



# Repro Tracks

► by **Bill Beal**, beef cattle reproductive physiologist, Virginia Tech

## Scrotal circumference: Does bigger mean better fertility?

*Scrotal circumference measurements are the best indicator of a bull's daily sperm production potential. Bulls must exceed the minimum acceptable levels for scrotal circumference, sperm motility and sperm morphology to pass a breeding soundness exam (sometimes referred to as a BSE). Breeding soundness exams eliminate bulls that are at risk of being poor potential breeders, and pregnancy rates achieved by bulls passing a breeding soundness exam are higher than those of untested bulls.*

### Breeder question No. 1

*Which is more important when doing a bull BSE, measuring a bull's scrotal circumference or evaluating the semen that he produces?*

**Response:** Scrotal measurements and semen characteristics are both important! This is proven by the change made in the Society for Theriogenology's breeding soundness exam in 1992. The exam was changed from a numerical scoring system to a system employing minimum threshold standards for scrotal circumference, sperm motility and sperm morphology.

Prior to 1992 measurements of scrotal circumference, sperm motility and sperm

morphology were each given a numerical score. The scores were added up to determine if a bull passed the exam. In some cases a bull could be marginal or deficient in one area — for example, have a very small scrotal circumference — but produce semen with excellent motility and quality and thereby have a total score that enabled him to pass the exam.

When it became apparent bulls that passed the breeding soundness exam but were deficient in one part of the exam were more likely to have breeding problems, the scoring system was changed. Now a bull must exceed the minimum acceptable level

for each of the three traits related to semen production.

Therefore, the Society for Theriogenology views both scrotal circumference and semen characteristics to be critical in predicting the breeding soundness of a bull.

Scrotal circumference is measured because it is highly correlated (0.92) with testis weight. Hence, scrotal circumference is the best estimate of a bull's maximum daily sperm production. In contrast, sperm motility and morphology are used to estimate the proportion of the sperm produced by a bull that are alive and have a normal shape. Percent live and percent normal sperm are related to the chance of fertilization and successful embryo development occurring after a cow is bred by the bull.

### Breeder question No. 2

*How repeatable is the scrotal circumference measurement?*

**Response:** To perform the technique for taking scrotal circumference measurements recommended by the Society for Theriogenology, the testes must be pressed firmly into the lower part of the scrotum with the thumb and fingers of one hand cradling the testes and scrotum. The scrotal tape is slipped up over the scrotum and tightened around the widest part (see Fig. 1). Moderate tension should be placed on the tape with the thumb when the reading is obtained.

The largest source of error among individuals taking scrotal circumference measurements is the amount of tension placed on the scrotal measuring tape. "Moderate tension" is interpreted differently by different operators. In a New Zealand study where three operators performed repeated measurements of scrotal circumference on 92 rams, the repeatability between operators was 0.90. The difference in average scrotal circumference measurements recorded by the two most divergent operators was 8%. The potential of an 8% error rate is large enough (approximately 3 cm in a yearling bull) that some effort should be made by operators measuring scrotal circumference to standardize and validate their measurements.

Variation in scrotal circumference measurements can be minimized by having

**Fig. 1: Recommended technique for measuring scrotal circumference**

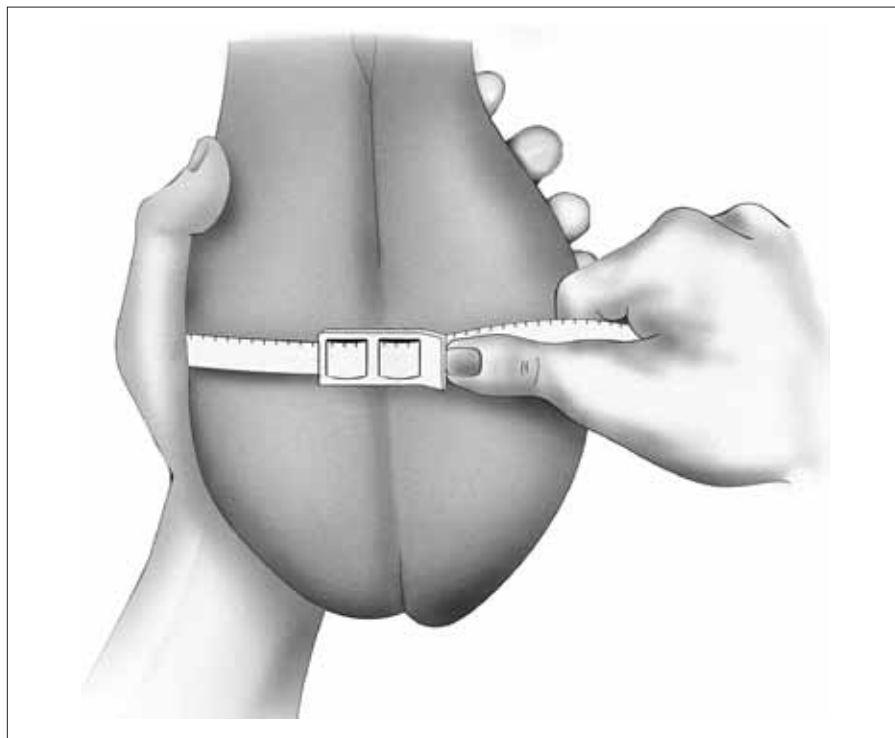


ILLUSTRATION BY CRAIG SIMMONS

**Table 1: Pregnancy rate of cows or heifers bred by untested bulls or bulls passing a breeding soundness exam**

|        | No. females bred | Pregnancy Rate After 90 Days |                |
|--------|------------------|------------------------------|----------------|
|        |                  | All bulls passed BSE         | Untested bulls |
| Year 1 | 1,330 (cows)     | 93%                          | 87%            |
| Year 2 | 1,282 (heifers)  | 90%                          | 85%            |

one operator do all the scrotal circumference measurements in a herd.

In the experiment with sheep cited before, the repeatability of the same operator measuring the same ram more than once was 0.99, and in a similar experiment with Holstein bulls at Cornell University, the within-operator repeatability was 0.96.

Hence, even though a single operator may have a tendency to record scrotal measurements that are consistently slightly larger or slightly smaller, high repeatability of a single operator improves the validity of the comparison of scrotal measurements among bulls.

### **Breeder question No. 3**

*Is there any "proof" that using bulls that pass a breeding soundness exam increases pregnancy rate?*

**Response:** The purpose of a breeding soundness exam is to eliminate bulls that are at risk of being poor potential breeders. It is not a fertility test. The only true fertility evaluation is placing a bull with cows or heifers and determining pregnancy rates. With that said, by eliminating bulls classified as "unsatisfactory potential breeders," pregnancy rates should be improved. Perhaps the best demonstration of this was an experiment performed by J.N. Wiltbank and coworkers at the King Ranch in Texas (see Table 1).

They placed gate-cut groups of cows or heifers with either bulls that had passed a breeding soundness evaluation semen test or bulls that were randomly selected from the same set of bulls (untested). After a 90-day breeding season, the pregnancy rate achieved by bulls that had passed the exam was 6%

higher among cows bred and 5% higher among heifers bred.

A 6% advantage for using bulls that passed a breeding soundness exam may seem small when the results of several groups of females mated to multiple sires are considered. However, in a single-sire breeding pasture, the effects of an infertile or subfertile bull are magnified. One bull with poor fertility can be the cause of a major reduction in the calf crop and can be economically devastating. This makes the importance of passing a breeding soundness exam even greater for bulls to be used in single-sire mating.



**Editor's Note:** Bill Beal is a beef cattle reproductive physiologist and professor emeritus at Virginia Tech. He conducts research involving estrus synchronization, artificial insemination, embryo transfer and the use of ultrasound technology. This column is designed to provide answers to questions about reproductive management commonly posed by commercial and purebred breeders. If you have questions or comments related to the reproductive management of cows or bulls, e-mail them to Beal at [wbeal@vt.edu](mailto:wbeal@vt.edu).