Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 951

1987

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Recommended Citation

Boyd, G. and Corah, L. (1987) "Evaluating serving capacity of yearling beef bulls - A field trial," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. https://doi.org/10.4148/2378-5977.2354

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Abstract

Results from two trials showed that serving capacity (SC) can be successfully evaluated in yearling beef bulls under field conditions and is influenced by sire line (P<.01). Also, providing sexual experience to low SC yearling bulls can improve SC and should be a standard part of the test. Scrotal circumference and breeding soundness examination scores, both traditional measures of bull fertility, were unrelated to SC.

Keywords

Cattlemen's Day, 1987; Kansas Agricultural Experiment Station contribution; no. 87-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 514; Beef; Yearling bulls; Scrotal circumference; Breeding soundness

Evaluating Serving Capacity of Yearling Beef Bulls - A Field Trial[1]

Garth Boyd and Larry Corah

Summary

Results from two trials showed that serving capacity (SC) can be successfully evaluated in yearling beef bulls under field conditions and is influenced by sire line ($P<.01$). Also, providing sexual experience to low SC yearling bulls can improve SC and should be a standard part of the test. Scrotal circumference and breeding soundness examination scores, both traditional measures of bull fertility, were unrelated to SC.

Introduction

Most cows are still bred by natural mating, so success depends on the reproductive capacity and fertility of the bulls used. As a measurement of fertility, many beef bulls undergo a breeding soundness examination prior to either sale or breeding. This examination involves visual and manual examination of the genital system and assessment of semen. However, sex drive, which is essential for successful mating, is not measured.

In research trials, pregnancy rates of cow herds have varied from 0 to 100%, when using bulls of similar and acceptable scrotal size and seminal traits. The differences in pregnancy rates were due to differences in the bulls' serving capacity (SC) or sexual efficiency during mating.

Several methods for testing the sex drive or SC of beef bulls have been reported but the most accurate and useful test was developed by an Australian scientist, Dr. Mike Blockey. High heritability estimates for SC have been reported but the influence of sire line on SC, and whether providing sexual experience to virgin bulls affects their subsequent SC has not been evaluated. More important, it has not been demonstrated in the U.S. that SC can be measured practically under field conditions.

We conducted two experiments to determine 1) if SC can be evaluated in yearling beef bulls under field conditions, 2) what influence sire line has on SC, and 3) what effect providing sexual experience to low SC bulls would have on their subsequent SC.

[1]Sincere appreciation is expressed to the Gardiner family of Gardiner Angus, Ranch, Ashland, Kansas, for providing cattle, facilities, and management for this trial.

Experimental Procedures

Trial 1

A field trial involving 70 yearling (13 to 15 month old) Angus bulls, was conducted during Nov., 1985 and Jan., 1986. The bulls weighed approximately 985 lb and represented four artificial insemination (AI) sire lines. They included 42, 11, 9, and 8 sons of sires A, B, C, and D, respectively, and were reared together since birth.

The SC test involves the bulls being given a 20 min corral test. Bulls that achieve 0 or 1 services during the test are classified as Low SC (LSC). Medium SC (MSC) bulls achieve 2 or 3 services, and High SC (HSC) bulls achieve 4 or more services. The dirt pen used for the SC tests had four service crates[2] spaced 24 ft apart attached to the corral fences. Yearling, nonestrus Angus heifers weighing 650-800 lb were placed in the service crates and their vulvas were smeared with lubricating jelly. For sexual stimulation purposes, prior to each test, bulls were held in a alleyway adjacent to the test pen, which allowed a clear view of any mounting activity.

To acclimate the bulls to the test environment and determine if there was any relationship between reaction time to first service and subsequent SC scores, bulls went through a pretest session consisting of 10 minutes prestimulation followed by exposure to the restrained heifers. Each bull was immediately replaced by another bull after successfully completing one service or after having spent 30 minutes in the pen, whichever came first. Time to first service was recorded.

One week after the pretest session, bulls underwent the first SC test (SC1). Bulls were randomly allotted into subgroups of five and exposed to heifers for 20 minutes. The first group tested was prestimulated by watching teaser bulls, which were allowed to mount the restrained heifers over a 10 minute period. Thereafter, each test group served to sexually stimulate the next group, which could watch from the adjacent alleyway.

The second SC test (SC2) was conducted over 2 months later (Jan. 22) in the same manner as SC1, except that the subgroups of five bulls contained no more than three bulls of like SC category. One day after SC2, all bulls underwent a breeding soundness examination by a veterinarian. Scrotal measurements were adjusted to 1 year of age according to the following formula developed by Lunstra and others (U.S. Dept. Agric., Agric. Res. Ser. ARS-42, MARC Beef Research Prog. Rep. No. 2, pp 41-43, 1985.): Adjusted scrotal circumference (cm) = [(.032 cm/day) (365 - Actual bull age in days) + (Actual measurement)] + Age of dam adjustment factor. Adjustment factor for dams aged 2, 3, 4, and 5 or older is +1.3, +0.8, + 0.4, and + 0.0 cm, respectively.

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[2]Designed by Dr. Blockey and manufactured by Spring-O-Matic, Rt. 1, Box 128, Marion, KS 66861.

In Apr., 1986, the producer sold all but 32 of the 70 yearling bulls in a production sale. Without taking any other traits into consideration, HSC bulls sold for an average of $257.53 more than MSC bulls. None of the LSC bulls were offered for sale. Of the 32 remaining bulls, 24 were maintained together on pasture away from female contact, and eight were exposed to females during spring breeding season. On Nov. 11, 1986, all 32 bulls were retested for SC (SC3) as 2 year-olds. The test was conducted in. the same manner, except that cows were used.

Trial 2

In November of 1986, Trial 1 was repeated in exactly the same manner as SC1 with 78 different yearling (13 to 15 months) Angus bulls weighing approximately 1025 lb and representing six AI sires, of which only one (sire A) was common to Trial 1. Sires A, E, F, G, H, and I were represented by 24, 17, 14, 9, 8, and 6 sons, respectively. After SC1, all LSC bulls (n=23) were separated and offered sexual experience by being run with nonrestrained, estrus females for 4 days. To stimulate maximum estrus activity, 43 Angus females (9 cows, 34 yearling heifers) were injected with 5 ml of prostaglandin on the first day of sexual experience "schooling". Five days after "schooling" ended, all bulls were retested for SC.

Results and Discussion

Trial 1.

Across all 70 bulls, the average SC1 and SC2 scores were 3.4 and 3.8 services, respectively. However, Figure 1 shows distinct differences in mean scores of the four sire lines ($P<.01$). Actual SC scores ranged from 0-11 services per bull. Mean SC1 scores ranged from 0.6 services for sons of sire D up to 4.2 services for sons of sire A. Mean SC2 scores show the same trend and illustrate the repeatability of the test. Average change in SC by sire line shows an increase between SC1 and SC2 for all lines, except sire line C (Figure 22.1), indicating that with added experience most yearling bulls become more proficient.

Age, weight, scrotal circumference, breeding soundness examination score, and reaction times of the 4 sire groups are presented in Table 22.1. These traits were unrelated to SC1 or SC2 scores.

The mean SC3 score for the 24 bulls retested as 2-year-olds was 4.2 services, which was an increase of .9 services compared to their last SC test as yearlings. Most of this increase was due to an improvement in SC for sons of sire D, indicating that with added maturity some LSC bulls will improve. Of the eight bulls used for breeding, seven were sons of sire A. Five and three of these bulls were HSC and LSC, respectively, at SC2 and all retested the same at SC3. This similarity in scores shows good repeatability and indicates that for MSC and HSC bulls, the yearling test was accurate, because experience and added maturity did not greatly improve their SC. Observations made during the breeding season on the three LSC bulls found one of the bulls displayed adequate mating activity, yet this bull retested as LSC perhaps because he was not properly stimulated.

Table 22.1. Effect of Sire Line on Parameters Measured for Bulls, Trial 1[a].

Parameter	Sire A	Sire B	Sire C	Sire D
No. of sons	42	11	9	8
Age (days)	427	442	427	394
Adj. yearling wt. (lbs)	1001	968	952	963
Adj. yearling scrotal cir (cm)	33.7	32.9	32.0	33.9
Breeding soundness exam. scores[b]	63	72	60	68
Reaction time to 1st service (min)	8.8	13.0	11.8	10.0

[a]Mean values.
[b]Scores based on scrotal circumference and seminal traits.

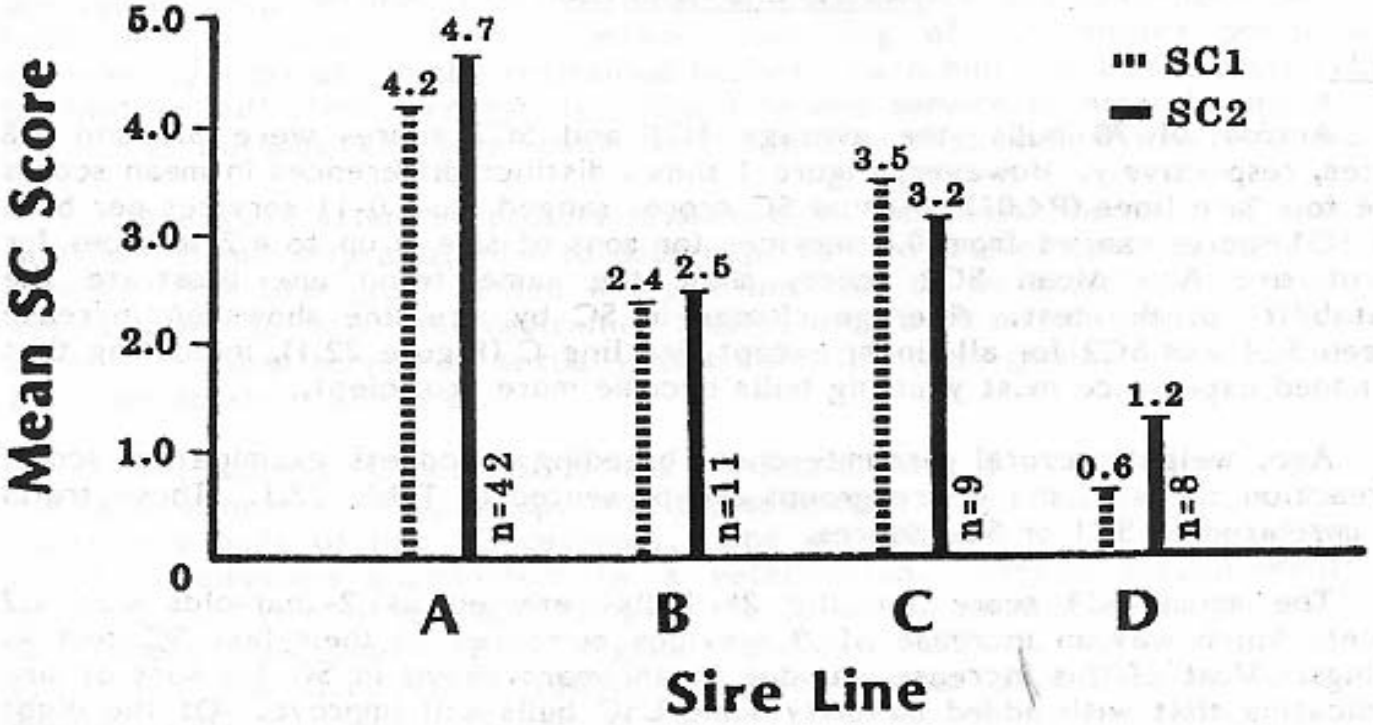

Figure 22.1. Trial 1. Number of bulls and their mean serving capacity score at the first test (SC1) and the second test (SC2) by sire line. Scores based on services achieved during a 20-minute test.

Trial 2.

Mean SC1 and SC2 scores for those bulls not schooled (n=58) are depicted in Figure 22.2 and again show differences between sire lines (P<.01). Of the 58 bulls, 78% stayed in the same category or improved one category. However, 22% decreased one category, from SC1 to SC2, perhaps because they were not properly stimulated. This resulted in an overall average change in SC of -.3 services.

The percentage of bulls "schooled" for each sire line is presented in Table 22.2. Mean SC1 and SC2 scores for "schooled" bulls are depicted in Figure 22.3 and show a dramatic impact of sexual experience on subsequent SC (P<.01). Of the 23 bulls, 14 moved into the MSC category and three (all sons of sire A) became HSC bulls at SC2. Only three bulls remained LSC. The remaining three bulls were temporarily lame and were not retested. Overall average change in SC was +2.2 services, which represented an increase for sons of all sire lines. Observations indicated that the "schooling" could be shortened to 48 hours and should be conducted in a larger pen to reduce fighting between bulls.

Of special interest in this study are sire A sons, which were tested in both trials. In Trial 1, 42 sons of sire A had a mean SC1 score of 4.2 services. Mean SC1 score for 24 different sons of the same sire in Trial 2 was 4.1 services. This similarity in SC scores for different groups of half brothers tested a year apart supports the high heritability of SC.

Table 22.2 presents data by sire line on parameters measured similar to Trial 1. Again, none of these traits were related to SC. Reaction time to service in the pretest session was a poor predictor of bulls' SC in both trials.

Serving capacity apparently is a highly heritable trait that is not related to traditional measures of bull fertility. Serving capacity can be measured successfully under field conditions, but before accurate culling decisions can be made, all LSC bulls should be "schooled" and then retested.

Table 22.2. Effect of Sire Line on Parameters Measured for Bulls, Trial 2.[a]

Parameter	Sire					
	A	E	F	G	H	I
No. of sons	24	17	14	9	8	6
Age (days)	420	415	429	426	411	423
Adj. yearling Wt. (lbs)	1041	1014	1034	999	1027	1012
Adj. yearling scrotal cir (cm)	35.8	35.2	35.6	34.3	34.9	37.1
Reaction time to 1st service (min)	6.2	6.6	5.7	3.8	6.8	4.6
% of sons requiring "schooling"	25	12	21	44	50	17

[a]Mean values.

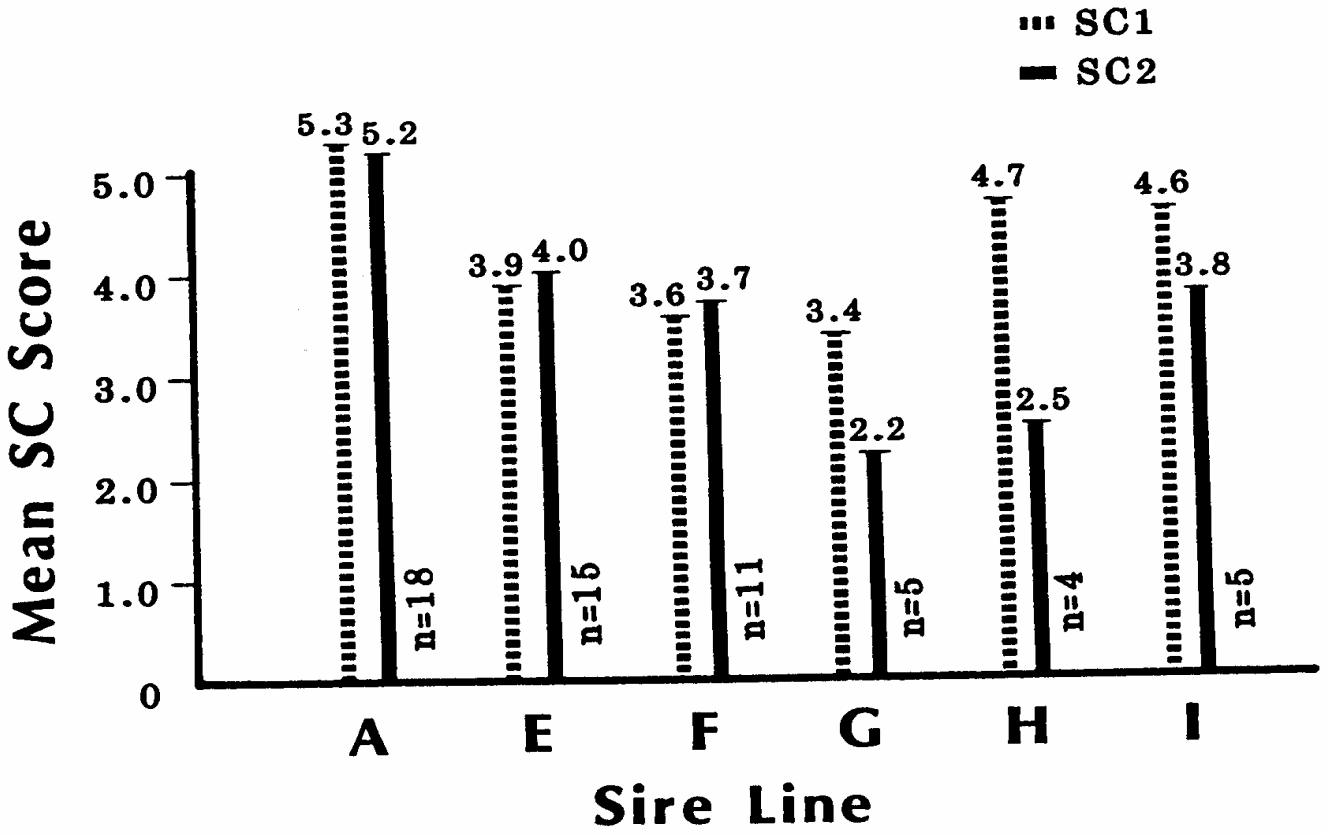

Figure 22.2. Trial 2. Number of non-schooled bulls and their mean serving capacity score at the first test (SC1) and second test (SC2) by sire line. Scores based on services achieved during a 20-minute test.

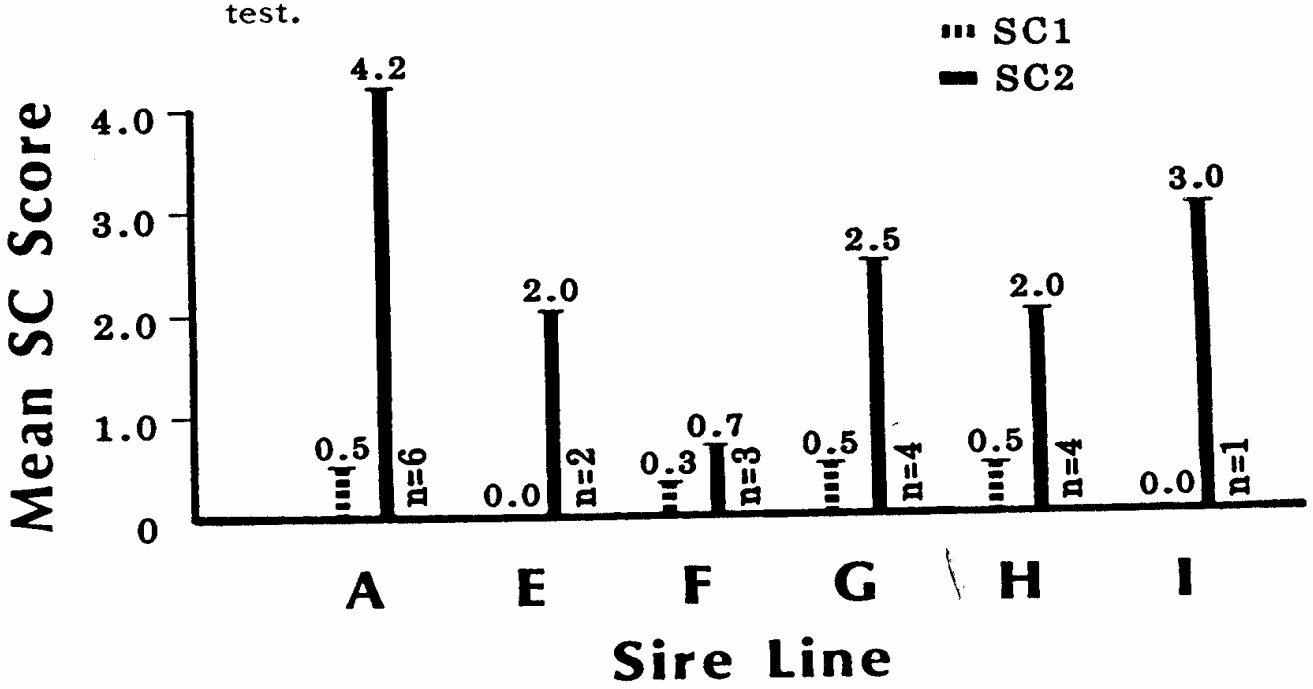

Figure 22.3. Trial 2. Number of schooled bulls and their mean serving capacity score at the first test (SC1) and second test (SC2) by sire line. Bulls underwent schooling after SC1 and were then retested. Scores based on services achieved during a 20-minute test.