



Breeding Soundness Evaluation of Bulls

Clell V Bagley, DVM, Extension Veterinarian
C. Kim Chapman, MS, Area Animal Scientist

Very few bulls are “sterile” and unable to produce any offspring. But, 10% to 25% of bulls have reduced fertility or possess physical problems which reduce their ability to sire calves. The breeding soundness evaluation (BSE) is a useful tool in identifying these bulls. Eliminating bulls with physical problems or reduced fertility from the breeding herd will improve overall reproductive efficiency of the herd.

A standardized procedure has been developed and refined during many years of use, along with research to validate the accuracy. The current standards were adopted in 1992. When this procedure is carefully followed the results are consistent for assorted breeds, locations and veterinarians. However, if shortcuts are taken from the standard procedure, the results are erratic and inconsistent. For example, if a veterinarian evaluates the semen only for sperm motility, the abnormalities of sperm morphology (shape) will be missed and this will result in a different and misclassification of the bull’s fertility. It is critical that each step in the procedure be followed. It is also important to remember that the BSE is only a “snapshot” on that one day, and subsequent injury or illness may change the classification and fertility of the bull.

A major problem in conducting BSEs on young bulls is the variability in their sexual maturity at the time of evaluation. Many bulls are initially evaluated by a BSE at 11 to 13 months of age, yet some bulls will not reach sexual maturity until 15 to 16 months. Sexual maturity cannot be predicted entirely by body weight, or even by scrotal circumference. Some young bulls deemed not acceptable by the test at a young age may be satisfactory breeders if re-tested 1 to 3 months later. Approximately 75 days are required for the bull to produce semen. Sperm production requires about 60 days and an additional 15 days are required for transport through the system, during which further sperm maturation occurs.

It is critical for the evaluating veterinarian to remain neutral between seller and buyer during the evaluation, even though it is often the seller who is paying for the BSE, prior to a sale. The evaluator cannot allow that source of payment to tilt the evaluation in favor of the seller, but must remain neutral and follow all the prescribed BSE procedures. Anything less is unfair to the buyer, who is expecting to purchase a bull that is ready to breed and who may put the bull in with females the day after purchase.

Producers also need to recognize that a BSE does not evaluate a bull’s breeding drive or ability. Other tests could be conducted for this type of evaluation, but they are involved and time consuming. If these tests are not conducted the producer should ensure that bulls, especially new ones, are observed during the breeding process and that they are interested and able to mount and inseminate females. This is another critical test.

A BSE consists of three steps or parts:

1. A physical exam including the internal and external reproductive structures.
2. A measurement of scrotal circumference; 30 cm is the minimum acceptable size for even young bulls, and the size requirement increases with age.
3. Collection and evaluation of semen. At least 30% motility and 70% normal morphology are required as a minimal acceptable level.

The standardized procedure of evaluation will result in a classification into one of three categories:

- a. “Satisfactory” potential breeder
- b. “Unsatisfactory” potential breeder
- c. “Classification Deferred” (with a recommended date for re-evaluation)

Physical Examination

A bull with a physical problem that would interfere with his ability to impregnate females, whether due to feet, legs, eyes, testicles, penis, or internal reproductive structures, may be classified as “Unsatisfactory,” if that problem is unlikely to improve with time. If there is a reasonable possibility of improvement, the report could indicate “Classification Deferred” along with a recommended date for re-evaluation. A bull with only one testicle could likely impregnate some females, but would always be classified as “Unsatisfactory.”

A persistent frenulum” is a piece of tissue on the penis which anchors the end



Persistent frenulum

of the penis to the sheath and prevents insemination. It can be cut during ejaculation, but it would be best if the penis were rechecked after a week to be sure it healed without scarring or complications.

A “fibroma or fibropapiloma” is a wart-like growth on the penis that can usually be snipped off with little difficulty. These do not usually recur, but it would be best if the bull were rechecked 2 to 3 weeks later to be sure it had not grown back.



Penile fibroma

The seminal vesicle is a gland which lies alongside the penis, on the pelvic floor, and adds part of the fluid component to the semen during ejaculation. This gland may become inflamed, enlarged and infected and then may discharge white blood cells and other debris into the semen. Seminal vesiculitis requires a judgment decision for classification. It is not a rare condition in young bulls and most of them will clear the infection and recover with time. Treatment with antibiotics may aid that process. However, in older bulls the condition is often permanent, even with aggressive and long-term treatment. Thus, the classification on a young bull may be “Deferred,” while an old bull may be classified as “Unsatisfactory.”

Scrotal Circumference

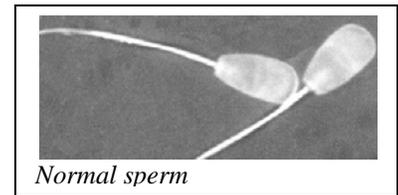
The minimal acceptable scrotal circumference increases with age. A young bull with a Scrotal Circumference (SC) measurement that is less than the minimum required would usually be classed as “Deferred” as that measure could improve with age. Even young bulls must have an SC of at least 30 centimeters; if they do not, there is no need to continue with the semen collection as part of the BSE. If an older bull does not meet the minimum standard, he should usually be classed as “Unsatisfactory,” unless he is in poor body condition or has some other obvious problem that can be corrected.

Sperm Motility and Shape

Semen is collected so the sperm cells can be evaluated for their motility (forward motion) and morphology (shape and structure). Requirements for motility are that 30% of sperm must have forward, progressive activity. This must be evaluated soon after collection (on-site) and is best determined by observing a drop of collected semen and also a drop of diluted semen, using a good microscope. Cold shock or urine expressed during ejaculation both have a dramatic, detrimental effect on motility and must be differentiated from another motility problem.

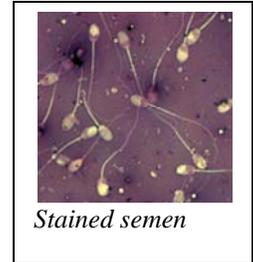
At least 70% of the sperm cells must have normal morphology for the bull to be classed as “Satisfactory.” Trials have shown that bull herds with no selection on semen quality and those with less than 70% normal sperm morphology had reduced fertility, compared to those that used bulls that met this requirement. It has also been shown that bull fertility is

not better with, for example, 85% vs. 75% normal morphology. The 70% appears to be a functional “threshold” level.



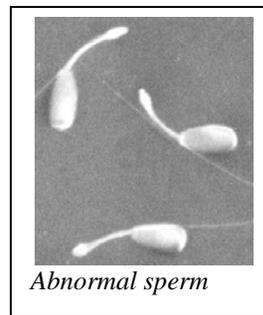
Normal sperm

The evaluation of sperm morphology requires staining of sperm cells, then evaluation and counting of at least 100 sperm with a microscope, or use of a special phase contrast microscope for a similar count. This is the most time-consuming portion of the evaluation procedures and some evaluators try to shortcut this and evaluate morphology based on motility.



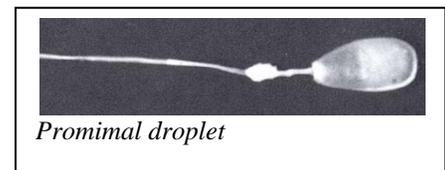
Stained semen

Neglecting this step will miss many sperm abnormalities and result in the misclassification of bulls. In a previous evaluation system these sperm abnormalities were classed as primary or secondary, but that is not used in this system. If the total abnormal cell count exceeds 30% the bull does not meet the required minimal level. For most bulls receiving an “Unsatisfactory” classification it is due to inadequate normal sperm morphology, inadequate scrotal circumference, or a physical defect.



Abnormal sperm

A special problem for young bulls is the presence of proximal cytoplasmic droplets on many sperm.



Proximal droplet

This is one of the more frequent sperm abnormalities in young bulls and their presence is associated with bull immaturity or testicular degeneration. The percentage of affected sperm declines as the bull matures and most of these bulls may have satisfactory semen quality within a few months. However, fertilization rates are markedly lower for bulls with 30% sperm with proximal droplets so these bulls should be placed in the Deferred category and re-tested later.

Summary

Bull producers and buyers should understand the basis and protocol for a standard BSE. This will enable them to better interpret the test results and to ask questions about the procedures or the results.

References

Bull Persistent Frenulum (Photo). 2005. Bruce Eilts, DVM, MS, Dip. ACT. Professor of Theriogenology, Louisiana State University.

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran’s status. USU’s policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions.

Utah State University employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran’s status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person otherwise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities.

This publication is issued in furtherance of Cooperative Extension work. Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Noelle Cockett, Vice President for Extension and Agriculture, Utah State University.