

# Texas Agricultural Extension Service

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## Breeding Soundness of Bulls

Tom R. Troxel\*

The importance of the bull in a cattle breeding program is often underestimated. A cow is responsible for one-half the genetic material for one calf, but a bull is responsible for one-half the genetic material for 20 to 50 calves. The ability of that bull to locate cows in estrus and breed them is vital for a successful cattle breeding program.

Bulls differ in physical appearance, fertility and sex drive (libido). In the past, when a cow failed to become pregnant it was assumed she was at fault. A clearer understanding of the male reproductive system and the differences between reproductive capabilities of bulls indicates that assumption is not always correct.

### Reproductive System

One of the major organs of the bull's reproductive system, the **testis**, is made up of two tissues that perform different functions. The seminiferous tubules produce the sperm cells while the Leydig cells (interstitial tissue) produces testosterone. The testes should be free inside the scrotum. Twisted and uneven testicles do not affect the reproductive performance of a bull; however, they are conformationally abnormal and unpleasing to the eye.

The **scrotum** supports and encloses the testes. Its main function is to regulate the temperature of the testicles. The scrotum has large subcutaneous (sweat) glands and the muscular ability to raise and lower the testicles according to environmental conditions.

Also located inside the scrotum and adjacent to each testis is the **epididymis**. The epididymis is made up of three sections (head, body and tail) and is approximately 3.4 meters long (10 to 12 feet). The main functions of the epididymis are concentration (from 100 million/cc to 4 billion/cc), storage, maturation and transportation of the sperm cells. Immature sperm cells cannot swim nor fertilize an egg when they

enter the epididymis, but when they leave both functions can be accomplished.

The **vas deferens** extend from the epididymis to the **ampulla**. They aid in the transport of sperm cells. Prior to ejaculation, sperm cells are pooled in the ampulla. The **seminal vesicles** and **prostate gland** contribute to the semen by adding substrates, buffers and inorganic ions (sodium, chlorine, calcium, etc.). The ejaculate is transported via the **urethra** and the extended **penis**. The reproductive tract of the bull is shown in Figure 1.

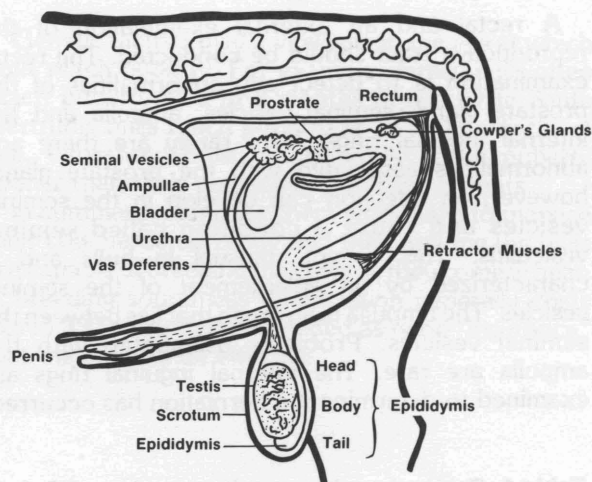


Figure 1. The Reproductive Tract of the Bull.

### Breeding Soundness Evaluation

Bulls should be evaluated for breeding soundness 30 to 60 days before the beginning of the breeding season to allow sufficient time to replace questionable bulls. Bulls should also be evaluated at the end of the breeding season to determine if their fertility decreased. The second evaluation may explain a poor calf crop.

\*Extension livestock specialist, The Texas A&M University System.

A breeding soundness evaluation should include: physical examination, examination of the reproductive tract, semen evaluation and libido evaluation.

### Physical Examination.

A physical examination involves the overall appearance of a bull. Body condition is one factor to evaluate. Body condition will vary with the genetics and age of a bull, the length of the breeding season, the number of cows the bull must service and the area a bull must travel to service those cows. A thin bull probably will not have the stamina to settle a large group of cows in a short time or a few cows in a large area. An overly fat bull may lack vigor and is not likely to breed up to his potential.

Feet and legs are very important to the bull's performance. A bull cannot locate and service cows unless he is sound. Bulls with a structural unsoundness such as sickle hocks, post legs, straight shoulders and bucked knees may develop soreness and tenderness in the stifle and hocks. These structural deficiencies, along with long hooves and corns, reduce a bull's breeding performance.

Eyes should be clear and free of injuries or diseases. The general health of the bull should be considered because bulls that are sick or injured will have a tendency to be dominated by other bulls. This greatly reduces their breeding potential.

### Examination of the Reproductive Tract.

A rectal and an external examination of the reproductive tract should be conducted. The rectal examination is to detect any abnormalities of the prostate gland, seminal vesicles, ampulla and the internal inguinal rings. Very rarely are there any abnormalities associated with the prostate gland; however, an infection can develop in the seminal vesicles and cause a condition called seminal vesiculitis. This is not unusual in bulls and is characterized by an enlargement of the seminal vesicles. The ampulla is an organ that lies between the seminal vesicles. Problems associated with the ampulla are rare. The internal inguinal rings are examined to determine if a herniation has occurred.

The external examination of a bull's reproductive tract should include the testes, scrotum, spermatic cord and epididymis. Inflammation of these organs is not uncommon. The testicle should feel firm while the upper portion of the epididymis should be soft, pliable and free of any lumps or enlargements.

Degeneration of the testicles is a common cause of reduced breeding efficiency. Many times young bulls are fertility tested and then assumed to be fertile for the next 5 to 8 years. Testicular degeneration can be caused by prolonged hot weather with high humidity, vascular lesions, age, trauma, stress, bacterial diseases of the testicles and genetic susceptibility. Some signs of testicular degeneration are a decrease in testicle size and libido, soft testicles and a depression in semen quality. Fertility testing every year and maintaining the breeding soundness records of each bull, will aid in the detection of testicular degeneration.

Scrotal circumference is an important and useful measurement to determine a bull's breeding ability. Scrotal circumference has a positive relationship with larger mass of sperm-producing tissue, the percent normal sperm cells and the sexual maturity of female relatives. Table 1 provides a comparison guide for average scrotal circumference of beef breeds.

When examining the penis and prepuce, note any inflammation, abscesses, adhesions and penile deviations. The erected penis should be parallel to the body of the bull.

### Semen Evaluation.

Bulls tested for fertility are usually scored according to the Breeding Soundness Evaluation System. The spermatozoal motility spermatozoal morphology and scrotal circumference are evaluated on a scoring system. Scrotal circumference is the most important measurement. A bull must accumulate 60 points to be classified as good on the Breeding Soundness Evaluation System. Of the 60 points, 40 could come from the scrotal circumference measurement. This emphasizes the importance of scrotal circumference.

The scoring system used for fertility testing is shown in Table 2.

Other factors considered during a semen evaluation are volume (varies with age, size and breed) and

**Table 1. Comparison by age of average scrotal circumference of beef breeds.**

Breed	Months							
	<14	14-17	17-20	20-23	23-26	26-30	30-36	>36
Angus	34.8*	35.9	36.6	36.9	36.7	36.3	36.6	38.2
Charolais	32.6	35.4	34.5	34.9	34.6	36.2	37.1	38.1
Horned Hereford	33.0	32.2	34.1	36.2	33.4	33.8	35.2	34.0
Polled Hereford	34.8	34.2	34.9	34.9	34.8	35.0	35.6	36.4
Simmental	33.4	36.5	—	—	36.0	—	—	37.2
Limousin	30.6	31.7	32.0	33.9	—	—	—	35.5
Santa Gertrudis	34.0	35.3	35.5	36.7	36.5	36.4	38.3	40.5
Brahman	21.9	27.4	29.4	31.4	31.7	33.5	34.7	36.7

\*Centimeters

**Table 2. Breeding soundness and evaluation scoring system.**

	Classification			
	Very Good	Good	Fair	Poor
<b>Initial spermatozoal motility</b>				
Score	20	12	10	3
<b>Spermatozoal abnormalities (%)</b>				
Primary	<10%	10-19	20-29	>29
Total abnormalities	<25	26-39	40-59	>59
Score for abnormalities	40	24	10	3
<b>Scrotal circumference (cm)</b>				
12-14 mos.	>34cm	30-34	<30	<30
15-20 mos.	>36	31-36	<31	<31
21-30 mos.	>38	32-38	<32	<32
30+ mos.	>39	34-39	<34	>34
Score for scrotal circumference	40	24	10	10
<b>Total Score</b>	<b>100</b>	<b>60</b>	<b>30</b>	<b>6</b>

the color of the semen (should be milky and free of blood, urine, dirt or pus). A bull should be classified as a satisfactory potential breeder, a questionable potential breeder or an unsatisfactory potential breeder.

### Libido.

Libido (sex drive) is the bull's drive to search for cows in estrus and to successfully breed them. Presently there are no practical ways to determine a bull's libido. Libido is not correlated with scrotal circumference, hormone levels (testosterone) or visual estimates of masculinity. A bull with an excellent breeding score is worthless to the producer if he lacks the desire to mate.

### Nutrition

Nutrition is important in the development of the bull's reproductive system during puberty. Improved levels of nutrition will hasten puberty and body development. Extremely high levels of nutrition tend

to lower libido and magnify structural weaknesses.

Underfeeding bulls will delay puberty and, if continued for a prolonged period of time, can cause irreversible testicular damage. If a mature bull is subjected to prolonged underfeeding, libido and testosterone production will decrease before semen quality is decreased. The effects of underfeeding mature bulls can generally be reversed. Nutrient requirements for bulls are shown in Table 3.

### Genetic Factors Affecting Puberty

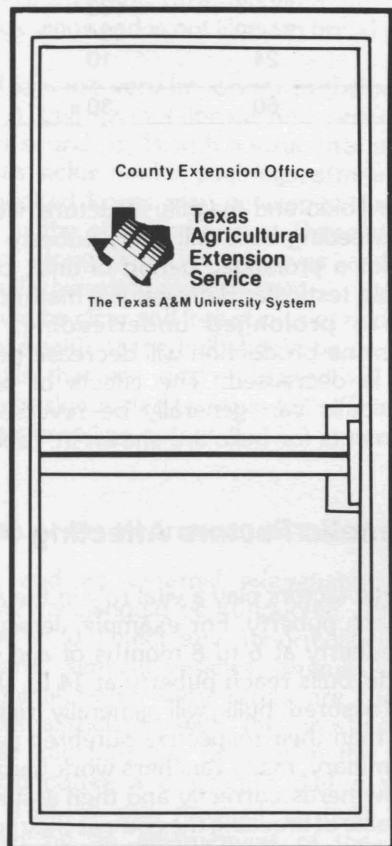
Genetic factors play a vital role in the age at which bulls reach puberty. For example, Jersey bulls often reach puberty at 6 to 8 months of age while Santa Gertrudis bulls reach puberty at 14 to 18 months of age. Crossbred bulls will generally reach puberty sooner than their respective purebred parents.

In summary, many ranchers work hard to manage their cow herds correctly and then assume the bulls are capable of breeding the cows as they come in heat. A breeding soundness examination generally costs \$15 to \$30 and is recommended as good "insurance" that the bull will be effective.

**Table 3. Nutrient requirements for bulls\*.**

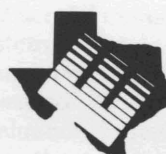
Body Weight	Gain	TDN	Total Protein	Ca	P
1100	1.5	61%	8.1%	.24%	.19%
1300	1.0	56%	7.6%	.22%	.19%
1500	1.5	56%	7.4%	.21%	.19%
1700	0	48%	6.8%	.21%	.21%
1900	0	48%	6.8%	.21%	.21%
2200	0	48%	6.8%	.22%	.22%

\*NRC, 1984. Nutrient requirements of beef cattle.



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