## SFT Bull Breeding Soundness Examination Standards Update:

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## Summary:

The Bull Breeding Soundness standards established by the Society for Theriogenology have recently been updated following review by an ad hoc committee charged insuring that the recommendations of the Society reflect the best available evidence.

The committee's report affirmed the basic tenets of the Bull BSE standards adopted in 1983 but suggested a few updates to align the principles with the most current findings. These recommendations were adopted by the Society as the official guidelines for veterinarians providing bull breeding soundness examinations.

Highlights from the updates to the Bull Breeding Soundness Examination standards include:

- General physical examination including examination of the genitalia, measurement of scrotal circumference, determination of sperm motility, and determination of the percentage morphologically normal spermatozoa in an ejaculate remain the cornerstones of the SFT Bull Breeding Soundness Examination.
- 2. The minimum standard for the percent progressive motility remains unchanged at 30%. The determination of individual progressive motility rather than mass motion is preferred.
- 3. The minimum standard for the percent morphologically normal sperm remains unchanged at 70%. Updates to assessment of sperm morphology include:
  - a. Otherwise normal sperm containing distal cytoplasmic droplets are recognized as variations of normal sperm morphology and not counted as abnormal.
  - b. Otherwise normal sperm with abaxial implantation of the midpiece are recognized as a variation of normal and not counted as abnormal.
  - c. Recording or the percentage of abnormal sperm in the ejaculate based on the location of the abnormality (head, midpiece, or tail) is preferred.
    The Bull Breeding Soundness Examination forms provided by the Society will be modified to facilitate capture of data in this format.

The committee's recommendations included the creation of a new, updated manual detailing the basis of the Bull Breeding Soundness Examination Standards. That manual has been completed and is available from the SFT.

#### SFT Bull Breeding Soundness Examination Standards

Evaluation of bulls for breeding soundness was one of the earliest and remain one of the most important components of production medicine programs offered by veterinarians. Development of procedures and standards for evaluation of bulls to identify infertile or subfertile individuals led directly to the creation of the Rocky Mountain Society for the Study of Breeding Soundness in Bulls, the forerunner of the Society for Theriogenology, and eventually to organization of the American College of Theriogenologists. The Bull Breeding Soundness Standards established by the SFT remain the most widely accepted and utilized criteria for evaluation of bulls in the United States and are the basic requirements are incorporated to varying degrees in most of the cattle producing countries of the world.

Bulls meeting criteria for classification as "Satisfactory Potential Breeders" should be capable of generating acceptable pregnancy rates in a fair complement of cows during a defined breeding period. Because no testing modality specifically measures fertility, the Bull Breeding Soundness Evaluation relies on exclusion of animals which do not meet minimum standards associated with successful performance in common management systems.

Properly performed examination of bulls for breeding soundness is valuable to producers selecting animals to be added to the breeding battery (pre-purchase) and as an integral portion of preparations prior the breeding season. To maximize its value, the examination must be more than a "semen test" and classification as a "Satisfactory Potential Breeder" must signify to producers that the animals have met a high standard which can be relied upon.

Many bulls failing to meet minimum standards may be capable of achieving pregnancies, and informed producers may choose to utilize these bulls. With assessment of data measured in the properly performed evaluation, veterinarians can provide valuable guidance.

The Society Standards have focused on minimum criteria in four categories, namely physical soundness, scrotal circumference, sperm motility, and microscopic evaluation of sperm morphology. In order for an animal to be classified as a "Satisfactory Potential Breeder", the bull must meet or exceed the criteria in all four categories. The standards adopted by the SFT in 1983 have served the cattle industry and the veterinary profession well and enjoy wide acceptance among progressive cattlemen. The standards were established by a committee of veterinarians with interest and experience in evaluation of breeding bulls with input from reproductive physiologists and animal scientists. Extensive evaluation of available research combined with the realities of field evaluation of bulls and the spermiogram were combined and the Bull Breeding Soundness Examination standards were widely adopted in the decades that followed their introduction.

In 2016, the Society for Theriogenology established a task force charged with re-evaluation of established standards and assessment of the criteria evaluated in light new information from research generated since the adoption of the 1983 standards. The members of the task force assessed the available evidence pertinent to each of the components evaluated in the current BSE standards, focusing on the value and the details of how each standard was to be assessed. The basis for each

criteria and standard was compared to published literature and research, with the goal of bringing the process into close alignment with available evidence.

The committee concluded that the widely recognized SFT 83 standards have served well to remove infertile and subfertile bulls from the bull battery, and while suggesting a few changes supported by current understanding of specific nuances, largely affirmed the wisdom of the earlier committee. The recommendations for updates to the SFT guidelines were presented to the executive board of the Society in 2018 and adopted as the standards for breeding soundness examinations of bulls.

It is encouraging that following this in-depth review, the tenets of the BSE standards were affirmed. The few suggested changes align the recommendations of the SFT with current science the efforts and will enhance the ability of veterinarian as they provide a value-added service to their clients.

Changes:

Physical examination: No changes to previous expectations.

Prior to the introduction of the electro-ejaculator, semen was collected utilizing a mount animal and an artificial vagina, providing the collector with an excellent opportunity to assess breeding ability during the simulated coitus. This opportunity to observe is not available in with semen collection utilizing an electro ejaculator, making careful assessment of animals for physical clues to physical soundness essential.

Bulls must be able to visually identify females in estrus and complete the physically demanding coital act. Observation of locomotion and the animal's ability to navigate obstacles is a necessary portion of the BSE. Musculoskeletal soundness is prerequisite for successful service. The necessity to pay particular attention to the conformation and structure of the feet and legs is obvious and communication with the client (either buyer or seller) becomes an opportunity for client education.

Body condition scoring is not specifically required but should be observed and recorded as part of the assessment of the potential for the bull to withstands the rigors of a breeding season.

Focused examination of the internal and external genitalia is necessary in addition to the general physical exam. Trans-rectal palpation of the accessory sex glands is only possible with transrectal palpation, which. Palpation also serves as an excellent pre-ejaculatory stimulus to facilitate collection of semen with an electro-ejaculator.

#### Scrotal Circumference: No changes to previous standards.

The age-based standards for scrotal circumference were not changed in the updates. Scrotal circumference measurements provide an easily obtained and reliable estimate of daily sperm production.

#### Sperm motility: No changes to previous standards:

Minimum requirements for individual motility of sperm in an ejaculate remain at 30% progressive motility. The committee's recommendation, adopted by the Society, state that determination of individual progressive motility is preferred to estimation of progressive motility assessment of mass motion in the ejaculate.

Determination of motility has historically been based on microscopic observation of appropriately diluted semen by an experienced observer. The use of other methods, including computer assisted measurement of motility, is acceptable and may be useful to some practitioners.

# Sperm morphology: No changes to previous standards requiring a minimum of 70% morphologically normal sperm in an ejaculate.

Appropriate examination of sperm morphology requires a high-quality light microscope or phase contrast microscope. Use of oil objectives is required to achieve maximum resolution at a level of magnification suitable for evaluation of subtle anomalies found in the individual sperm. Without this level of resolution, the observer's opportunity to appropriately classify individual sperm as normal of abnormal is compromised.

Distal cytoplasmic droplets are remnants of the spermatogonia cell contents which are found just proximal to the termination of the mid-piece. These droplets generally shed as the sperm are mixed with seminal fluid and become motile at the time of ejaculation. These droplets are occasionally found in ejaculates, especially in young animals shortly after puberty. Breeding trials have not demonstrated a decrease in fertility of ejaculates containing even high percentages of distal droplets. Otherwise normal sperm with typical distal droplets should not be counted as abnormal when assessing the spermiogram. The observer must be cautious and not confuse distal droplets with defects in the mitochondrial sheath which produce "pseudodroplet" or "swollen midpiece" defects.

The presence of sperm in the ejaculate with "abaxial attachment of the midpiece" to the sperm head has not been associated with a decrease fertility and are therefore otherwise normal sperm with abaxial implantation should not counted as abnormal in the assessment of the spermiogram. Similar recommendations have been adopted for several other species.

#### Classification of sperm abnormalities:

Several classification systems for recording abnormalities in spermatozoa in many species have been explored. The Bull Breeding Soundness forms provided by the Society for Theriogenology have previously utilized the "Primary/Secondary" system which attempts to classify abnormalities by the location of the sperm cell a the time of disruption. Primary defects are those which occur in the testis (seminiferous tubules) and secondary defects occur during maturation or storage in the epididymis. While sometimes useful, the origin of specific defects has sometimes been elusive and not always clear. New forms will utilize a classification system based on the location of the defect, e.g. Head Defect, Midpiece Defect, or Tail Defect. This simpler system should prove useful to practitioners doing serial evaluations of particular bulls. NOTES:

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