

RESEARCH NOTE

REDUCING THE COMPETITION FOR FEED TO FACILITATE THE MATING OF HEIFERS AS YEARLINGS

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The economic advantages associated with breeding heifers to calve as two-year olds have been well-demonstrated (Pope, 1967; Pinney, Stephens & Pope, 1972; Harwin & Lombard, 1974; Meaker, 1978). Critics of this practice cite the frequency of assistance required at parturition (Pattullo, 1973; Meaker, 1978) together with a reputed lowering of the conception rate as first-calvers and a possible reduction in the mature size of the breeding cow as disadvantages of early mating (Snapp & Neumann, 1960; Tracey, 1963).

For calving at an early age to succeed in practice, management procedures require to be modified. These adjustments include judicious choice of the breed of sire to limit the size of the mature foetus, close supervision at parturition and a nutritional level which will not inhibit the growth rate of the young lactating female.

To apply a system of early mating successfully, the first requirement is that the yearling heifers should reach puberty prior to, or during the annual breeding period. At this time the heifers would be 14–15 months old and they can be expected to have exhibited oestrus (Harwin & Lombard, 1974). Within a particular breed-type, puberty is closely associated with bodymass, although age has an important influence. The nutritional regime to which a female is exposed can modify these relationships (Wiltbank, Gregory, Swiger, Ingalls, Rothlisberger & Koch, 1966; Penzhorn, 1975; Meaker, 1978).

The first culling of replacement heifers commonly occurs in autumn when they are weaned from their dams. At this time there will be a variation in the bodymass of the group selected. It is a simple matter to calculate the growth rates that must be realised for puberty to be reached timeously. However, when heifers are fed as a single group during the first winter, as is usually done in practice, the differential growth rates required, are not easy to achieve. In fact, competition for the limited feed available often aggravates differences in size which were manifested at weaning. An investigation was therefore initiated to examine the effect of reducing competition and of applying differential feeding levels (Wiltbank, 1976) on the success with which yearling heifers could be mated.

A group of 68 weaner heifers, consisting largely of British crossbreds (Angus, Hereford and Sussex) as purchased locally. The livemass varied from 170–260 kg and the age in mid-June was 8–10 months. Wiltbank (1976) proposed that for 85–90% of British breed heifers to commence cycling at 14–15 months of age the bodymass should be between 295 and 330 kg, depending on breed. Accordingly, the animals were randomized into a “divided” and an “undivided” group. In order to reach an average bodymass of 290 ± 10 kg at mating the undivided group was fed a daily ration of 15 kg maize silage and 1,5 kg broiler litter. The divided group was separated into three sub-groups, according to bodymass, with the light (< 191 kg), medium (191–214 kg) and heavy (> 214 kg) sub-groups being fed differently and separately (Table 1) so that the mass of the individual sub-groups would average 290 kg at the commencement of the breeding period. The undivided group was confined to an open winter-feeding pen (45 m x 35 m) with a 45 m feeding trough along one side. The sub-groups of the divided group were maintained in similar pens (35 m x 35 m) with 35 m trough space per sub-group.

The planned growth rates were exceeded (Table 1) with only 2,8% of the divided group not achieving a mass of 280 kg (290 minus 10 kg). In contrast, 18,2% of the heifers in the undivided group were below 280 kg. In the latter group the coefficient of variation of the bodymass increased from 9,6% at the start of the winter period to 10,9% at the end of the winter-feeding period. The corresponding figures for the divided group were 8,6 and 6,4%. The average feeding cost of the former group was however, lower than the R32,53 average for the divided group (Table 1).

When the breeding period commenced on 29 October, 1977, the sub-groups which comprised the divided group were combined and the animals of both groups were then fed 11,7 kg maize silage, 1,8 kg *E. curvula* hay and 1,2 kg broiler litter per day. Observations for oestrus were made twice daily for 45 days. A single insemination with frozen semen (Brahman) was performed between 16h00 and 17h00 for heifers

Table 1

Changes in bodymass of weaner heifers overwintered to control the rate of gain by differential feeding and by reduction of competition for feed

	Overwintered as:						
	A divided group				An undivided group		
	Bodymass category				Categorized as for "divided" group:		
	Heavy	Medium	Light	As fed	Heavy	Medium	Light
Number of animals	12	11	12	33	10	10	13
Mean bodymass (kg) at:							
15 June (weaning)	222±3,3	202±1,7	186±0,6	203±3,4	224±6,3	203±1,7	183±2,5
29 October (onset mating)	317±6,5	300±4,3	300±5,3	302±6,9	333±5,7	304±6,6	272±7,0
23 March	375±7,2	363±7,0	351±4,1	361±7,7	398±8,7	362±8,1	329±9,7
% < 280 kg at breeding	0	0	8,3	18,2	0	0	46,2
Mean A D G during winter period (136 days)	0,70±0,03	0,73±0,03	0,85±0,03	0,74±0,02	0,81±0,03	0,79±0,04	0,66±0,04
Daily ration (kg):							
Maize silage	6,2	15	15	15			
<i>E. curvula</i> hay	1,7	--	--	--			
Broiler litter	1,5	1,5	1,5	1,5			
Maize meal	--	--	2,0	--			
Mean cost/day (cents)	11,20	22,27	39,20	22,27			
Mean cost/winter (Rands)	15,0	29,84	52,53	29,84			

Table 2

Reproductive performance of yearling heifers when overwintered in order to reduce variation in size at mating

	Overwintered as:					
	A divided group			An undivided group*		
	Bodymass category			Bodymass category:		
	Heavy	Medium	Light	Heavy	Medium	Light
Mean days to first oestrus	13,7±2,3	9,8±2,3	8,6±1,6	9,9±4,0	7,5±2,1	10,0±2,0
Mean days to conception	16,7±2,5	11,7±2,6	16,1±1,2	19,2±3,9	9,0±3,4	9,8±1,9
Conception rate (%)	83,3	90,9	92,5	90,0	60,0	84,6
Average for group		88,6			78,8	
Services / heifer	1,4	1,2	1,3	1,2	1,4	1,6
range	1-2	1-2	1-2	1-2	1-3	1-3
Services / pregnant heifer	1,5	1,3	1,6	1,4	2,1	1,8

* Fed as a single group, but sub-divided for comparison with "Divided" group.

observed to commence oestrus prior to 07h00. Similarly, animals which stood for mounting in the afternoon were bred after 07h00 the following day. During the latter half of the mating period heifers which exhibited oestrus after 07h00, but before 16h00 were inseminated at the afternoon breeding and again the following morning.

All heifers exhibited oestrus and the delay to first oestrus (Table 2) did not indicate any treatment differences. The pregnancy diagnosis (rectal palpation) performed on 23 March showed that a greater proportion ($\alpha^2=0,586$; $P<0,5$) of the divided than of the undivided group had conceived. There was also a tendency for the number of services per heifer that became pregnant to increase where the heifers were fed as a single group (Table 2).

Should the total overwintering costs for the two systems of management be apportioned amongst those heifers which had attained the desired bodymass it is obvious that sub-dividing the heifers reduced the cost

from R36,47 (undivided group) to R33,41. On the basis of heifers conceiving, the difference in favour of the divided group was reduced to R1,14. This relatively small saving in cost, brought about by sub-division and differential feeding, could perhaps be due to the fact that all the groups achieved an average bodymass which was in excess of that judged to be necessary viz., 290 kg. If the feeding had been less liberal, the treatment difference could possibly have been magnified.

The results obtained indicate that beef heifers can be successfully mated as yearlings with a short breeding period of only 45 days. The sub-division of weaner heifers on a livemass basis and differential feeding of these groups prior to mating can improve the overall results, especially where feed is fed on a rationed basis.

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