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Breeding Soundness Evaluation of Beef Bulls

Kurt Wohlgemuth
Extension Veterinarian

Kris A. Ringwall
Extension Livestock Specialist

Justification

How often have we heard, "The bull is half the herd?" Many producers have experienced the frustrations associated with a significant percentage of open cows and heifers once the breeding season is over. Little can be done then, other than cull open females or feed them for an extra year of unproductive life.

Improving conception rate is not an easy task. It requires both a fertile female and a fertile bull used either under a natural breeding system or artificially (AI).

When we talk about breeding soundness of a bull, we refer to its overall ability to settle fertile females. Assessment of the various factors which contribute to this ability is the purpose of breeding soundness evaluation. Ultimately, breeding soundness evaluation enables us to breed the cow herd only to bulls which are satisfactory potential breeders.

When Should Bulls Be Evaluated?

Breeding soundness evaluation of bulls is recommended in the following situations:

Before a sale: The seller can be assured that bulls leaving the herd are physically sound and capable of producing semen of acceptable quality. This information is important should questions on the bull's fertility arise later on.

Following purchase: The breeder purchasing an untested bull is advised to evaluate it before the breeding season to be assured that the bull is physically sound and capable of producing semen of satisfactory quality. Should an unsound bull be detected, it may still be returned to the se er and a sound bull obtained without loss of time during the breeding season.

Before each breeding season: Regardless of their previous reproductive performances, all bulls in the breeding herd should be examined.

Semen quality and physical condition can deteriorate with advancing age. The fact that a bull is a satisfactory potential breeder as a two-year-old does not ensure that high fertility will be maintained throughout the bull's life. When a single bull is used in a limited breeding season, the dependence on a subfertile or infertile bull or one which is incapable of copulation due to a physical defect can result in serious reproductive deficiency and substantial loss to the owner.

In multiple-sire systems of mating, the effects of subfertility in one bull may not be as obvious to the owner. Normally fertile bulls in the group may compensate to some degree for the impaired performance of the subfertile bull. This will result in overuse of the normal bulls. Identification and replacement of the subfertile bull often results in an increase of breeding efficiency from an average to an excellent calf crop.

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When a herd has low conception rates: The history and clinical signs of diseases and conditions causing infertility are often the same as those resulting from use of subfertile or infertile bulls. In well-managed herds the producer usually reports that an unusually high number of females return to estrus. When observation of the herd is not as diligent, reduced breeding efficiency may not be discovered until an excessive number of non-pregnant cows are found at the pregnancy examination following the breeding season. Breeding soundness examination of the bulls in the herd should be the first step in investigation of reduced fertility, yet too often it is not initiated until more expensive and time-consuming tests have been performed on the cows.

Following exposure to North Dakota winters and scrotal frostbite: There is a proven relationship between scrotal frostbite and decreased semen quality. Scrotal frostbite resulting from a severe blizzard in 1964 was diagnosed in 14.4 percent of 6,389 bulls from Colorado and Wyoming. According to this study, frostbite was associated with a high incidence of unsatisfactory semen quality.

Damage to the spermatogenic (sperm forming) function was related to the severity of scrotal lesions, testicular adhesions, and swelling of testes. Mating behavior was adversely affected by severe lesions in some bulls. Older bulls with pendulous scrotums were more frequently and severely affected.

Provision of wind shelter, bedding and balanced nutrition reduced the incidence and severity of lesions. The adverse effect of weather on semen quality was not necessarily permanent. Ability to produce satisfactory semen was regained by some bulls over a period of three to six months. Bulls with questionable semen quality appeared to have a better chance of recovery than those with unsatisfactory semen.

Steps Involved in Breeding Soundness Evaluation

A breeding soundness evaluation includes the following steps: (1) A general physical examination; (2) a detailed examination of the external genitalia; (3) measurement of the scrotal circumference; (4) a rectal examination of the pelvic genital organs; (5) collection and evaluation of a semen sample or samples; and (6) classification of the bull as satisfactory, questionable or unsatisfactory.

Physical Examination: Steps #1 and #2

The bull is first observed free, in a pasture or corral. General condition, nutritional status, haircoat, masculinity, conformation and locomotion are noted. Particular attention is paid to the rear limbs of the bull used in natural service. If the bull is considered adequate following this initial appraisal, then it should be restrained, positively identified (tag, tattoo, brand, etc.) and thoroughly checked "from mouth to tail" paying particular attention to the external genitalia.

Any abnormalities in the sheath, penis, prepuce, scrotum, epididymides, symmetry, texture and consistency of testes are noted. The normal healthy testicle should be firm and resilient, much like a rubber ball. Deviations from normal vary from extremely soft to very hard testicles; either condition indicates low or abnormal fertility.

Measuring Scrotal Circumference: Step #3

Measuring the scrotal circumference is a very important criterion in evaluating a bull's breeding soundness potential. It is measured in centimeters (1 inch = 2½ cm). The positive relationship between scrotal circumference, testicular size and sperm production has been demonstrated in beef and dairy bulls. In addition, bulls with smaller testicles tend to produce a higher percentage of abnormal spermatoza. Measuring the scrotal circumference probably is the best single method to predict the ability of a young bull to produce spermatozoa.

The relationship between scrotal circumference and a bull's classification at different ages is illustrated in the following table:

	SCROTAL CIRCUMFERENCE[1] (in centimeters)		
Bull's Age	**Very Good**	**Good**	**Poor**
12-14 mo.	> 35 cm	30-35 cm	< 30 cm
15-20 mo.	> 37 cm	31-37 cm	< 31 cm
21-30 mo.	> 39 cm	32-39 cm	< 32 cm
Over 30 mo.	> 40 cm	33-40 cm	< 33 cm
SCORE	40 points	24 points	10 points

[1]Beef Improvement Federation
Guidelines for Uniform Beef Improvement Programs (1981)

Rectal Palpation: Step #4

The rectal examination is the last part of the physical examination. It immediately preceeds the collection of a semen sample because it serves as a preejaculatory stimulus. In most cases, rectal examination will make semen collection more efficient. In addition to partial stimulation of the bull, rectal palpation permits examination of the internal reproductive organs. Abnormalities of the accessory sex organs are not uncommon and are often accompanied by poor semen quality.

Semen Collection and Evaluation: Step #5

Most beef bulls are "collected" using an electroejaculator. The use of the electroejaculator makes it possible to examine semen from a relatively large number of bulls.

Different breeds respond differently to electroejaculation. Angus bulls require less electric stimulation to produce ejaculation than do Herefords. Charolais and Simmental bulls require ejaculation devices capable of high levels of stimulation. Age is also a factor; older bulls usually require greater stimulation than younger ones.

Evaluation of the quality of the semen sample is done as soon as possible after collection. The two most important criteria to evaluate the semen sample are motility and morphology. Of all the criteria available, the careful analysis of sperm morphology has the best correlation to fertility and the highest repeatability. Increased sperm abnormalities are associated with decreased conception rates.

The relationship between sperm morphology and a bull's classification is summarized in the following table:

Percent abnormalities and bull's classification[1]

Type of abnormalities	Very Good	Good	Fair	Poor
Primary	< 10	10-19	20-29	> 29
Total abnormalities	< 25	26-39	40-59	> 60
Score	40	24	10	3

[1]BIF Guidelines for Uniform Beef Improvement Programs (1981)

Bulls with "Very Good" sperm motility score 20 points, "Good" score 12 points, "Fair" score 10 points and "Poor" motility receives 3 points.

Classification of the Bull: Step #6

The evaluated bull may be classified as a "SATISFACTORY potential breeder," a "QUESTIONABLE potential breeder," or an "UNSATISFACTORY potential breeder." This classification is based on tested techniques which evolved from many years of practical and economical selection of bulls which are likely to have satisfactory reproductive performance.

These techniques are now standardized and should be applied uniformly, irrelevant of geographical locations. The classification is based on a numerical scoring system which ranges from a minimum of 16 points to a maximum of 100 points. This final score is obtained by adding up scores assigned to (1) the bull's scrotal circumference, (2) its semen morphology (quality) and (3) its semen's motility. These three criteria are scored as follows:

	Scrotal Circumference	Semen Morphology	Semen Motility
Very good	40 points	40 points	20 points
Good	24 points	24 points	12 points
Fair	10 points	10 points	10 points
Poor	10 points	3 points	3 points

The bull's final score (scrotal performance points + semen morphology points + semen motility points) determines the bull's classification as a potential breeder, as follows:

TOTAL POINTS	CLASSIFICATION
60-100 points	SATISFACTORY potential breeder
30- 59 points	QUESTIONABLE potential breeder
16- 29 points	UNSATISFACTORY potential breeder

A bull is not classified as either questionable or unsatisfactory until a minimum of three ejaculates are evaluated. Bulls which are classified as questionable or unsatisfactory should be reevaluated after a suitable period, usually six to eight weeks. This is especially true in young bulls. Older bulls may have periods of temporary infertility due to disease or stress, both of which depress semen quality. Reexamination after a six- to eight-week period of recovery usually allows differentiation between permanent or temporary infertility.

Libido and Serving Capacity

Once a bull has been classified as a satisfactory potential breeder, a determination of willingness to mate cows should be obtained through observation of the bull's libido or mating desire. Using bulls with low libido can decrease the pregnancy rate of the cow herd by as much as 25 percent.

Low libido yearling bulls must be identified. Yearling bulls that are slow or hesitant to mate restrained estrous cows tend to mate fewer estrous females under natural mating conditions and show little improvement with increasing maturity.

Currently no standards have been established for libido evaluation within the United States, but the bull's mating desire can be observed within the cow herd or the bull can be exposed to estrous females. During the libido test, the bull should be allowed to observe other bulls mating immediately prior to evaluation and then exposed to at least one estrous female that is willing to stand or be restrained.

Bulls fully acclimated to their environment and with previous opportunities to mate which do not complete two successful services within 30 minutes if twice exposed to estrous cows must be culled.

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