



Cattle Producer's Handbook

Reproduction Section

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Identifying the Functional Bull: Bull Soundness and Management

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Evaluating breeding soundness of bulls is often neglected as a management practice. Producers may tend to believe that bulls in the bull battery for a year or more are of sound breeding value for the rest of their lives. They may also feel that new bulls are sound breeders simply because of some vague or implied guarantee by the seller to replace infertile bulls.

Unfortunately, neither idea may be correct. Bulls that do not settle their share of cows early in the breeding season are contributing to reproductive inefficiency. This can be just as costly as dead calves, although much less dramatic.

Bulls are selected for their genetic potential to improve the cowherd. It is economically important that all bulls are fertile. A breeding soundness examination performed yearly on each bull is the best way to ensure that the producer will get his money's worth from his bull battery.

A basic breeding soundness evaluation consists of:

- Physical examination of the animal.
- Examination of reproductive organs.
- Measurement of scrotal size.
- Semen evaluation.

In addition, the following tests or procedures may be included in a breeding soundness evaluation:

- Mating ability: Some assessment of the bull's desire (libido) and ability to breed a female in heat (termed serving capacity).
- Pelvic measurement.
- Trichomoniasis testing.

Physical Examination

The bull needs to be able to see, eat, smell, and move around to successfully breed his share of cows. Any factor that lowers the efficiency of these activities will have a negative effect on the bull's breeding ability.

A history of recent illness is also important since the semen sample may show evidence of testicular damage from a fever for several months after the illness. Spermatogenesis or the creation of sperm cells in a bull requires 45 to 60 days.

High fever, infections, and other physical problems can cause damage to the sperm creation process. It is important to keep this in mind when semen testing breeding bulls.

Eyes—A bull with poor vision is not only dangerous to handle but is usually dominated by other bulls to the point that his breeding effectiveness is reduced. Both eyes should be free from injuries or disease. Special care should be taken to examine eyes for early cancer eye growths. Old pinkeye scars that result in loss of vision may be reason to cull some bulls, especially in multiple sire groups.

Teeth and Mouth—Older bulls need to be examined for lost and severely worn teeth. Lump jaw (actinomycosis) is a chronic bone and soft tissue infection that is not responsive to treatment. This type of infection is much more serious than the simple "cheatgrass" type abscesses that drain and then completely heal up. Bulls with actinomycosis should be culled as soon as the condition is diagnosed.

Another infection that cattle are susceptible to is "wooden tongue." This is caused by bacteria that are present in the mouth of the animal. When rough feed is consumed, it can cause abrasions in the lining of the mouth that allow the bacteria to invade the soft tissue. The tongue and lymph nodes are often affected. The tongue suddenly becomes hard, swollen, and irritated.

Symptoms are cattle that drool excessive saliva and seem to be chewing softly. In advanced cases, the animal is unable to eat or drink and rapidly begins to lose weight. Treatments using iodine and tetracyclines

are usually successful unless the infection is advanced. The disease is progressive and can be fatal.

Body Condition—Ranchers often disagree about what is the correct body condition for a breeding bull. Bulls should have enough condition to be strong with some reserves of energy in the form of fat. The required amount of condition will vary with age, kind of range, length of the breeding season, and the number of cows per bull. A body condition score of 5 to 6 is desirable for range bulls entering the breeding season.

Feet and Legs—Structural soundness of the feet and legs is paramount if the bull needs to travel to mount females in heat. A bull that is either sore or crippled will not be able to perform efficiently under range conditions.

Structural defects of the feet and legs should be discriminated against during the breeding soundness evaluation. Some young bulls may have been foundered to some degree in their growing phase. The foundered condition may be fully expressed during the breeding season, causing the bull to go lame and reducing his effectiveness to travel and breed. Do not purchase foundered young bulls. Conformational faults, stifling, or other injuries can result in the bull going lame soon after the breeding season begins.

Most structural faults such as sickle-hock and post-legs are heritable and may cause lameness with hard use. All four legs and all joints should be clean and free from any swelling or evidence of old injuries. A bull traveling on rough, hard ground will wear his hoofs off even and seldom will have foot problems if he is structurally correct.

Diseases of the foot including foot rot (foul foot), interdigital corns, and puncture wounds should be observed and treated to render the bull sound before the breeding season.

Examining the Reproductive Organs

A thorough examination of the bull's reproductive system follows the general health examination. The internal organs are examined by rectal palpation while the bull is adequately restrained in some type of chute. The vesicular glands, ampullae, and prostate are examined for evidence of inflammation, adhesions, or fibrosis.

The spermatic cord, scrotum, testicles, and epididymides are examined for evidence of abscess, injury, frostbite damage, or tumors. The testicles are the factory where sperm cells are produced, and they should be firm, resilient, equal in size, and size appropriate for the bull's age. Degenerative change in any of these organs is a frequent cause of infertility.

Testicular hypoplasia (underdevelopment) is also evaluated at this time. Hypoplasia reduces fertility and is highly heritable. With this condition, one or both testicles are one-third of normal size.

The penis and sheath should be examined for any sores, lacerations, abscesses, scar tissue, or adhesions. During erection with the electro-ejaculator, the penis should come from the sheath in a straight line with the body of the bull. Persistent penile frenulum (tied back penis) is occasionally found during this part of the examination. Sometimes young bulls may have a *penile hair ring*. This involves a band of hair encircling the penis causing irritation, abrasions, and even scarring.

Injuries to the penis usually occur during the active breeding season but may be resolved enough to be missed until the breeding soundness exam. Old lacerations and adhesions usually prevent the penis from being fully extended or cause irritation during breeding. Bulls with any type of painful lesion will usually quit trying to breed cows. Warts on the tip of the penis are a relatively common finding in young bulls.

Scrotal Circumference

There is no accurate, repeatable method of measuring actual semen concentration with samples collected with the electro-ejaculator. Because scrotal size correlates well with daily sperm production and is highly repeatable, scrotal circumference is a valuable indicator of semen production. Bulls with bigger testicles produce more semen and sire sons with bigger testicles. Bulls with larger testicles will reach puberty at an earlier age and will sire heifers that reach puberty also at an earlier age.

Zebu cattle (*Bos indicus*) tend to have small testicle size for age compared to *Bos taurus* breeds. This smaller testicle size also correlates with the late onset of puberty found in these cattle. Many of the newer beef breeds such as Brangus, Simbrah, and other Brahman cross cattle contain a certain percentage of Zebu blood.

Because most of the bulls in these newer breeds possess testicles at least as large as the average *Bos taurus* breeds, the breeding soundness evaluation system used by most veterinarians does not make allowances for smaller testicle size in these breeds (Lunstra and Cundiff 2003). Scrotal circumference is given a score based on the age of the bull. *Scrotal circumference score represents 40 percent of the total score of the bull.*

Semen Evaluation

A semen sample is usually collected from beef bulls by electro-ejaculation under normal field conditions. The quality of semen obtained with the electro-ejaculator is equal to that of any other collection method.

However, a semen sample adequate for evaluation cannot always be collected from every bull on every attempt with an electro-ejaculator. Failure to obtain sperm cells from a single attempt does not automatically place the bull in the unsatisfactory category. A bull can be normal on general physical and reproductive organ

examination and still have low fertility due to poor semen quality.

Semen Quality

Sperm cell concentration, motility, and morphology evaluations are the basis for the scoring system developed by the Society of Theriogenology. This scoring system has become the standard across the country and is used by almost all veterinary practitioners. If the bull is satisfactory on the general physical exam and a complete exam of internal and external reproductive organs, a semen sample is collected and evaluated under the microscope for the following traits:

Concentration (the number of normal sperm cells present in each cc of the ejaculate) and volume (the number of cc's of ejaculate) are important factors in semen quality. Together, these values represent total sperm output or the serving capacity of the bull.

Motility of individual sperm cells is an important factor in determining the breeding soundness of bulls. Ideally, the sample should contain more than 90 percent vigorous, progressively motile sperm cells when diluted and viewed under the microscope (Parker, Mathis, and Hawkins 1999). Motility is easily decreased by exposing the semen sample to cold temperature shock during collection in severe weather conditions. Special heated equipment must be used during cold weather if the test is to be meaningful. *Motility score represents 20 percent of the total breeding soundness score.*

Morphology, or the shape of the sperm cells, is also an important semen characteristic. A small sample of semen is stained on a microscope slide, and at least 100 cells are graded for normal shape. Sperm cells with droplets, bent or coiled tails, misshapen heads, or other defects will have much less success in settling a cow. Abnormal cells should usually be less than 25 percent of the total for a bull to receive the full points in this category. *Morphology score represents 40 percent of the total breeding soundness score.*

Classification of Breeding Bulls

The Society of Theriogenology developed a system to evaluate breeding ability of bulls in 1976. This system has become the standard by which bulls are measured for breeding soundness. In 1992 the system was modified slightly to reflect the most current concepts in bull fertility examination (Table 1).

To be classified as a **Satisfactory Potential Breeder** requires a satisfactory physical examination and minimum values for scrotal circumference, motility, and morphology. Any bull not meeting minimum is classified either as **Unsatisfactory Potential Breeder**, or classification may be **Deferred** at the evaluator's discretion. Table 1 shows the standards for scrotal circumference per month of age, as well as semen motility and morphology.

Mating Ability

No practical way is now known to estimate a bull's potential mating ability except to observe the bull with cows in heat. Semen production, scrotal size, or hormone levels do not relate well to the mating performance of the bull. Contrary to popular opinion, there seems to be no good visual indicator of bull fertility or libido.

In one study reported from Texas A&M University (Wiltbank 1977), 40 yearlings to 2-year-old bulls were given a masculinity score from 1 (very feminine) to 10 (very masculine). In addition, the size of the crest of each bull was measured. Bulls covered the range of masculinity scores, and a great deal of variation was noted in crest size (from almost none to very large). No relationships, however, were observed between these measures and either classification after the breeding soundness evaluation or mating behavior.

Libido, or sex drive, is important in the bull's ability to settle a large number of cows. Assessment of libido and mating ability is important because it can help to detect physical abnormalities that would prevent a bull with good semen from settling cows.

Information is lacking on breed difference in mating behavior of bulls in natural breeding service. Libido and semen production do not appear to have any relationship, so it is possible to get good semen from low libido bulls and vice versa (Hafs, Hoyt, and Bratton 1959). Standardized libido testing procedures using heifers in standing heat are quite accurate, but the cost of such tests may preclude their routine use during the breeding soundness examination.

Trichomoniasis Testing

Trichomoniasis, a venereal disease, can be responsible for poor reproductive performance of the cow-

Table 1. Bull breeding soundness evaluation.

SCROTAL CIRCUMFERENCE (40 percent)		
Age of bull	Minimum scrotal circumference	
<15 months	30 cm	
15-18 months	31 cm	
19-21 months	32 cm	
22-24 months	33 cm	
>24 months	34 cm	
MOTILITY (20 percent)		
Gross activity	Individual activity*	Rating
Rapid swirling	>70%	Very good
Slower swirling	50-69%	Good
Generalized oscillation	30-49%	Fair
Sporadic oscillation	<30%	Poor
MORPHOLOGY (40 percent)		
Minimum is 70 percent normal sperm cells.		

*Motility may be described either by gross activity (descriptive) or by individual activity (percent) (Parker, Mathis, and Hawkins 1999).

herd. This disease causes cows to abort within the first 4 months of pregnancy. If the bulls have been pulled after a short breeding season, these cows will be open at pregnancy test time. However, cows will usually clear up and breed back during a prolonged breeding season, producing a delayed calving season and strung-out calf crop. For more information about trichomoniasis, please refer to article 659.

Pelvic Measurements in Bulls

The size of a cow's pelvic area is critical in the parturition process. Small pelvic areas can be responsible for serious dystocia problems.

Producers selling bulls for seedstock purposes are beginning to report pelvic measurements along with many of the other genetic traits considered important. Pelvic area has been reported to be highly heritable by some researchers (Deutscher 1987), while others have found it to be moderately heritable (Benyshek and Little 1982).

Basically, bulls with larger pelvic areas should translate into daughters with the same making it an important trait in the selection process. Deutscher (1987) reports that the relationship of calf birth weight to heifer pelvic area is the major factor influencing the degree of dystocia, thereby suggesting that pelvic area should be a priority in selection criteria.

The best time to evaluate bulls for pelvic areas is as yearlings. Bulls, generally, will have smaller pelvic areas in comparison to heifers of the same age (Laster 1974). The Beef Improvement Federation recommends adjusting pelvic area measurements to a common age so comparisons on genetic potential can be made.

Summary

Breeding soundness evaluation is a practical method to eliminate bulls with less than satisfactory breeding potential. This evaluation should be conducted on every bull 30 to 60 days before each breeding season to allow time to replace questionable or unsatisfactory

bulls. Producers should also observe bulls with cows in heat to determine that they have the desire and ability to mate successfully. Pelvic measurement allows selection of bulls with a large pelvic area for their size or age. Bulls should also be free of venereal diseases, the most important being trichomoniasis.

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