

Bull breeding soundness evaluation: A practitioner's perspective

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Abstract

It is well established that the bull breeding soundness evaluation (BBSE) is an easily performed, relatively inexpensive, and extremely useful tool for the cow–calf operation. However, the BBSE can only achieve its full potential if it is performed properly by the practitioner in the field. A properly performed BBSE should include the use of the standards established by the Society for Theriogenology and a systematic protocol by the practitioner. This paper will review the Society for Theriogenology BBSE standards and the author's protocol.

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1. Introduction

The current Society for Theriogenology (SFT) BBSE standards were adopted in 1993 [1]. The BBSE requires that a bull must meet minimum standards in four categories, a general and reproductive physical examination, a scrotal circumference indexed for age, semen motility, and sperm morphology. These four categories are pass or fail on their own; thus a bull must pass all four areas to be classified as a satisfactory potential breeder. Scrotal circumference can be obtained in a single action, whereas evaluation of the other standards will require multiple actions that may occur while gathering information for other categories. Therefore, a protocol is needed to ensure that all the information needed for each category is obtained as the examination is being performed. There appears to be a great deal of variation in performing the BBSE in the field. If we expect to provide useful results from the BBSE, there must be consistency in the information

gathered. The SFT BBSE form provides the best way to record and organize this information; the next step is to develop an examination protocol that will allow you to gather this information in a consistent and efficient way.

2. SFT BBSE standards

A thorough knowledge of the SFT BBSE minimum standards is mandatory for performing a proper BBSE. The standards are listed on the inside cover of the SFT BBSE form booklet, and on the back of the last sheet (pink) of each form. They are as follows:

For bulls to be classified as *Satisfactory Potential Breeders*, they must pass the physical examination and equal or exceed the minimal thresholds in each of the following categories:

Category	Threshold
Scrotal circumference	30 cm at <15 mo
	31 cm at >15 ≤ 18 mo
	32 cm at >18 ≤ 21 mo
	33 cm at >21 ≤ 24 mo
	34 cm at >24 mo

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Sperm morphology	≥70% normal sperm
Sperm motility	≥30% individual motility and/or “Fair” gross motility

Bulls which do not equal or exceed these thresholds will either be classified as *Unsatisfactory Potential Breeders* or they will have their *Classification Deferred*. Placement in the latter category implies subsequent retesting.

3. Protocol for BBSE

It is the author's preference to watch the bull approach the chute. This is a good time to observe the gait of the bull and overall appearance. Once in chute, the identification, eyes, head and front feet are observed, and observations recorded. From the side of the chute, the testes are palpated, scrotal circumference measured, the prepuce is palpated for abnormalities, and the hind feet are observed. At this point, scrotal circumference and any observations are recorded. The rear of the bull is then approached, the back, and the hind leg, especially the hock joints, are observed and/or palpated. Transrectal palpation is then performed, again using a constant sequence. The pelvic area, the urethralis muscle is followed forward to the seminal vesicles, which are palpated and massaged, the fornix of the seminal vesicles is located and the ampullae are palpated and massaged, as are the inguinal rings, pelvic lymph nodes, iliac lymph nodes, the kidney, and any viscera within reach. The ampullae and the seminal vesicles are then massaged again. The urethralis muscle and the prostate are identified and massaged while progressing toward the anus. In addition to identifying abnormalities or eliciting a painful response, which may indicate a problem, palpation and massage serves to stimulate the bull and facilitate ejaculation. Thereafter, the electroejaculator is placed on a standard program and the probe is inserted into the rectum. At this point, any observations or abnormalities from palpation are recorded. As erection and protrusion occur, the internal prepuce and the penis are examined by observation and palpation. A pre-warmed Styrofoam™ cup is placed into a holder and some seminal fluid is collected, before the ejaculate is collected. As soon as possible, a drop of semen is placed on a pre-warmed slide and observed for either gross or individual progressive motility. The results are recorded, and a morphology slide is then made using one drop of semen and one drop of eosin-nigrosin stain. In no further collection is needed, the bull is then released from the chute. The bull is observed leaving the chute and the chute area for lameness. The

next bull is brought into the chute and the next examination started, while the morphology slide from the first bull is drying. This protocol provides minimum time in the chute for the bull. A system utilizing a second veterinarian, who remains at the microscope to perform the motility, morphology, and record information on the SFT bull evaluation form, further minimizes the time in the chute for the bull, and makes the testing protocol more efficient.

4. Classification

The next step of the BBSE is the classification of each bull on an individual basis. The information has been gathered on the individual SFT bull breeding soundness form. The individual form is used by our practice to allow adequate space and organization of information gathered while performing the BBSE, as well as comments regarding the classification of each bull. The herd SFT bull breeding soundness form does not allow adequate room for the information and comments needed. Each bull is evaluated on all four categories of the SFT BBSE standards; he must achieve at least the minimum in all four categories to be classified as a satisfactory potential breeder.

4.1. General and reproductive physical examination

Although deficiencies in this category are common, this part of the BBSE is often overlooked or done in a quick, cursory fashion. Begin your examination at the head of the bull, directing your attention to the eyes, looking for evidence of squamous cell carcinomas, corneal damage, and lymphomas. The front feet are then observed. Screw claw and interdigital fibromas are common. The prevalence of screw claw appears to be increasing in the beef breeds, and since it may be inherited, it is not only listed under the feet and legs section of the form, but a statement should also be made in the comment block at the bottom of the form that this bull should not be used as a purebred herd sire, or his heifers should not be retained for breeding if he is used in a commercial herd. As the examination moves to the side of the bull, prepuce injuries, rear foot abnormalities, hock joint injuries, hernias, lymphomas, scrotal or testicular abnormalities or injuries can be detected and noted. While doing the transrectal examination, lymphomas, kidney abnormalities, inguinal hernias, adhesions, seminal vesiculitis, or prostate abscesses may be detected. During penile protrusion and ejaculation, the penis and the internal prepuce are

examined for lacerations, warts, tumors and scars that may interfere with extension or coitus. One of the more common defects detected in young bulls is a persistent frenulum. Although it is usually easily corrected at the time of collection, it too may have hereditary potential, and this must be noted on the form.

Any single reason, or combination of reasons, may cause a bull to be classified as a deferred or unsatisfactory potential breeder. A thorough general and reproductive is required for an adequate BBSE, as well as gathering information that will aid in a prognosis of returning to service if the defect or abnormality noted is treatable, or likely to improve with time.

4.2. Scrotal circumference

The scrotal circumference measurement is obtained while doing the general and reproductive examination. It can be obtained from the side or the rear, depending on your preference, the facilities, and the bull's temperament. After gently forcing both testes to the bottom of the scrotum, the primary considerations are to avoid spreading the testes apart, and to ensure sufficient pressure that the top surface of the measure tape is even with the skin. Record the measurement; if the bull is below the minimum, there is no need to continue the examination. Bulls not meeting the minimum for scrotal circumference should fail, although young or emaciated bulls may receive a deferred classification in some cases.

4.3. Minimum motility standards

It is preferred that gross motility and individual progressive motility be performed as soon after collection as possible. This is to reduce the affect of cold shock, urine contamination, or other spermicidal contaminants. The author uses a warm Styrofoam™ cup almost exclusively for warmth and reducing contamination. A warm microscope stage, warm slide and warm cover slip are necessary to maintain maximum motility. Under field conditions, this can be achieved with heating pads, stage warmers, or slide warmers. Gross motility is observed microscopically with under low power, whereas progressive individual motility is observed under 400×. All bulls that have unsatisfactory motility are collected at least one additional time, to insure that technique is not an issue. The bull must have a minimum of 30% progressive motility or fair gross motility to be classified as a satisfactory potential breeder according to SFT BBSE minimum standards.

4.4. Minimum morphology standards

The SFT BBSE minimum standard for a satisfactory potential breeder is 70% normal sperm. The most common method of obtaining morphology counts in practice is to use an eosin–nigrosin stained sperm smear observed under oil immersion (1000–1200×), with either a bright-field (conventional) or phase-contrast microscope. Sperm are classified as being normal or having secondary abnormalities or primary abnormalities. With a bull that has <70% morphologically normal sperm, the author will list (in the comment section) the more abundant individual abnormalities. Morphology is done immediately after collection, between bulls, or after all bulls have been processed, depending on the number of bulls to be tested, and the presence of a second veterinarian. That 52% of bulls categorized as unsatisfactory potential breeders failed due to morphology [2] provides ample evidence that an adequate BBSE cannot be performed without assessing sperm morphology.

5. Overview of the procedure

Once completing the examination, closely adhering to an efficient protocol, completing the form and addressing specific problems, you may ask for additional history to aid in the interpretation of your findings. Once you have complete information, communication of the results to the owner or manager is the next step. Specifically, they are interested in why a particular bull was classified as an unsatisfactory potential breeder or deferred; this is the rationale for listing specific sperm defects, traits that are potentially heritable, or physical abnormalities. Carefully recording defects as you go provides you with accurate information. Furthermore, a good understanding of spermatogenesis, sperm maturation, and where, when or how toxins or injuries have an effect, will provide a rational way to make a diagnosis, provide a prognosis, and make sound, science-based recommendations. Regarding specific sperm abnormalities or specific conditions, the history and the timetable for proposed sale or use will assist you and the owner to decide whether to retest, treat, or cull individual bulls.

6. Conclusion

The BBSE has been well accepted by the profession and the cattle industry as a standard for determining if a bull is a good potential breeder and a satisfactory

method of identifying subfertile breeders. With the SFT BBSE minimum standards, a good protocol or examination procedure, and a thorough understanding of spermatogenesis and sperm maturation process, you will be able to examine and assess bulls more efficiently.

References

- [1] Chenoweth PJ. A new bull breeding soundness form. *Proc Soc Theriogenol* 1993;63–70.
- [2] Carson RL. Over a thousand BSE's using the new form. *Proc Soc Theriogenol* 1995;65–72.