

Bull Health and Management

Max Irsik DVM, MAB
Beef Cattle Extension Veterinarian
University of Florida College of Veterinary Medicine
IrsikM@ufl.edu
352-294-4349 office



Bull Health and Management

Max Irsik DVM, MAB
Beef Cattle Extension Veterinarian
University of Florida College of Veterinary Medicine
IrsikM@ufl.edu
352-294-4349 office

Bull management can be divided into the following seasons, which may vary in length depending on the operation: pre-breeding or conditioning (2 months), breeding season (2 to 3 months) and post-breeding season (7 to 8 months).

Prior to the Breeding Season and Bull Purchasing

Plan ahead, purchase bulls at least 45 to 60 days before the breeding season. This gives the bull time to adjust to new surroundings and to recover from stresses involved in sale or transportation. It also provides enough time to find another bull if it is determined that the bull purchased is of questionable or unsatisfactory breeding potential. Do not wait until the last minute to find a bull and then immediately turn him out to pasture with the cow herd.

Purchase bulls from reputable breeders who provide records of their herd health programs. Obtain available records and breed registration papers from the breeder. Inquire about performance information such as birth weight, weaning weight, yearling weight, average daily gain, weight per day of age, weight ratios, feed efficiency, size of contemporary group, frame size and scrotal circumference data, ultrasound scan data. Expected progeny differences (EPDs) may also be available from seed stock producers which provides an indication of how a bull's calves are expected to perform for certain individual traits relative to calves from other bulls within the same breed.

Visual appraisal of structural soundness and conformation is also useful in the selection process. Consideration should be given to the temperament (disposition) of sires used in breeding programs as well. Many breeders will supply this type of information upon request.

Some breeders provide additional customer service in the form of bull guarantees or calf buy-back programs.

Breeding Soundness Evaluations

A BSE is used to evaluate bull breeding potential and should be performed by a veterinarian. It consists of a physical examination in which the reproductive organs are palpated, a scrotal circumference measurement and an evaluation of semen quality. The physical examination is important because the bull must be physically sound enough to travel across pastures or paddocks (sound feet, legs, shoulders and hips are needed for ease of movement), find cows and heifers in heat (largely dependent on good vision) and successfully mate with herd females. Scrotal circumference is an indicator of semen producing capacity with larger scrotal circumferences indicating enhanced semen producing capacity. In addition, as scrotal circumference increases, daughter age at puberty decreases which has implications for the lifetime productivity of a bull's daughters. The semen quality evaluation assesses morphology and motility.

Ideally a bull should have passed a BSE prior to purchase. A BSE should be performed annually on each bull about 60 days prior to the start of the breeding season. This allows time to recheck or replace bulls receiving suspect scores. Do not use a bull that fails a BSE. Because the breeding potential of a bull can change over time BSEs should be conducted on a regular basis. Disease, injury and environmental conditions can affect proper function of the testes and impair reproductive performance. An annual BSE is essential especially when there is only one bull for the entire operation, one bull per breeding herd or a high female to bull ratio is used.

Herd Health Program

Purchasing or leasing virgin bulls may help avoid introduction of diseases into the herd. It is recommended that your local veterinarian test bulls for vibriosis, leptospirosis and trichomoniasis, particularly if bulls were purchased from a sale barn or other facility where they may have been co-mingled with infected cattle. Keep newly purchased bulls isolated from the rest of the herd for at least three weeks after arrival. This quarantine period is important in preventing the introduction of disease into the herd. During the quarantine period, observe bulls for disease and feet, leg, back, eye or libido problems that may compromise breeding performance. The quarantine period may also be used to slowly adapt bulls to a new diet. Bulls coming off a grain-based bull performance test need a hardening period to adjust to a forage-based diet prior to being turned out to pasture to minimize the risk of digestive problems. Bulls to be used in multi-sire groups should be placed together ahead of turn out. This gives them a chance to become accustomed to one another and may help minimize fighting over females.

It is important to keep bulls healthy to prevent the spread of disease throughout the herd and to ensure that they are able to successfully breed females. A comprehensive herd health program should target the females in the herd as well. Consult your local veterinarian for a herd health program suited to your area.

Follow Beef Quality Assurance guidelines and product label directions for proper injection sites and administration. Treating bulls for internal (worms) and external (flies, lice, grubs) parasites is an important component of a good herd health program. Parasite control should involve de-worming at least twice a year, autumn grubicide application, treatment for lice and horn and face fly control during fly seasons. Treatment for external parasites not only prevents performance losses, but also improves the appearance of the bull which may be valuable when it comes time to market the bull.

General Health Guidelines

- IBR,BVD,PI3, BRSV recommended annual at BSE evaluation timing
- Leptospirosis (5-Way) recommended annual (every 3 to 6 months in some areas)
 - Make sure it includes hardjo bovis
- Campylobacter (Vibriosis) annual (30 to 60 days before breeding)
- Trichomoniasis optional annual (30 to 60 days before breeding)
- Clostridial 7 or 8 way with annual booster
- Treat for internal and external parasites (twice a year)

Purchased herd editions should be vaccinated for

- Leptospirosis 5-way: insure hardjo bovis in vaccine
- Vibriosis (*Campylobacter fetus*)
- IBR/PI₃/BVD/BRSV
- 7-way clostridial (blackleg) booster vaccination
- Consider de-worming
 - Some parasitologists recommend after a bull reaches 2 years of age de-worming is not economically feasible.

During the Breeding Season

Breeding Management

Provide a satisfactory breeding area. . Good footing is important, clear pastures and paddocks of wire, scrap metal, boards and other debris that may pose an injury risk to bulls. Turn bulls out with heifers four weeks in advance of turning bulls out with the mature cow herd. Observe the cow herd closely, and keep accurate records to assure that the bull finds cows in heat, service them and . a large percentage of cows conceive to the first service. This can help in identifying and culling bulls that are not satisfactory breeders. A bull with superior genetics cannot contribute to genetic improvement in the herd unless he actively seeks out females in heat and settles them.

Bull Power

How much bull power do you need? “Bull power” refers to the number of cows a bull can effectively service and depends on many factors. Placing a bull with too many cows to service may result in many open cows. The number of females a bull can handle depends upon bull maturity, soundness, fertility and condition as well as pasture size and length of the breeding season. Less sexually mature bulls should be placed with fewer females than their older counterparts. In general, do not expose a young bull to more than 15 cows or heifers during breeding time.

Bulls should be well developed and at least 24 to 30 months of age before they are allowed to run with 25 to 30 cows during the breeding season. A “rule-of-thumb” for the proper bull to female ratio is one cow or heifer per month of age of the bull up to 30 months of age. For example, an 18-month-old bull could run with 18 females, and a 2-year-old bull (24 months of age) could be exposed to 24 females. It may be wise to separate bulls based on age if multi-sire breeding pastures are utilized. Older bulls may exhibit dominance over younger bulls (less than 4 years old) and allow younger bulls fewer chances to mate if allowed to run in the same breeding group. If multi-sire breeding groups are used, older bulls should be in separate groups from younger bulls

After the Breeding Season

Bull Confinement and Culling

Herd bulls should be kept in a separate paddock or pasture away from cows and heifers during the non-breeding season with plenty of exercise room, protection from severe weather, adequate shade, access to clean water and a mineral supplement. Provide ample feeder space if there is competition for feed from other animals in the paddock. Decisions on bull culling and acquisition will need to be made well in advance of the next breeding season. Reevaluate your herd sires on a regular basis as goals change, se-

lection criteria are modified and new information becomes available. The conclusion of the breeding season is an excellent time to perform BSEs on bulls to aid in determining which bulls to replace in the breeding herd. Bulls may need to be culled for failure to pass a BSE, lack of libido, injuries, poor vision, undesirable conformation or inferior calf performance.

The semen quality of bulls begins to decline after the age of 6. If a bull is 7 yrs of age or older utilize that bull more sparingly and insure he has passed a BSE.

If only one factor is utilized to determine the fertility of a bull other than a Breeding Soundness Exam, that factor should be the scrotal circumference and the age of the bull. Table 1 provides information regarding the scrotal circumference for a bull and the age of bulls. (Society for Theriogenology)

Minimum recommended Scrotal Circumference (SC) by Bull Age

Age in months	Minimum Acceptance
< 15 months	30 cm
< 15 ≤ 18 months	31 cm
< 18 ≤ 21 months	32 cm
<21 ≤ 24 months	33 cm
>24 months	34 cm

A few tips regarding scrotal circumference and Breeding Soundness Evaluation (BSE)

- Delayed onset of puberty because of inadequate nutrition delays yearling size of scrotal circumference.
- If the scrotal circumference is more than 2 centimeters below the average scrotal circumference for age, it is unlikely that bull will catch up.
- Bulls that are inadequate, less than recommended SC at 16 months of age rarely produce satisfactorily by 24 months of age.
- Yearling bulls with a scrotal circumference less than 30 centimeters usually have poor semen quality
- Bulls with a large scrotal circumference as a reflection of larger testicles produce more semen, have a higher prevalence of morphologically normal sperm and have greater sperm motility than bulls with smaller scrotal circumferences.
- Scrotal circumference is highly correlated with son and daughter fertility,
 - Daughters from bulls with larger scrotal circumferences are more fertile.
 - In beef cattle there is a high correlation between scrotal size and the age at which female progeny reach puberty (-0.71 to -1.07). Females from sires with above average testicular size reach puberty at an earlier age.
- There is a very low positive correlation between body growth rate and testicular size in beef bulls. Therefore, selecting bulls for faster growth does not necessarily put any pressure on selection for reproduction.
- The heritability for testicular size is reported as moderate to very high (.4 to .75)
- It has **not** been shown that some breeds (limousine) which may have longer and narrower testicles can produce larger numbers of sperm cells than other breeds of bulls with an equivalent scrotal circumference. **(Statement does not include Bos Indicus Bulls)**

- Accepting smaller than minimum recommended scrotal circumferences for any breed is a step backward,
- When performing a BSE, semen characteristics such as concentration, volume, and percentage of live sperm cells have a low correlation with fertility, and are not repeatable between ejaculates and are therefore not considered when performing a BSE.
- A large scrotal circumference, even if the testicles are firm, symmetric and free of abnormal findings does not guarantee the production of quality semen capable of fertilization.
- Physical defects overrule BSE findings
- There is a negative correlation between backfat thickness and bull fertility,
- There are probably very few sterile bulls, most bulls will eventually get some cows pregnant, if left together for a sufficient period of time on an adequate plane of nutrition. However unlimited breeding seasons are very detrimental to economic returns for a cow herd.
- A BSE is not just a semen exam, examining semen is just one component of a BSE.
- A BSE does not guarantee that a bull is highly fertile nor ranks bulls with respect to fertility
- A BSE exam will not insure that a bull is free of infectious agents in their semen.
- A BSE exam does identify individuals that possess undesirable heritable traits.
- Bulls considered as satisfactory potential breeders by routine examination should get 25-35 cows pregnant in a 70 day breeding season.
- Coe and Gibson found that calves at 200 days of age with a SC > 23 cm had a 95% probability of having a SC > 34 cm by 365 days of age. Calves with a SC < 23 cm had a 54% probability of achieving a SC > 34 cm by 365 days of age.
- Scrotal circumference in weaned bulls are helpful to predict yearling SC
 - Angus, Simmental, and Zebu derived bulls (Santa Gertrudis) must have a SC > 23 cm at 198-291 days of age to have a high probability (100%) of attaining a SC > 30 cm by 365 days of age
 - Charolais and Herefords require a > 26 cm to attain a SC > 30 cm by 365 days of age.
- Young bulls with small testis should be culled.
- Spermatogenesis takes 60 days leading to a mature sperm cell ready for ejaculation
- 78% of the genetic improvement in a cow herd comes from the bull
- It should be remembered that 1-2 bulls in five in a random sample of animals cannot achieve satisfactory conception rates in cows due to inadequate semen quantity or quality, physical defects that prevent copulation or lack of libido.
- The highest incidence of satisfactory bulls is found between 2 and 8 years of age.
- BSE exams are an effective way to identify bulls that are poor potential breeders. It is also a way to identify bulls which are predicted to be excellent or satisfactory breeders.
- Pre-purchase testing for BVD, Leukosis, IBR, Johnes, Blue tongue???
- Ask the breeder about the herd status for these diseases.
- The four aspects of a beef bull that should be evaluated to determine its reproductive potential are
 - Testicular size and normalcy and scrotal circumference measurement
 - Physical ability to breed females

- Seminal quality
- Libido or serving capacity.
- Bulls are visual breeders; eye abnormalities can have a significant effect on herd reproductive performance.

Common Causes of Bull Infertility

General body condition

Obese animals may show decreased libido, greater intolerance to heat, and an increased incidence of musculoskeletal problems. Additionally over conditioned bulls may accumulate scrotal fat which can interfere with testicular thermoregulation and lead to defective spermatogenesis. Severe weight loss associated with a low plane of nutrition can lead to testicular atrophy and a reduction in libido. Also delayed puberty and reduced sperm cell production can occur in bulls which are undernourished during the growing period.

Conformation and lameness issues associated with beef bulls. Observed abnormalities can include sickle hocked, post legged, cow hocked, bow legged. Foot-rot, interdigital fibroma, laminitis, or overgrown claws shape may limit a bulls interest in following cows or limit his mounting efforts, especially when abnormalities affect a bulls rear feet.

Preputial problem

Persistent frenulum prevents extension of penis, and results in a ventral deviation, most common in Angus, Shorthorn, Hereford, Polled Hereford and Beefmaster. Probably an inherited condition .

Preputial prolapse may be inherited, congenital, traumatic or secondary to other conditions. Angus and Hereford predisposed to prolapse, also more common in the Bos indicus breeds or their crosses, Brahman, Santa Gertridus, Brangus,

Penile problems

hematoma, hair rings, warts, denervation of the glans, urethral fistulas,

Rupture of the tunica albugines (hematoma, broken penis). Usually a breeding accident, repair surgically 60-70% success rate, problems occur with breeding but does not usually affect urination. If left untreated over 50% will abscess within a couple of weeks.

Fibropapilloma, caused by the strain 1 of the bovine papilloma virus, most are self limiting and are rarely seen in bulls past 3 years of age. Can be surgically removed, electrocautery, cryotherapy, or laser.

Testicular problems

Cryptorchidism and testicular hypoplasia are heritable conditions.

Most congenital testicular problems are uncommon.

Testicular degeneration can be unilateral or bilateral, temporary or permanent. It is clinically recognized as soft testis that have undergone size reduction.

Testicular degeneration is often associated with low sperm counts and abnormalities of the head and midpiece and decreased motility. The presence of spheroids indicates severe damage to the seminiferous epithelium.

Heat stress is a common cause of testicular degeneration.

Bulls should not be culled on the basis of one BSE examination that detects testicular degeneration. Once a testicular insult is alleviated, approximately 60 days are required for normal sperm to be produced and ready for ejaculation. These bulls should be re-evaluated 2 months after the first examination. Testicular biopsy may help to determine the severity of the insult to the testicle.

Seminal Vesiculitis

Generally involves bulls over 10 months of age. Can be acute or chronic problem and can be a cause for premature culling of infected bulls. Associated with close confinement and feeding of higher concentrate diets. It is generally more common in young <10 months prepubertal bulls and aged bulls over 9 years of age. It can be caused by virus, bacteria and protozoa. Most cases cause no overt clinical signs, usually recognized during a BSE exam and rectal palpation. Often the first sign is the gross appearance of purulent exudates in the ejaculate or an increase in leukocytes on microscopic exam. Microscopic semen evaluation is the most sensitive indicator of the presence of seminal vesiculitis. Semen quality from affected bulls is often reduced.

Genetic Causes of Bull infertility

Translocations are defects in chromosomal structure and are heritable.

Freemartin, the female born as a twin to a male 90% of the time the female is sterile. Male is ok.

Acrosomal cap defects

Detached heads

Tail and Mid-piece abnormalities

Cryptorchidism

Testicular hypoplasia

Persistent Frenulum

Corkscrew penis

Semen production and age of the animal

Sperm production begins in most bull calves by 8 months of age and increases rapidly until 12 months of age. Average age of puberty 39 weeks if age. In individual bulls puberty can range from 35 to 49 weeks of age.

Bulls that are genetically predisposed to produce semen with abnormal head shapes do so consistently. The heritability of head shape is high.

Infectious Causes of Abortion

Trichomoniasis

A venereal disease characterized by early to midgestation pregnancy loss, reduced calving rates and pyometra.

It is transmitted by venereal contact.

Generally has a 15-18% prevalence rate with higher rates in western states.

Estimated loss is \$650 million dollars annually in the U.S.

Older bulls are more likely to sustain an infection than younger bulls.

The bull is the long-term carrier of the organism without ill effects.

Once an infection is established in a bull the bull is infected for life.

Infection of the female occurs at the time of coitus. Pregnancy is established in the face of infection.

Fertilization and early development of the embryo are not necessarily prevented. The viability of the conceptus is lost some time after maternal recognition of pregnancy which occurs from day 14 to 18 after fertile breeding. This means an infected pregnant cow will not return to estrus at day 21 but will have an extended inter-estrous interval.

Most infected females clear the infection spontaneously within 2-4 months, by which time many have essentially missed the breeding season.

Rule outs include: Campylobacter fetus cows calving in poor body condition, sub-fertile bulls, environmental stress during the breeding season such as high temperatures or heat stress.

Diagnosis

Collect smegma from prepuce of bulls, culture and micro exam for the parasite, if detected should do a PCR to confirm that it is T foetus and not an environmental organism.

Treatment

Currently no approved effective drug exists for the treatment of T foetus infection in either cows or bulls.

Infectious Bovine Rhino Tracheitis

Common cause of Respiratory Disease

Encephalitis in new born calves

Conjunctivitis

Abortion

Most common in cows 6-8 months pregnant but can occur from 4 months to term.

Virus can become latent; an animal is essentially persistently infected with intermittent periods of viral shedding.

In an unvaccinated herd, if exposed to virus can have a high percentage of the pregnant animals aborting (5-60%).

Can have a latent infection which vaccination will not clear.

Start vaccinating calves at a young age, with an annual booster of a MLV vaccine. Protection should last a year, perhaps longer.

BVD

If fetus infected prior to ~ 120 days several results can occur, abortion, still births, persistently infected animals, developmental abnormalities, If after 125 days can have a abortion or the fetal immune system will clear the virus.

Vaccinate bulls in combination with IBR, PI3 and BRSV.

Leptospirosis

Transmission among maintenance hosts is often direct (orally) and involves contact with infected urine, placental fluids, or milk. In addition, the infection can be transmitted venereally or transplacentally.

Calves should be 2 months or older before vaccination and should be vaccinated twice with four weeks between vaccinations. Vaccination thereafter is with a single dose annually. Leptospirosis or “lepto” is found worldwide, but is most common in warm, wet climates. It is shed in the urine and/or bodily fluids of infected animals. Research shows that *Lepto hardjo-bovis* is the most common cause of bovine leptospirosis in the United States and is frequently associated with reproductive losses, although an infected animal may not show clinical signs. When vaccinating for leptospirosis, it’s important to make sure your vaccine contains a *L. hardjo-bovis* strain. Animals can become permanent carriers of the organism with intermittent shedding. Treatment will not clear these animals. Abortion usually occurs 6-12 weeks after the initial infection. If the infection occurs in the late gestation, an infected calf may be born which are weak at birth, with many dying shortly after birth. Diagnosis of leptospiral abortion is difficult and based on maternal and foetal serology, as no obvious lesions are associated with the infection, also PCR and darkfield microscopic exam/

Campylobacter (Vibriosis)

Vibriosis – or genital campylobacteriosis – is a venereal disease that is spread from cow to bull and bull to cow during breeding. The disease often destroys the embryo at its earliest stages, however late term abortions can occur. A producer will see repeat breeders and a spread out calf crop.

Vaccination at 2x dose will clear the disease from bulls. Is a good vaccine and very efficacious

Heritability Estimates for Beef Cattle: University of Missouri

Trait	Percentage heritable
LOW HERITABILITY	
Conception rate	0-10
Calving interval	0-10
MODERATE HERITABILITY	
Milking ability	15-25
Calving ease	10-40
Gestation length	30-40
Cancer eye susceptibility	25-30
Birth weight	35-40
Weaning weight	25-30
Weaning confirmation score	20-25
Postweaning daily gain - pasture	30-35
Postweaning feed conversion	35-40
Slaughter confirmation score	35-40
Dressing percentage	35-40
Percentage retail product	25-30
MODERATE TO HIGH HERITABILITY	
Scrotal circumference	40-55
Postweaning daily gain	40-45
Postweaning daily feed consumption	50-55
Final feedlot weight	50-55
Yearling weight	50-55
Ribeye area	60-65
Fat thickness	40-55
Marbling score	40-45
Tenderness score	50-60

Notes