

Characteristics of successful breeding programs include having a large number of females pregnant in a short breeding season and to have successful matings that occur within the first two to three estrous cycles. In order to achieve these goals, both the female and the male must be reproductively sound.


Requirements

Female	Male
1. Must be cycling	1. Be able to detect heat 2. Physically mount female 3. Deposit fertile semen into female tract

The most reliable measure of fertility is the pregnancy rate a male obtains when bred to normal females.

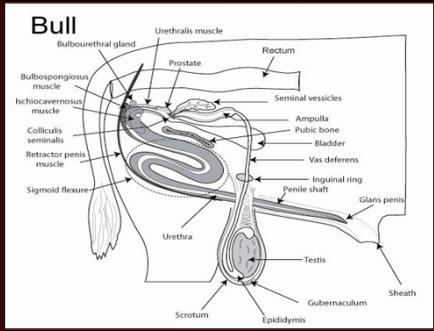
A useful predictor of selecting possible sires for breeding is the Breeding Soundness Examination.

A BSE should be conducted 60 days prior to the breeding season.



Breeding Soundness Examination

- The objective of a BSE is to evaluate and classify the potential breeding ability of a male.
- Components of a BSE include:
 - Physical Examination
 - External and internal evaluation of the reproductive tract
 - Semen collection and evaluation
- A BSE does not guarantee fertility, but helps identify animals with problems
- A BSE does not detect an animals' desire to mate or identify those with low libido



A breeding soundness exam is an evaluation used to identify satisfactory, questionable, or unsatisfactory breeding sires.

Factors Influencing a BSE

- ☆ Age of Male
- ☆ Disease
- ☆ Heat Stress
- ☆ Body Condition
- ☆ Breeding Pressure
- ☆ Collection Procedure

Physical Examination

- A. Overall Physical Condition
 - 1. General Health and Body Condition
 - 2. Soundness
 - 3. Eyes and Teeth
- B. External Evaluation
 - 1. Palpation of Scrotum and Testes
 - 2. Masculinity
 - 3. Examination of Penis and Sheath
 - 4. Measure scrotal circumference

Scrotal Circumference

- An indicator of a males:
 - Production of semen
 - Rate of maturity
 - Potential rate of maturity of his daughters

AGE (months)	Minimum Scrotal Circumference (cm)
Up to 15	30
15 to 18	31
18 to 21	32
21 to 24	33
24 and over	34

Special Considerations for Brahman and Brahman-crossed males



Physical Examination

- c. Internal Exam
 - 1. Remove fecal material
 - 2. Allows for closer contact of probes on accessory sex glands
 - 3. Examination for Abnormalities of the Accessory Sex Glands
 - a. Seminal Vesicles
 - a. Seminal Vesiculitis – inflammation of the seminal vesicles (enlarged and swollen)
 - b. Prostate

Semen Collection Methods

- ☆ **Artificial Vagina (AV)** – sire ejaculates into a man-made apparatus that mimics the feel of breeding a female by natural service

AV Mimics Natural Service in 4 ways:

- Temperature
- Pressure
- Lubrication
- Position (angle)

- ☆ **Electroejaculation** – an electrical probe (electroejaculator) is inserted into the rectum to stimulate ejaculation via slight electrical stimulus of the accessory sex glands and pelvic muscles

Semen Collection Methods

- ☆ **Massage** – ejaculation caused by manual stimulation of the accessory sex glands
- ☆ **“Gloved” Hand Method** – application of physical pressure to the penis by the collector to stimulate ejaculation
 - Mimics the pressure that would be applied to the penis by the cervix of a female during natural breeding
- ☆ **Recovery** – collection of sperm from the testis or epididymis
 - Irreversible damage to the testis or other reproductive organ
 - Death

Semen Evaluation

Volume – measured in mL or cc (1mL = 1cc)

Motility – percent of sperm cells that are progressively moving forward

- ☆ Standard measure for viability of the spermatozoa
- ☆ Most common industry measure for spermatozoal survival once in the female tract:
 - ~ 30 hours in the female tract with natural service
 - ~ 24 hours in the female tract for AI

Semen Evaluation

☆ **Concentration** - the number of total sperm cells collected in the ejaculate

- Hemocytometer
- Densimeter (Blue Box)
- Spectrophotometer

☆ **Morphology** – the evaluation of the sperm cells for abnormalities of the head and/or tail

- Visual observation
 - Sperm are classified as normal or as having a 1^o, 2^o, or 3^o abnormality
- Staining ability
 - Live cells = unstained
 - Dead cells = stained

Semen Characteristics

Comparison of Semen Volume and Concentration by Species

Species	Volume (ml)	Concentration (x10 ⁹ /ml)
Ram	1	2000
Bull	10	1000
Stallion	100	500
Boar	200	250

Notice Trends from largest to smallest and vice versa

Semen Characteristics

Comparison of Testicular Weight and Daily Sperm Production (DSP) by Species

Species	Testicular Weight (gm)	DSP
Ram	550	14x10 ⁹
Bull	500	8x10 ⁹
Stallion	165	3x10 ⁹
Boar	750	25x10 ⁹

Ejaculate Characteristics

Bull	Ram
Single Fraction	Single Fraction
Duration = 1 second Single Thrust	Duration = 0.6 second Short Thrust
Color = Creamy White	Color = Creamy
Volume = 5 – 15 ml Concentration = 8 – 1200 x 10 ⁶	Volume = 0.8 – 1.2 ml Concentration = 2 – 3 x 10 ⁹

Ejaculate Characteristics

Boar	Stallion
Fractionated Ejaculate	Fractionated Ejaculate
Accessory Fluid -Sperm Rich Fraction -Gel Fraction	Accessory Fluid -Sperm Rich Fraction -Gel Fraction
Duration = 5 – 30 minutes	Duration = 1 – 2 minutes
Color = Milky	Color = Grayish White
Volume = 150 - 200 ml Concentration = 200 – 300 x 10 ⁶	Volume = 60 – 100 ml Concentration = 200 – 500 x 10 ⁶

Classification of a BSE

1. **Satisfactory**
 - Males that meet or exceed all minimum standards for motility, morphology, and scrotal circumference and pass a physical exam
2. **Questionable (deferred)**
 - Males that have the potential to pass all areas of the BSE, but have failed to do so based on some type of temporary illness, injury, or stressor
 - These animals should be re-tested at a later date
3. **Unsatisfactory**
 - Males that do not pass one or more areas of the BSE
 - These animals must be culled

Minimum Requirements for the BSE

Bull

Minimum Scrotal Circumference of Bulls Based on Age

AGE (months)	Minimum Scrotal Circumference (cm)
Up to 15	30
15 to 18	31
18 to 21	32
21 to 24	33
24 and over	34

Special Considerations for Brahman and Brahman-crossed males

Motility = 30% Morphology = 70%

Ram

Class	Motility	Morphology	Scrotal Circumference	Scrotal Circumference
			< 14 months	> 14 months
Excellent	> 50%	> 90%	> 33 cm	> 35 cm
Satisfactory	> 30%	> 70%	> 30 cm	> 33 cm
Questionable	< 30%	< 70%	< 30 cm	< 33 cm

Minimum Requirements for the BSE

Stallion

Scrotal size is determined by measuring scrotal width across both of the testes using calipers.
- Average scrotal width is from 9 to 13 cm

Motility = 60% Morphology = 90%

Boar

Potential sires should be 7 months of age or older before breeding.

Motility = 70% Morphology = 90%

Serving Capacity Evaluation

Serving Capacity Evaluation is used to assess the desire (libido) to seek out females in estrus and to determine the number of copulations achieved by a male during a specific time period.

A lack of Libido (mating desire) could result in decreased conception rates.

Serving Capacity Evaluation

1. Libido develops as a male enters puberty
2. Controlled by testosterone
 - a. Minimum level is required, however, additional testosterone levels will not increase libido

Seasonal breeders experience a decrease in testosterone during the non-breeding season

- a. The ram and the stallion have decreased libido out of season

Fertility Associated Antigen

Bulls with increased amounts of FAA are more fertile than bulls without FAA. The lack of FAA **does not** indicate sterility or infertility.

- ☆ Protein produced by the accessory sex glands
- ☆ Released into the seminal fluids at ejaculation
- ☆ Binds to the sperm cell membrane
- ☆ Binds "heparin-like" compounds in the female tract after ejaculation
 - Important for the initiation of capacitation

Semen Extension

☆ Why Extend?

1. Increases volume of ejaculate
 - Increase number of potential breedings
2. Preserve viability of sperm
 - Maintain osmotic pressure of sperm cells

☆ Ability of Semen to be Extended is Dependent on:

1. Concentration
2. Quality – motility and morphology
3. Fertility of sire

Semen Extenders

<u>Components</u>	<u>Function</u>
1. Egg Yolk Buttermilk Glucose	Provides a source of nutrients
2. Na Citrate Na Phosphate	Stabilizes pH
3. Glycerol	Protects against temperature shock during cooling and warming
4. Antibiotics (Penicillin, Streptomycin, etc.)	Controls metabolic and bacterial activity