Failure to demonstrate a relationship between beef bull libido and conception rate

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The relationship between beef bull libido and conception rate following a 21-day breeding period was investigated over two seasons. Libido was defined as the number of services completed during a 10-minute exposure to a restrained oestrous female. In the first year bulls which achieved a mean libido score of three or more services were compared with bulls which achieved a mean of one service. In the second year a mean score of six or more services was compared with a mean of three services. Bulls were joined as single sires at a bull to female ratio of 1:35 in the first and 1:40 in the second year. Libido, as measured in this study, did not influence conception rate significantly.

Die verwantskap tussen libido en besetting by vleisbeeste is gedurende 'n teelseisoen van 21 dae oor twee seisoene ondersoek. Libido is gedefinieer as aantal voltooide dekkings gedurende 'n 10-minute-toets saam met 'n ingeperkte koei op hitte. In die eerste jaar is bulle wat 'n gemiddelde libidotelling van drie of meer dekkings behaal het, vergelyk met bulle met 'n gemiddelde van een dekking. In die tweede jaar is 'n gemiddelde telling van ses of meer dekkings met 'n gemiddelde van drie dekkings vergelyk. 'n Enkel bul per groep is teen 'n verhouding van 1:35 in die eerste en 1:40 gedurende die tweede dekseisoen gebruik. Libido, soos uitgedruk in hierdie studie, het geen betekenisvolle invloed op besetting gehad nie.

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Introduction

Under conditions of natural mating the bull must ensure that every cow capable of producing a calf does so. In order to fertilize an acceptable number of females the bull must produce sufficient semen of good quality and possess a high level of sex-drive to seek out receptive females which are then mated with a high degree of expertise. According to Blockey (1980) farmers mate more bulls per 100 females than is necessary to ensure good herd fertility. Thus, by identifying high-libido bulls the producer can effectively reduce bull costs per calf and obtain more calves earlier in the season (and therefore improved weaning masses) as a result of higher first oestrus conception rates (Blockey, 1978).

Serving capacity, the number of services completed during a 30-minute pen test, is positively related to conception rate following veld mating (Blockey, 1978; Lunstra, 1980). Christensen, Seifert & Post (1982), however, found no such relationship.

Application of the serving capacity test (bulls tested in groups of three - five animals) to small groups of mixed-age bulls, poses a problem in that age is related to position in the social hierarchy, which is in turn related to sexual behaviour (Blockey, 1981). The libido score test (Chenoweth & Osborne, 1975) in which bulls are tested as individuals represents an alternative to the serving capacity test. Reports on the relationship between a bull's performance on the libido score test and conception rate following herd mating are limited. Sullins, Tomky, Farin, Chenoweth & Pexton (1979) found that high libido bulls (average score of 9,7 on a scale of 0 - 10) served a greater proportion of the females available and achieved better conception rates than medium libido bulls (average score 7,8). Makarechian, Farid & Berg (1983) could not confirm these results. In a trial using Santa Gertrudis bulls Smith, Morris, Amoss, Parish, Williams & Wiltbank (1981) found that libido score (number mated/ number in oestrous × 100) was positively correlated with conception rate (r=0,44).

In the light of the highly significant relationship between number of services completed in the libido score test and serving capacity (Crichton & Lishman, 1985) it seems feasible to use the individual test to predict veld mating performance expressed in terms of conception rate.

The aim of this study was therefore to link the number of services completed in the libido score test to conception rate when bulls are mated as single sires to relatively large groups of cows for a limited period of time.

Procedure

The trial was repeated over two breeding seasons, 1983/84 and 1984/85. Libido (number of completed services) was determined by exposing individual bulls to a restrained oestrus-induced ovariectomized cow for 10 minutes following at least 10 minutes of sexual stimulation (Chenoweth & Osborne, 1975). In the month prior to the start of mating in each year bulls were examined for breeding soundness. A single ejaculate was evaluated for motility and per cent abnormal sperm according to the method of Roberts (1971). Bulls were determined fertile (progressive

rapid movement of sperm and less than 10% abnormalities) and had scrotal circumference greater than 35 cm.

In the first season 16 and in the second season eight Sussex bulls were subjected to three and four libido tests respectively. A given bull's libido score was determined by taking the mean of his two best scores. Six bulls were selected for mating in year 1 and four in year 2. In the first year three of the six bulls achieved mean scores of more than three services (3,5; 3,5 and 6,0), whereas the remaining three bulls achieved mean scores of one service each. Two of the four bulls in year 2 achieved mean scores of more than six services (6,5 and 7,0) and the other two bulls scored three services each. The number of bulls was reduced in the second season in order to place bulls under greater mating pressure. Bulls were joined to females in single-sire herds.

In 1983/84 the cow herd (n=230) consisted of 152 lactating and 36 dry Sussex cows together with 42 Simmentaler-cross heifers. In 1984/85 the herd (n=218) consisted of 173 lactating and 45 dry cows, no heifers were present. Bulls were thus joined with groups of 38 - 39 females in 1983/84 and 54 - 55 females in 1984/85.

Prior to the start of mating cows were evaluated for body condition (van Niekerk & Louw, 1982) and palpated rectally to determine the cyclic status of their ovaries. Cows were allocated to breeding herds in accordance with age, calving date, condition score, lactational status, and ovarian activity. In this way each bull received a uniform herd of females.

The bulls were placed with the cows for a period of 35 days. The incidence of heat cycles and of mating activity was determined by twice daily observation (5h00 and 16h30), heat mount detectors (first season only), and chinball markings from harnesses fitted to the bulls. Following termination of the trial cows were placed with clean-up bulls until the end of the season. These bulls were fitted with harnesses containing ink of a different colour to that used previously.

A rectal pregnancy diagnosis was made 4 months after the termination of the breeding season and the age of the foetus estimated. Successful conceptions were determined on the basis of heat-spotting data, pregnancy diagnosis and duration of gestation.

Cows were grazed on veld (Natal Sour Sandveld; Acocks, 1975). Veld utilization was carefully monitored and groups were most often grazed in camps adjacent to one another in order to minimize any differences in veld quality and quantity.

The majority of cows cycled within 21 days of the start of mating. For the purposes of statistical analysis cows which cycled after 21 days were omitted. Therefore bulls were evaluated over a period during which mating pressure was most intense and second oestrous conceptions were effectively excluded denying poorer bulls more than one opportunity to impregnate a female. Any changes in bull and/or cow fertility were accounted for by subdividing the season into seven 3-day intervals, conception rate being determined for each interval.

A split-plot analysis was used (Rayner, 1967). The higher and lower scores in each year were treated as whole plots and the seven time intervals as sub-plots in the design. The relationship between conception rate for each 3-day interval and the number of cows cycling, lactating, with an interval from calving to cycling of $\leq$75 days and an interval of $\leq$80 days, was examined using linear regression analysis (Rayner, 1967) for both years. The relationship between conception rate and the number of cows with condition score $\leq$2,0 and $\leq$2,5 was evaluated for 1984/85 (there being no heifers in this year). Variates which had a significant effect on conception rate were included as covariates in the split-plot analysis.

Results

The mean condition score ($\pm$ *SE*) for lactating cows which cycled during the first 21 days of the season was 2,53 ($\pm$ 0,51) and 2,55 ($\pm$ 0,46) in 1983/84 and 1984/85 respectively. The mean ($\pm$ *SE*) calving to cycling intervals for years 1 and 2 were 87,9 ($\pm$ 17,5) and 84,6 ($\pm$ 13,0) days respectively.

In 1983/84 the number of cows cycling in any 3-day interval and the number with a calving to cycling interval of $\leq$ 75 days significantly depressed conception rate ($P < 0,05$). During 1984/85 the number of cows lactating and number with a calving to cycling interval of $\leq$ 75 days had a significant negative effect on conception rate ($P < 0,05$), whereas number cycling, number with condition score <2,5, and number with calving to cycling interval $\leq$80 days tended to depress conception rate ($P < 0,10$).

A greater proportion of cows did not cycle during the second season (from the start of breeding to the start of clean-up) when compared with the first season (16,1 versus 5,2%). Furthermore, 10,6% cycled after the first 21 days in year 2 as opposed to 4,4% in 1983/84. Cows which did not cycle at all were generally in poor condition.

The mean $\pm$*SE* number of services completed in the libido tests was 2,0 $\pm$1,0 (n=16) in 1983/84 to 4,0 $\pm$ 2,0 (n=8) in 1984/85.

Bull libido score had a non-significant effect on conception rate in both years (Table 1). In the first year the interaction (score $\times$ time interval) was significant ($P < 0,05$). No trend was however evident and differences were not consistently in favour of any one group of bulls.

Conception rate increased significantly ($P < 0,05$) over time interval during 1984/85 (Table 1). The increase was not consistent. The F-value for the interaction was significant at the 10% level. Again (as for 1983/84) no trend was evident.

The increase in conception rate in 1984/85 was accompanied by a simultaneous increase in the interval from calving to cycling ($P < 0,05$). Although this interval increased ($P < 0,05$) over the 1983/84 season, conception rate did not increase concurrently.

Discussion and Conclusions

During the second season the number of cows lactating had a significant influence on conception rate. This was not the case in 1983/84. The interval from calving to cycling increased over time in both years and a longer post-partum interval would have improved the chances of conception in

Table 1 The mean conception rates adjusted for covariates for two libido score treatments over seven 3-day time intervals during two breeding seasons, 1983/84 and 1984/85[1]

Year	Libido score		Time interval 1	2	3	4	5	6	7	Treatment means
1983/84	More than 3 services (n=3)	Mean conception[2] rate (%)	79,3[c]	87,2[c]	64,5[c]	96,3[c]	96,6[c]	90,9[c]	70,5[c]	83,6
	1 service (n=3)	Mean conception rate (%)	74,4[c]	79,9[c]	89,6[c]	87,4[c]	61,6[d]	82,9[c]	88,8[c]	80,7
		Mean conception rate (%) for each time interval	76,9	83,5	77,1	91,8	79,1	86,9	79,7	
1984/85	More than 6 services (n=2)	Mean conception rate (%)	55,8	69,5	71,6	63,2	98,9	98,9	60,9	77,0
	3 services (n=2)	Mean conception rate (%)	64,2	68,6	48,5	59,7	99,0	84,4	82,9	72,3
		Mean conception[3] rate (%) for each time interval	60,0[a]	69,0[a]	70,0[a]	61,5[a]	99,0[b]	90,6[b]	71,9[a]	

[1]Unless otherwise indicated means are not significantly different.

[2]LSD for score × time interval = 31,3% (P<0,05), means within a row are NS, and means within columns with different superscripts are significantly different.

[3]LSD for effect of time = 20,8% (P<0,05) and 29,3% (P<0,01), means within the same row without common superscripts are significantly different.

lactating females. This effect was probably masked by the greater proportion of dry cows and heifers in 1983/84, 33,9 versus 20,6% in 1984/85 (there were no heifers in this year).

In 1984/85 conception rate tended to be lower, and a greater proportion of females either did not cycle or cycled after the first 21 days when compared to 1983/84. It is suggested that limited veld availability contributed to the poorer reproductive efficiency in 1984/85. Rainfall at the peak of the growing season (December/January) was 40,4% below average. The shortage of grazing became noticeable during early January. Graham (1982) demonstrated that poor nutrition can prolong the post-partum interval. No doubt this effect is more marked in cows of sub-optimal condition. Van Niekerk (1982) considered a condition score of 3,0 at the start of mating to be ideal, whereas cows in this study had an average condition score of less than 3,0. In order to minimize the effect of grazing on conception rate, cows were grazed on veld which had been spared for winter grazing. Grazing on rested veld started on day 15 of the breeding season and was terminated at day 29.

The mean libido score increased from year 1 to year 2. The increase would appear to be due to an improvement in the performance of young bulls with no or limited previous heterosexual experience. Although bulls did not show a marked improvement in libido score over the three tests in 1983/84 it is obvious that bulls underwent some form of learning experience during the breeding season.

The insignificant effect of a bull's libido score on conception rate in 1983/84 was thought to have been largely due to insufficient numbers of cows cycling over the first 21 days. In 1984/85 an attempt was made to highlight differences in conception rate due to libido by placing bulls under greater mating pressure (the number of bulls used was decreased). The attempt did not succeed because of the larger proportion of cows which failed to cycle or cycled after 21 days.

Results from the present study indicate that a bull's libido score was not related to conception rate when bulls were mated at bull-to-female ratios of 1:35 and 1:40 (based on the mean number of cows cycling in 21 days) even though differences between the teatments were greater than 100% as regards number of services completed in 10 minutes. Furthermore, it appears as if the generally accepted bull-to-female ratio of 1:25 is conservative and that bulls of average libido are capable of covering at least 40 cows over a standard 90-day breeding season. This suggests that bulls with superior libido would be capable of impregnating more than 40 cows over a breeding season. Neville, Smith & McCormick (1979) found no difference in conception rate between bulls mated to either 25 or 40 cows for 90 days and Rupp, Ball, Shoop & Chenoweth (1977) reported that most bulls achieved good reproductive efficiency when mated to 40 or 60 heifers for 21 days.

In the light of the positive results obtained in other studies (Blockey, 1978; Sullins, *et al.*, 1979; Lunstra, 1980) the contribution of bull libido to herd fertility cannot be ignored. The need to accurately predict male fertility on the basis of semen quality, testicular size, and sex-drive is acute. To this end further work using large groups of males and females should be undertaken.

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