

VETERINARY CONSIDERATIONS – MALE BREEDING SOUNDNESS EXAMS AND VENEREAL DISEASES IN BULLS

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Physical Examination

A complete breeding soundness exam begins with the overall health of the bull. A complete history should be obtained, including past and current medical conditions, surgical procedures current nutrition and vaccination status. The history can often provide the veterinarian with insights into breeding or fertility problems the bull may be experiencing.

While an in-depth physical exam is not typically performed, an abbreviated physical exam should always be conducted. This can easily be performed as the bull is entering the chute and being restrained.

- Normal temperature, pulse and respiration measurements will help to rule out many medical conditions.
- Observe the bull for nasal and ocular discharge. The bull should not have any increased respiratory effort, coughing or opaque nasal discharge.
- There should be no evidence of pinkeye, trauma, tumors or infections in and around the eyes. The bull should appear visual out of both eyes.
- Lameness and gait – The bull should have appropriate conformation and no apparent lameness when walking. Hooves should be examined to rule out hoof wall cracks, corkscrew claws or other problems that may hinder breeding.

Reproductive Examination

Scrotum and Scrotal Contents

The scrotum contains the testicles, epididymi, vas deferens, cremaster muscle and blood vessels that supply the testes. Functionally it is crucial for proper thermoregulation of the testicles and epididymi, as sperm development and maturation occur at a lower temperature than body temperature. Evaluation begins with the scrotal skin, ensuring there are no wounds, active skin infections or frostbite. The scrotum should be pendulous and form a neck-like shape as it approaches the main body of the bull, which helps with air movement and cooling of the blood supply. There should not be an excessive amount of fat, and masses or intestines palpable in this region. Within the scrotum the testes and epididymi should be freely movable, with no adhesions or fluid palpable. The testis should be turgid, smooth and symmetrical, as should the epididymis on each side. The head, body and tail of the epididymi are palpated to assess for symmetry and should also be smooth.

Following palpation, the scrotal circumference is measured. The scrotal circumference has been directly correlated to testicular volume and daily sperm output for bulls, thus serves a fast and reliable indicator of these more advanced calculations. It has been demonstrated to be a highly heritable trait in bulls, as well as an excellent indicator of the

onset of puberty and female offspring fertility. The Society for Theriogenology has established minimum standards for scrotal circumference by the time a bull is two years old. There are known breed differences, and the veterinarian should be aware of the standards typically found in the breed they are working with.

Age	SC (CM)
≤ 15MO	30
15 < Age < 18 MO	31
15 < Age < 18 MO	32
15 < Age < 18 MO	33
≥ 24 MO	34

Source: Society for Theriogenology

Scrotal Circumference (SC) by Breed in Beef Bulls at 2 Years of Age

Breed	Mean SC (cm)
Simmental	38.8
Aberdeen Angus	37.2
Charolais	36.3
Horned Hereford	36.1
Polled Hereford	35.6
Shorthorn	34.9
Limousin	32.2
Texas Longhorn	34.6

Data (for 6 studies in the United States and Canada) from Barth AD: Breeding soundness evaluation of bulls. The Western Canadian Association of Bovine Practitioners. Continuing Education, Western College of Veterinary Medicine, Saskatoon, Canada, 2000.

Penis/Prepuce

The penis and prepuce are easily examined during semen collection, just prior to and during ejaculation. The prepuce should not have any wounds or abscesses present, and should not be adhered to the free end of the penis in any way. The penis should be able to achieve a full erection, and is then examined for any lacerations, warts, a persistent frenulum or other pathology that may be present.

Internal Organs

The internal reproductive genitalia include the bulbourethral glands, seminal vesicles, prostate, ampulla and the pelvic urethra. All but the bulbourethral glands can be easily palpated per rectum to evaluate for size, pathology (if present) and apparent pain when gentle pressure is applied.

The most common abnormality seen in bulls is seminal vesiculitis, an infection of the seminal vesicles, in which the glands are enlarged, inflamed and painful upon palpation. While this is the most common problem seen, its incidence is estimated to be between 1-5%

in yearling bulls (*ch13 BR). The cause is typically bacterial (*Brucella abortus* in endemic regions, *Truperella pyogenes*, *Histophilus somni*), and can have variable effects on fertility and semen quality.

Semen Collection

Once the bull has passed a physical examination, semen is collected via an artificial vagina or electroejaculation. Most beef bulls undergoing a breeding soundness exam are collected using electroejaculation, as the use of an artificial vagina typically requires some training.

Most probes used for electroejaculation have three electrodes that face ventrally when inserted into the rectum. The probe will rhythmically stimulate the urethralis muscle and prostate, slowly increasing in intensity. As stimulation progresses the bull will relax penile and preputial muscles, become erect, extend his penis and ejaculate. This semen sample is collected into a clean, warm plastic cone and immediately analyzed.

Semen Evaluation

Motility

Sperm motility is categorized in two ways, gross and individual motility. Gross motility is evaluated under low-power microscopy (100x) by placing a drop of raw semen onto a warm slide. There are four classifications for gross motility: Very Good, Good, Fair and poor. Very good samples have thick, rapid swirls that are a function of both sperm individual motility and concentration. Good samples have slower swirls. Fair samples are not swirling but have sperm movement and generalized oscillation. Poor samples have very little movement observed.

Individual motility is evaluated by diluting a fresh semen sample with warm sodium citrate and observing under higher magnification (400x). Forward progressive movement of individual sperm is quantitated. A minimum 30% individual motility is required for a bull to pass a breeding soundness examination, however in my experience most successful bulls are much higher than that.

Morphology

A raw semen sample is diluted and stained, typically with an eosin-nigrosin contrast stain. The sample is observed under high magnification (100x) to quantitate normal and abnormal sperm morphology. A minimum 70% normal morphology is required for a bull to pass a breeding soundness exam. There are numerous types of sperm defects, a few of the more common ones with clinical significance are listed here:

- Head Shape Abnormalities
- Knobbed Acrosome
- Nuclear Vacuole Defect
- Proximal Cytoplasmic Droplets
- Distal Cytoplasmic Droplets
- Distal Midpiece reflex
- Coiled Tails

Abnormal morphology is recorded and classified based on the likely origin of the defect (primary/secondary system), the severity of the defect (major/minor defect system) or whether or not the defect can be overcome with a larger insemination dose (compensable/non-compensable system). The most common classification system used in the United States is the primary/secondary system. In this system primary abnormalities are those that originate during spermatogenesis in the testis, and secondary abnormalities result from problems with maturation in the epididymis. The semen must be properly handled during examination to ensure there are no iatrogenic morphologic abnormalities created from sudden temperature or pH change.

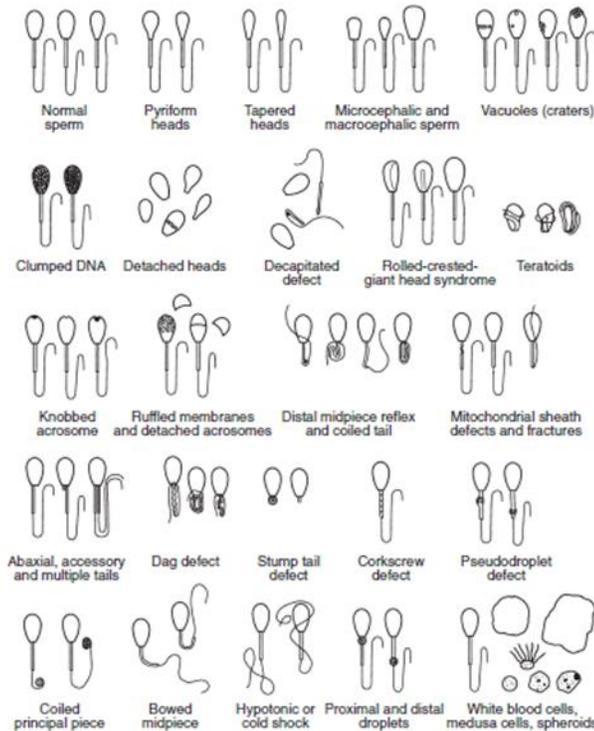


Fig. 31-1 Common abnormal morphologic forms of spermatozoa.

Source: Current Therapy in Large Animal Theriogenology, 2nd Edition

Final Classification

- Satisfactory Potential Breeder – The bull has met the minimum standards for scrotal circumference, sperm motility and sperm morphology. The bull also does not have any illness or physical qualities that would prevent him from breeding cows.
- Deferred Classification – The bull does not meet the minimum standards but it expected to in the future. This could be for pubertal bulls or bulls that have a temporary condition (fever from illness, scrotal frostbite, etc.) that affects their current fertility.
- Unsatisfactory Potential Breeder – The bull does not meet the minimum standards for scrotal circumference, sperm motility and sperm morphology, and is not expected to in this breeding season. There may also be a physical ailment that precludes normal breeding,

Trichomonosis (Briefly)

Trichomonosis (also known as Trichomoniasis or “Trich”) is a venereal disease of cattle caused by the protozoa *Tritrichomonas foetus*. Bulls are the asymptomatic carrier of the disease, and once infected are considered to be infected for life. They harbor the infection in their preputial cavity and transmit it to the cow during breeding, where it ascends the reproductive tract and causes vaginitis, cervicitis, endometritis and post-coital pyometra. Conception still occurs, however the cow will experience early to mid-embryonic loss secondary to the significant inflammatory response within the uterus. Occasionally, the conceptus survives this stage of pregnancy but will be aborted before 70 days gestation.

While the bull is considered to be infected for life, the cow will mount an immune response following embryonic or fetal loss which predominately involves IgG and IgA. Females typically clear the infection within 6-12 weeks and then have a short-lived immunity against *Tritrichomonas foetus*. During this period they may be bred to an infected bull, conceive and maintain pregnancy to term. This immunity, however, usually wanes before the next breeding season.

Diagnosis of this disease involves collection of smegma from the prepuce of herd bulls, typically by vigorously scraping the preputial cavity with a sterile pipette. Sample handling is critical for an accurate diagnosis, as improper conditions can lead to false negative results. Once obtained, culture or quantitative polymerase chain reaction (qPCR) is performed to obtain the diagnosis. Culturing alone may result in a false positive diagnosis, as there are non-pathogenic trichomonads that can contaminate samples. Most diagnostic laboratories will perform a confirmatory qPCR to verify the diagnosis. In most states a one-time sample, analyzed by qPCR, has become the standard method of diagnosis, with a sensitivity of 99%.

There is no effective, legal treatment in the United States for trichomonosis. Control is based on testing and culling, any positive bull may only be sold for slaughter. Vaccination is labelled for cows and can be used to aid in control of the disease in endemic or exposed herds, however the bulls should remain the focus of testing for herd eradication. There is recent discussion about the potential for a small proportion of cows to harbor *Tritrichomonas foetus*, and serve as a carrier within the herd. These cows may become the focus of herd clean-up plans in the future.

Trichomonosis is an economic disease within the cattle industry, and each state has its own testing requirements and regulations for control. There is currently an effort to harmonize requirements nationwide to allow easier and more consistent testing for interstate movement of cattle.

Resources

- Youngquist RD. Current Therapy in Large Animal Theriogenology, 2nd Edition. St. Louis, MO: Saunders Elsevier, 2007; 228-243.
- Hopper RM. Bovine Reproduction. Ames, IA. Wiley Blackwell, 2015; 58-77.
- Society for Theriogenology, various authors. Bull Seminar: Ethics and Professionalism in Bull Theriogenology. Annual Conference for the Society for Theriogenology. Portland, OR, 2014