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New Guidelines for Breeding Soundness Evaluation (BSE) of Bulls

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The primary function of a bull is to get cows pregnant as early in a breeding season as possible. Up to 20% of all bulls have less than optimum fertility and low overall pregnancy rates can often be traced to the herd bull. Totally sterile bulls are uncommon and relatively easy to identify, but bulls with lowered fertility are more important as a source of economic loss to a beef producer. To be a successful breeder of registered cattle, you must take all steps necessary to have a reputation as a consistent supplier of highly fertile bulls. Call it "Quality Assurance", call it integrity or whatever; you owe it to your customers.

Since the early 1950s, veterinarians have attempted to evaluate bulls for breeding soundness. The Society for Theriogenology has supplied leadership for developing, standardizing and improving a system for Breeding Soundness Evaluation (BSE) of bulls. In 1983, the Society for Theriogenology published the *Manual for Breeding Soundness Examination of Bulls* which used a numerical scoring system to place bulls in categories of Satisfactory Potential Breeder, Questionable Potential Breeder, and Unsatisfactory Potential Breeder. This system of evaluation has been very well accepted by the beef industry and, in essence, all reputable veterinarians conducting BSE have utilized these guidelines. Most of you are familiar with these procedures.

Since 1983, much new information has become available about fertility in bulls. This new information has necessitated a change in breeding soundness evaluations. As of September 1, 1992, the Society for Theriogenology has new guidelines and a new form for evaluating and classifying bulls for breeding soundness. These guidelines use parameters which have stood the test of time and incorporate the latest scientific information. The new form promotes a standardized set of procedures and requirements for categorizing a bull as a *Satisfactory Potential Breeder*.

Major Changes in Breeding Soundness Evaluation (BSE) of Bulls

A Renewed Emphasis on a Physical Examination As an Integral Part of a BSE - The physical examination should consist of a general evaluation of health, well-being, and body condition of all bulls. Any physical problem can potentially reduce fertility under natural mating circumstances, but some are more important than others.

Conformational and structural soundness are important components of breeding soundness. Significant defects in leg conformation tend to shorten the breeding life of bulls. Common leg problems relating to bull fertility include: sickle hocks - which lead to swollen hocks and lameness; postlegs - which predispose a bull to stifle problems; pastern problems and sore hocks; camped out hind legs - which increase likelihood of back and stifle problems; and bow legs - which results in hoof problems and lameness. Additionally, bulls need to see, eat, and smell. Any problem in these areas is good reason for questioning the breeding soundness of a bull.

A thorough examination of the male reproductive system follows the general health examination. Developmental defects and inflammation are commonly found problems. The accessory sex glands can be examined rectally, while the spermatic cord, scrotum, testicles, and epididymidis can be palpated externally. The penis and prepuce are generally examined during electro-ejaculation for a semen sample.

Missing or underdeveloped portions of the male reproductive system are not common problems, but are important in that they can have severe effects on fertility. One common developmental defect which will prevent a bull from servicing is persistent penile frenulum (tied-back penis). Correction of this problem is easy, but a caution in using a bull even after correction is that the condition appears to be heritable.

Inflammation of portions of the reproductive system is common, especially in groups of young bulls housed in fairly confined areas. This condition is often diagnosed as vesiculitis (inflammation of the vesicular glands), but it has been shown that inflammation in this

area is usually accompanied by inflammation in adjacent accessory sex glands. Semen quality is generally decreased under these circumstances. Many bulls with this condition recover without any treatment; some respond to antibiotic therapy; while yet others never recover.

Changes in testicular tone are associated with a degenerative process and can be detected to some degree by testicular palpation. Degenerative change in the testicle is a frequent cause of infertility in all males, including bulls. This condition is a common occurrence following inflammatory reactions discussed previously. Many non-disease factors can also contribute to testicular degeneration (examples are frostbite, injury, or the condition may develop with old age). Regardless of cause, the effect is reduced fertility.

Only bulls with satisfactory feet and leg conformation, good overall health and freedom from reproductive tract problems are candidates for continuing an evaluation. If results of the physical examination are not satisfactory, results of the rest of the evaluation will be of little importance.

Abandonment of the Numerical Scoring System in Favor of a System Employing Recommended Minimum Threshold Standards for Scrotal Circumference, Sperm Motility and Sperm Morphology - A problem with the previous system was an over-reliance on numerical scores. Thus, a bull could pass the BSE even if he was very poor in one particular category as long as other scores were high enough to give an overall passing grade. Also, scores could be used to "rank" bulls in terms of potential reproductive performance. Both approaches could lead to error and misrepresentation, especially as the original intention of numerical scores was to help place bulls in categories or groups.

In general, the minimum threshold standards selected are not overly rigorous. They are based on the latest scientific evidence and experiences with *all* breeds under varying managerial and environmental conditions. A case for establishing more rigorous thresholds received considerable support, especially on the grounds of encouraging genetic progress in breeding cattle. However, it is not a responsibility of veterinarians to force genetic progress, however commendable that goal may be. These guidelines provide minimum acceptable standards for a bull to be reproductively sound, not guidelines for a bull to be superior in the breeding pasture. It is left to individual breeds, breed associations and breeders to cause genetic progress by having standards higher than minimum necessary to be a ***Satisfactory Potential Breeder***.

A Minimum Scrotal Circumference Based on Age Categories to 24 Months

Table 1. Minimum Recommended Scrotal Circumference	
Age (months)	SC (cm)
<= 15	30
> 15 - <= 18	31
> 18 - <= 21	32
> 21 - <=24	33
> 24	34

Relatively low thresholds for scrotal circumference were selected for the reasons given above. ***These are minimum acceptable measures for bulls of all breeds.*** Emphasis is placed on standards for puberal bulls up to 2 years of age (i.e., the most common and probably most important test population). Although the use of low thresholds provides considerable latitude, variations will occur with age, level of nutrition and genotype. Again, these thresholds are based upon considerations of reproductive adequacy and not necessarily upon those of optimal genetic merit.

A Minimum Threshold of 70% Normal Cells for Sperm Morphology - Since 1975, the practice of separately classifying different sperm abnormalities based on how they were caused has been severely challenged. Using a single threshold for *normal* sperm is reinforced by new evidence indicating that many sperm abnormalities may in fact reflect stages of increasingly severe sperm problems relating to progressively worse fertility. The irony is that this approach is not inconsistent with the pioneering conclusions of Lagerlof (1934) who argued that damage to spermatogenesis might well influence many more sperm than those with easily seen abnormalities. The requirement for 70% or more normal sperm for a bull to pass the BSE does not make any distinction between types of abnormalities involved. However, the categories of *primary* and *secondary* sperm abnormalities are nevertheless retained on the form simply to assist in the mechanics of collating totals.

A Minimum Progressive Motility Threshold of 30% and/or "Fair" Gross Motility

Table 2. Minimum Recommended Motility of 30% or FAIR (F)		
Gross Mass Activity	Rating	Individual
Rapid Swirling	Very Good (VG)	>= 70%
Slower Swirling	Good (G)	50 - 69%
Generalized Oscillation	Fair (F)	30 - 49%
Sporadic Oscillation	Poor (P)	< 30%

Taking into account the varied and often trying conditions encountered in collecting semen samples in the field, this low threshold mainly serves to indicate a representative sample of semen was obtained. While total absence of motility may indicate severe reproductive problems, graduations of motility above 30% in samples collected by electro-ejaculation do not relate well to increasing pregnancy rates. For example, no motility in an otherwise good ejaculate may indicate a problem, but as long as 1/3 of the cells are motile, increases above this rate don't seem to relate to fertility.

Replacement of the "Questionable" Category with "Classification Deferred" - Producers and veterinarians alike have long expressed dissatisfaction with a "Questionable" category, despite its widespread use for many years. The difficulty arose from the realization that being placed in this category almost invariably meant that a bull was destined for a retest; certainly it was intended as a temporary or "holding" category. Bulls might be placed in this category for many reasons, both trivial and serious. It might just be due to an unwillingness to make a decision at that stage. Whatever the reason for its application, the term *questionable potential breeder* could be misinterpreted and be a disadvantage for animals so described, even if the category was intended to be temporary. Substitution of a *classification deferred* category, a description which has neutral connotations, does not have such disadvantages. However, its use implies that a retest will be scheduled.

Summary

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:

- **Scrotal Circumference (SC) based on age (Table 1)**
- **70% normal sperm cells**
- **30% individual and/or "Fair" gross motility (Table 2)**

Bulls which do not equal or exceed these thresholds will either be classified as *Unsatisfactory Potential Breeders* or will have their *Classification Deferred*. Placement in the latter category always implies that a retest is intended.

A BSE should be a systematic examination used to arrive at the best estimate of potential fertility. It should be emphasized that performing a BSE requires experience, judgment and scientific knowledge. As such, the estimate is related to skills of the veterinarian performing the evaluation. ***A BSE is not a fertility evaluation*** (the only true fertility evaluation is placing a bull with cows and determining pregnancy rates), ***nor is it a semen check***. Checking only semen will cause one to overlook many factors affecting ability of a bull to get cows pregnant.

A BSE attempts to measure only the potential of a bull to get cows pregnant. It does not consider his desire or ability to perform in the breeding pasture. Presently, we do not have good, quick, accurate ways to measure libido or mating ability, both of which are extremely important factors in reproductive performance. The only way to make these assessments is for producers to observe one or two matings. Having all bulls subjected to a BSE every year will definitely help you identify infertile and subfertile bulls and ultimately have higher pregnancy rates in your herd and for your bull customers.

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