

Libido evaluation of virgin beef bulls

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Fifty-four beef bulls with an average age of 21 months and representing nine breeds were evaluated for libido using two types of tests. The serving capacity (SC) test was repeated five times on groups of bulls and was followed by an individual test. In the SC test, breed significantly influenced the number of services completed in 30 min. Bulls showed a highly significant improvement in their SC as their experience increased but this did not apply to all breeds. There was thus a significant breed by test interaction. Agonistic interactions had no influence on SC although exceptions were noted. Age, mass, physical size, scrotal circumference, semen quality, and environmental temperature (10,5 – 26,5°C) did not influence SC. There was a highly significant correlation ($r = 0,664$) between SC and the number of services completed on the individual test. Of the bulls tested, 27,7%, 40,4%, and 31,9% were classified as having a low, medium, and high libido.

Vier-en-vyftig vleisrasbulle verteenwoordigend van nege rasse en met 'n gemiddelde ouderdom van 21 maande, is deur middel van twee afsonderlike toetse vir libido geëvalueer. Die dekkapasiteit (DK)-toets wat vyf keer herhaal is, is deur 'n individuele toets opgevolg. By die DK-toets is die aantal volledige dekkings per 30 min. betekenisvol deur ras beïnvloed, terwyl 'n hoogsbetekenisvolle vermeerdering in DK gevind is namate bulle ondervinding opgedoen het, alhoewel rasverskille wel voorgekom het. Strydlustigheid het op enkele uitsonderings na, nie die DK beïnvloed nie. Die DK is ook nie deur ouderdom, massa, grootte, skrotum-omtrek, saadkwaliteit en omgewingstemperatuur (10,5 – 26,5°C) beïnvloed nie. Tydens die individuele toets is 'n hoogs betekenisvolle positiewe korrelasie ($r = 0,664$) tussen aantal volledige dekkings en DK gevind. Van die getoetste bulle, is 27,7%, 40,4% en 31,9% as lae, gemiddelde en hoë libido geklassifiseer.

Keywords: Libido evaluation, beef bulls

With increasing attention being given to the unsatisfactory reproductive rates of beef herds, the need has arisen to evaluate the mating performance of bulls used in such herds. One facet which appears to warrant attention is that of the libido of such bulls. High libido bulls significantly increased first oestrus conception rates in cows and heifers over those achieved by low libido bulls (Blockey, 1978; Lunstra, 1980). Furthermore, high libido bulls can be successfully mated to more females over a limited breeding season (Blockey, 1980).

Fifty-four virgin beef bulls undergoing a phase D2 performance test were evaluated for libido at the end of their test. Nine breeds were represented. Their average age \pm SE was 629 ± 24 days (approximately 21 months).

Bulls were subjected to two types of tests. The first was a group test, the serving capacity (SC) test, designed to predict

veld mating performance (Blockey, 1981b). Bulls were classified in three breed type groups, British beef (Sussex, Red Angus, and Hereford), dual purpose (Simmentaler and South Devon) and zebu types (Drakensberger, Afrikaner, Brahman, and Santa Gertrudis). At the end of the feedlot stage of the performance test each breed type was subjected to five SC tests (breed types did not finish the feedlot stage simultaneously, they finished in the following order, British beef, dual purpose, and zebu). One test involved the use of non-oestrus heifers (Tests 2, 3, and 4 for the zebu, dual purpose, and British beef breed types respectively). Wherever possible, three bulls of the same breed and of similar mass were placed in a pen with two ovariectomized heifers in which oestrus had been induced. Oestrus was induced by a series of three injections (Lunstra, 1980):

- (a) Day 1, 50 mg progesterone (Depogest, Centaur).
- (b) Day 2, 25 mg progesterone.
- (c) Day 3, 4 mg estradiol cypionate (ECP, UpJohn).

All injections were intramuscular and administered at 10h00 each day. The heifers were restrained in service crates. As soon as a heifer became unreceptive she was replaced by another. Bulls were scored on the basis of the number of services completed in 30 min, i.e. their serving capacity. Prior to test, bulls were sexually stimulated for 30 min by observation of the previous group on test. Bulls which had been culled for various reasons formed 'stimulator' groups which were allowed to mate for 30 min prior to the first test on any given day. Tests were spaced 2–3 days apart. Agonistic interactions were recorded as having either no definite outcome or resulting in a win or lose. Disrupted mounts were also recorded as was the environmental temperature during each test.

In the second type of test used to evaluate individual bulls, bulls were exposed to a restrained, oestrus-induced, ovariectomized heifer for 10 min following at least 10 min of sexual stimulation (Chenoweth & Osborne, 1975). Libido was scored using the following system (Chenoweth, Brinks & Nett, 1979):

- 0 = showed no sexual interest
- 1 = sexual interest shown only once
- 2 = positive sexual interest in the female more than once
- 3 = active pursuit of the female with persistent sexual interest
- 4 = one mount or mounting attempt, no service
- 5 = two mounts or mounting attempts, no service
- 6 = more than two mounts or mounting attempts, no service
- 7 = one service followed by no further sexual interest
- 8 = one service followed by further sexual interest including mounts or mounting attempts
- 9 = two services followed by no further sexual interest
- 10 = two services followed by sexual interest including mounts, mounting attempts or further services.

Thus a completed service was not necessary for bulls to achieve a score. Only one such test was applied to each bull and it occurred once all the group tests had been completed.

The scrotal circumference, body length, and height (cm) of the bulls were measured in the month before the start of the SC tests. One ejaculate of semen (electroejaculation) was obtained just prior to the start of the SC tests and was evaluated for motility and percentage abnormalities.

Data from the SC tests were analysed using successive observations on the same animal as sub-plots in a split-plot design. The effects of agonistic interaction and environmental temperature on SC were evaluated using linear regression

analysis. The influence of age, mass, length, height, scrotal circumference, and semen quality on SC was evaluated using covariate analysis.

The bulls showed a highly significant improvement in their SC as the tests progressed (Figure 1). This agrees with Lunstra (1980) who reported an increase over the first three tests after which scores stabilized (yearling bulls). Blockey (1981b) stated that 2-year-old virgin bulls did not undergo a learning process. He did however note that a few bulls improved their scores in their second test.

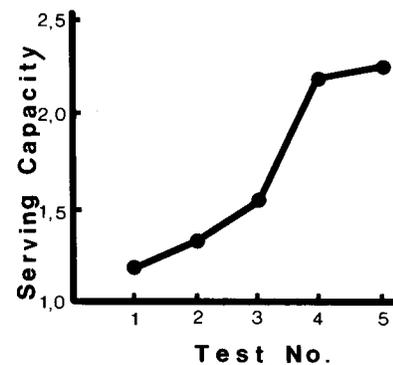


Figure 1 The improvement in serving capacity (SC) over five tests, expressed as the mean number of services completed in 30 min ($n = 54$).

There were significant breed influences on the number of services completed in 30 min (Table 1) and although the overall tendency was for SC to improve with experience (Figure 1), a significant breed by test interaction occurred.

The small number of bulls in some breeds (Sussex, South Devon, and Santa Gertrudis) contributed to their inconsistent scores, since a good or poor performance by one or two bulls on any given test had a drastic influence on the breed score. The Simmentaler and South Devon showed a slight but non-significant increase with time (Table 1).

The Brahman and Afrikaner breeds did not complete service at any time during the five tests, despite a willingness to mount (bear in mind the small numbers of Brahmans ($n = 5$) and Afrikaners ($n = 2$) evaluated). Two Afrikaner bulls, one in a 'stimulator' group and one which did not complete any SC tests owing to intestinal ulcers but partook in the individual test, completed service. Differences in libido among bulls representing *B. indicus* and *B. taurus* breeds are well documented (Chenoweth, 1975; Chenoweth & Osborne, 1975; Chenoweth, 1981). Indeed, Chenoweth (1981) states that, 'zebu bulls have been reported to exhibit marked sexual sluggishness and a tendency only to mount cows in full oestrus'. The latter suggests that zebu bulls are more sensitive to the oestral stimuli elicited by the teaser females than are *B. taurus* bulls. A test under more natural conditions and of longer duration is suggested for zebu bulls. Chenoweth & Osborne (1975) reported that individual Brahman bulls (16–31 months of age) achieved libido scores equal to the best of other breeds (Afrikaner, Hereford, and various crossbreds). It was suggested that selection against deficient or delayed libido could improve the reproductive performance of this breed. The possibility that the zebu bulls in this study were still undergoing pubertal changes cannot be discounted in the light of work carried out by Fields, Burns & Warnick (1979) on 16–20-month-old Angus, Hereford, Brahman, and Santa Gertrudis bulls. Furthermore, some bulls can show temporary

Table 1 Mean number of services completed by each breed over the five serving capacity tests, breed means included

Serial no	Breed	n	Serving capacity test*					Breed** mean
			1	2	3	4	5	
1	Sussex	5	2,20 ^a	4,00 ^b	2,40 ^{ac}	2,60 ^{ac}	3,60 ^{bc}	2,96
2	Red Angus	4	0,75 ^a	2,25 ^{ac}	2,00 ^a	4,50 ^b	3,75 ^{bc}	2,65
3	Hereford	9	0,33 ^a	1,11 ^{ab}	1,56 ^{bc}	1,22 ^{bc}	2,22 ^c	1,29
4	Simmentaler	14	2,57 ^{ab}	2,07 ^a	2,50 ^{ab}	3,21 ^b	2,86 ^{ab}	2,64
5	South Devon	4	2,25 ^a	0,50 ^b	2,50 ^a	3,25 ^a	3,50 ^a	2,40
6	Drakensberger	9	0,44 ^a	0,22 ^a	1,00 ^{ab}	1,89 ^b	1,78 ^b	1,07
7	Santa Gertrudis	2	0,00 ^a	1,50 ^a	0,00 ^a	0,50 ^a	0,50 ^a	0,50
8	Brahman	5	0,00	0,00	0,00	0,00	0,00	0,00
9	Afrikaner	2	0,00	0,00	0,00	0,00	0,00	0,00

*Means without common superscripts within breeds are significantly different ($P < 0,05$).

In Tests 2, 3, and 4 non-oestrus females were used for the zebu, dual purpose and British beef breeds respectively

**Significance of breed means: 2,4,5>8 ($P < 0,05$); 4>3 ($P < 0,05$); 1,4>6,9 ($P < 0,05$); 1>8 ($P < 0,01$)

psychogenic or central nervous inhibition of libido (particularly *B. indicus* bulls) and commence copulatory behaviour unpredictably at a later stage (Chenoweth, 1975).

All forms of agonistic interaction (no definite outcome, wins/losses and disrupted services) had a significant stimulatory effect on the number of mounts in 30 min ($r = 0,242$). This is not surprising, since Lunstra (1981) found that group evaluation was more effective than individual evaluation in terms of number of mounts and matings achieved per bull. The number of services achieved was not influenced detrimentally by agonistic interactions in general. The number of encounters won represented 2,5% of all agonistic interactions. Blockey (1979) reported that the social dominance order (SDO) in groups of 2-year-old bulls was unstable and had no significant influence on the number of cows a given bull mounted or served.

Despite the fact that agonistic interactions did not have a statistically significant effect on SC (all breeds considered), the performance of the Simmentaler breed decreased markedly though non-significantly in Tests 2 and 5 (Table 1). Analysis of the data for this breed revealed a significant negative association between all forms of agonistic interaction and SC in Test 5 ($r = -0,605$), and a strong tendency in Test 2 ($P < 0,10$; $r = -0,470$). Also the performance of one South Devon bull was decreased (six vs one service) by continual harassment from another bull which did not serve. This significantly decreased the breed average for Test 2 (Table 1).

Neither age, mass, length, height, scrotal circumference, semen quality, or environmental temperature (range 10,5 to 26,5°C) were related to SC. Furthermore, it was not necessary for heifers (hindquarters immobilized by the service crate) to be in oestrus (Table 1). This confirms the work of Chenoweth, Brinks & Nett (1979) and Blockey (1981a). They stated that an immobilized set of hindquarters is the most important stimulus causing a bull to mount and complete service.

The chance of bulls injuring themselves as a result of agonistic interaction while undergoing the SC test is always prevalent. Thus the idea of an individual test is appealing. Total SC over five tests was highly significantly correlated with the number of services completed during the individual test ($r = 0,664$).

Based on the means for the five SC tests, excluding Brahmans and Afrikaners, 27,7% of bulls had a low (less than

one service), 40,4% had a medium (one or two services), and 31,9% had a high libido (more than two services).

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References

- BLOCKEY, DE B.M.A., 1978. The influence of serving capacity of bulls on herd fertility. *J. Anim. Sci.* 46, 589.
- BLOCKEY, DE B.M.A., 1979. Observations on group mating of bulls at pasture. *Appl. Anim. Eth.* 5, 15.
- BLOCKEY, DE B.M.A., 1980. Getting the most out of rams, bulls and boars. *Proc. Aust. Soc. Anim. Prod.* 13, 46.
- BLOCKEY, DE B.M.A., 1981a. Modification of a serving capacity test for beef bulls. *Appl. Anim. Eth.* 7, 321.
- BLOCKEY, DE B.M.A., 1981b. Further studies on the serving capacity test for beef bulls. *Appl. Anim. Eth.* 7, 337.
- CHENOWETH, P.J., 1975. Bull behaviour and management. *Proceedings, the Range Beef Cow A Symposium on Production.* 4, 17.
- CHENOWETH, P.J., 1981. Libido and mating behaviour in bulls, boars and rams. A review. *Theriogenology.* 16, 155.
- CHENOWETH, P.J., BRINKS, J.S. & NETT, T.M., 1979. A comparison of three methods of assessing sex-drive in yearling beef bulls and relationships with testosterone and LH levels. *Theriogenology.* 12, 223.
- CHENOWETH, P.J. & OSBORNE, H.G., 1975. Breed differences in the reproductive function of young beef bulls in Central Queensland. *Aust. Vet. J.* 51, 405.
- FIELDS, M.J., BURNS, W.C. & WARNICK, A.C., 1979. Age, season and breed effects on testicular volume and semen traits in young beef bulls. *J. Anim. Sci.* 48, 1299.
- LUNSTRA, D.D., 1980. Evaluation of libido in beef bulls. *Proc. Ann. Meet. Soc. Theriogenology* p. 169.
- LUNSTRA, D.D., 1981. Effect of male-to-female ratio on assessment of sexual aggressiveness in yearling beef bulls. *J. Anim. Sci.* 53 (Suppl. 1), 104.