifers (Wiltbank *et al.*, 1969).

Carter and Cox (1973) concluded that yearling Angus heifers mated at weights greater than 195 kg can be successfully bred. In contrast Packard (1978) and Hanly and Mossman (1977) recommended joining weights of 250-290 kg and 270 kg respectively for Angus cattle.

The current series of three trials aimed to feed Angus and Hereford x Friesian (H x F) heifers to reach a range of yearling mating weights and to determine effects on subsequent performance over several calvings. This paper reports the effects of the treatments on the onset of puberty and yearling mating.

EXPERIMENTAL

In each of the three years about 80 weaner heifers, aged approximately 8 months were allocated to two pasture allowances until the end of the winter. The groups (still separate) were then offered

similar pasture allowances until joining when they were randomised across treatments into two balanced groups. Over both these latter two periods the heifers were offered 6 kg of pasture DM /100 kg liveweight.

The cattle were weighed monthly and oestrus activity was determined. Entire mating commenced about November 1 and lasted for 42 days. As birth date information was missing on half the 1978 Angus heifers, day of the year at first oestrus was analysed rather than age.

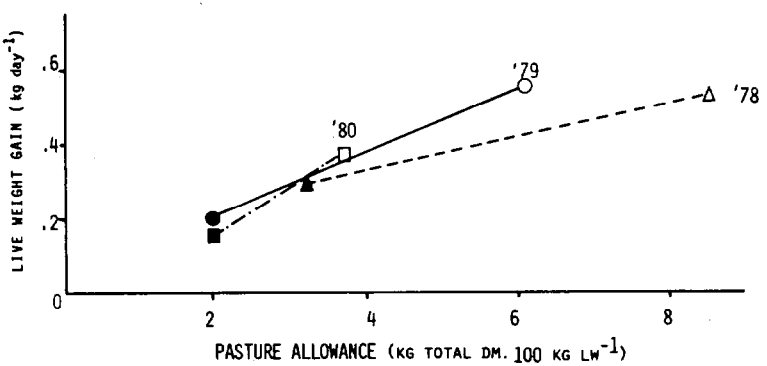

FIG 1: *The influence of pasture allowance over the autumn winter period on daily liveweight gain.*

RESULTS

LIVEWEIGHT

Pasture offered and liveweight gain (LWG) over the autumn-winter period are shown in Fig. 1. The 1978 autumn was very dry and LWG (0.5 kg/head/d) of the well-fed group was mediocre. In each year, treatment had a significant effect on liveweight at the end of the winter and before and after mating ($P < 0.01$; Fig. 2). Over all years a range of mean joining weights from 235 to 290 kg was achieved. In 1980 only this effect appeared as a treatment x breed interaction on end-winter and pre-joining weights ($P < 0.05$). LWG in the early spring ranged from 0.9 to 1.3 kg/head/d. There were no significant interactions of treatment with initial liveweight.

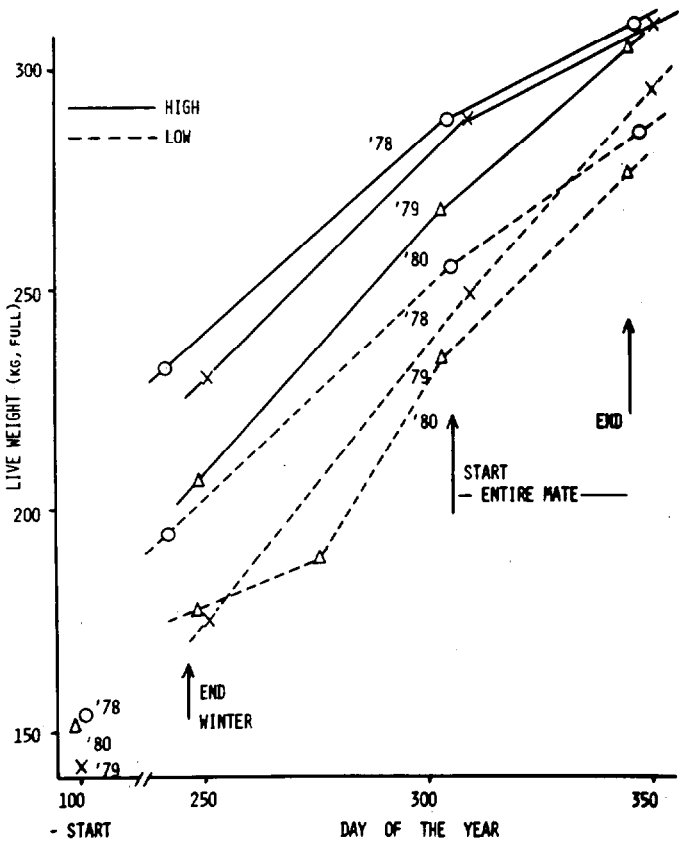

FIG 2: *Liveweight of the heifers at the end of the winter and before and after joining.*

OESTROUS ACTIVITY

Treatment did not affect liveweight at first oestrus in the first two years. However, in 1980 the "lows" reached oestrus at a lower weight than the "highs" (249 v 267 kg, $P < 0.05$). Initial liveweight was a significant covariate in 1978 ($P < 0.01$). Mean liveweight at first oestrus over all breeds, years and treatments was 258 kg.

Treatment significantly affected day of the year of first oestrus in 1978 ($P < 0.01$) and age at first oestrus in 1979 and 1980 ($P < 0.01$). In all years, the mean day of first oestrus in the lower groups did not occur until after entire mating commenced (Fig. 3).

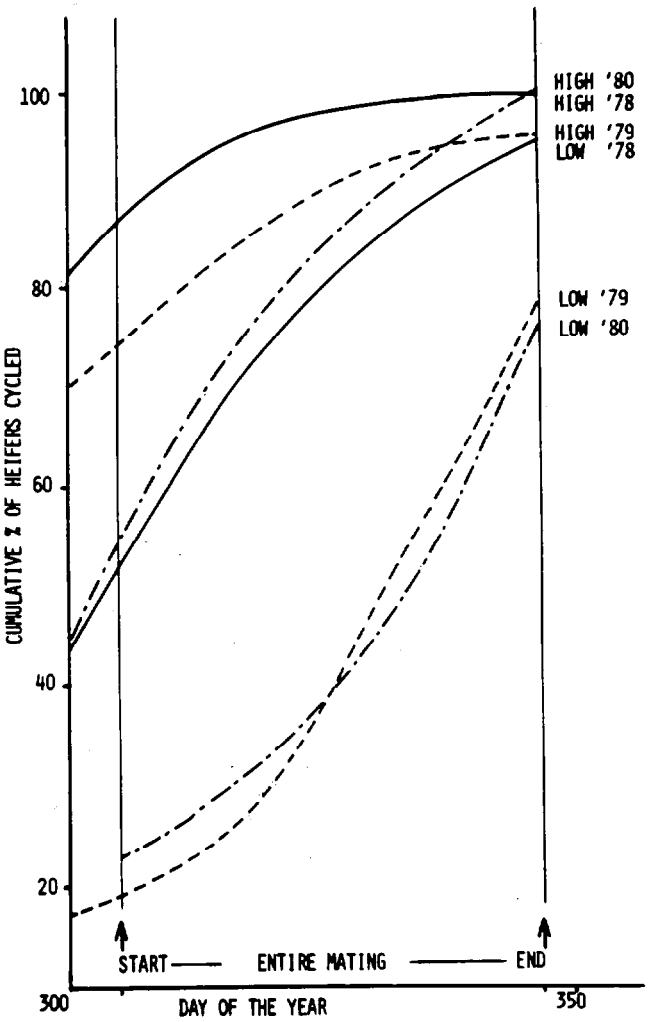

FIG 3: *The cumulative % of heifers reaching puberty during entire mating.*

These effects were reflected in day of conception in all years ($P<0.05$), the "lows" conceiving 4, 8 and 11 days later than their contemporary "highs" in 1978, 1979 and 1980 respectively.

There were no differences in the percent of heifers diagnosed in calf in the 1978 and 1979 trials but in 1980 the "lows" had a lower in-calf rate (56% v 88%) than their contemporary "highs" ($P<0.05$).

Breed Effects

The H x F heifers generally grew faster than the Angus. There was no effect of breed on weight at first oestrus. In 1978, H x F heifers showed oestrus 12 days earlier than their Angus contemporaries ($P < 0.01$).

DISCUSSION

The results in Fig. 1 demonstrate that during the autumn-winter period it is difficult to restrict heifers of the type described here to a LWG less than about 0.15 kg/d in a rotational grazing situation unless they are grazed to very low residual herbage levels (less than 600 kg DM/ha) assuming other factors are not limiting. In the autumn of 1978 the swards contained a high proportion of dead DM and had low levels of herbage mass. This explains the mediocre LWG of the well-fed group in the autumn-winter of that year. However, a daily LWG above 0.6 kg/d in the winter is difficult to achieve unless high levels of residual herbage mass can be tolerated.

In the spring period daily LWG was always very high. In a rotational grazing situation with both anthelmintic drenching and adequate levels of standing DM/ha, it appears possible to produce yearling heifers of 250 kg average liveweight regularly by November mating. However, this probably needs to be tested in a more extensive slow rotation or set-stocking situation.

The trials indicate that level of nutrition affects the age of onset of puberty rather than the liveweight at which it occurs except in conditions of very poor nutrition as in 1980.

Unless yearling heifers are joined at an average liveweight of 250 kg or more it is unlikely they will all conceive because they will not all reach puberty before the end of a 6-week joining period. The suggestion by Carter and Cox (1973) that Angus heifers can be successfully bred above 195 kg must apply only to those few animals that cycle at this low weight which seems excessively low for most circumstances.

Even so, yearling heifers which commence mating at 250 kg could have a delayed mean conception date compared with heavier animals by up to 8 days. Joining the heifers several weeks earlier may not help as they will be lighter. They will also take about 0.7 days longer to cycle after the following calving for every day earlier that they are mated (Knight and Nicoll, 1978).

The differences between the two breeds confirm other work (Baker *et al.*, 1981) that the Friesian crossed with traditional beef

breeds shows superior growth rates and consequently earlier attainment of puberty depending on initial liveweight. This is a distinct advantage in favour of the crossbred Friesian heifer.

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