

# REPRO TRACKS



by Cliff Lamb, Texas A&M University

## Bull fertility and herd reproduction

*Bulls with reduced fertility may lead to economic losses for a producer.*

We tend to focus a large portion of reproductive management on female fertility. However, fertility is more important in an individual bull than an individual cow because one bull may be used to breed as many as 20 to 40 females through natural service or potentially hundreds of thousands through artificial insemination (AI).

What makes fertility in bulls tough to manage and assess is 20% to 40% of bulls may have reduced fertility, but few are completely sterile. Nonetheless, these sub-fertile bulls delay establishment of pregnancy, prolong the calving season, reduce calf weaning weights, and increase the number of females culled, all resulting in economic losses for a producer.

There are two primary methods of evaluating the breeding soundness potential of bulls: 1) expose a bull to a large number of normal, fertile females and determine

pregnancy or calving rates (breeding trial); 2) expose bulls to a breeding soundness evaluation (sometimes referred to as a BSE). Although a breeding trial is the ultimate test of fertility, it is expensive, particularly if reproductive performance is poor. Therefore, it is strongly recommended to conduct a BSE 45 to 60 days before the initiation of a breeding season.

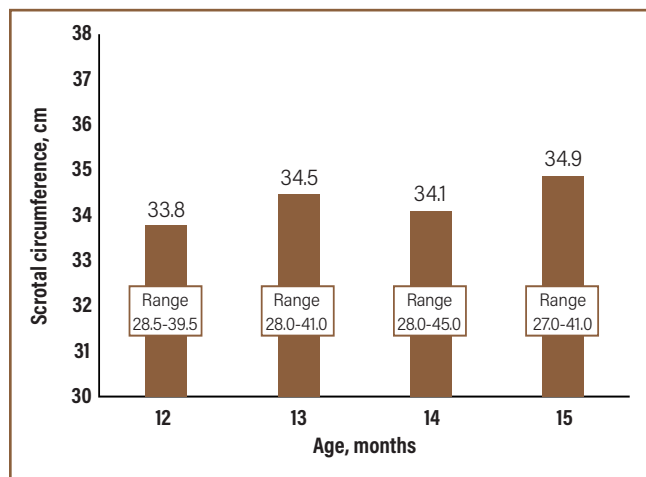
A suitable breeding bull should be free of genetic defects and infectious diseases, healthy and in good body condition, have sufficient libido and mating ability to identify and mount cows in estrus, achieve intromission, and ejaculate large numbers of motile, morphologically normal and fertile sperm. A bull that lacks any of these characteristics is more likely to have reduced fertility.

### Breeding soundness exam

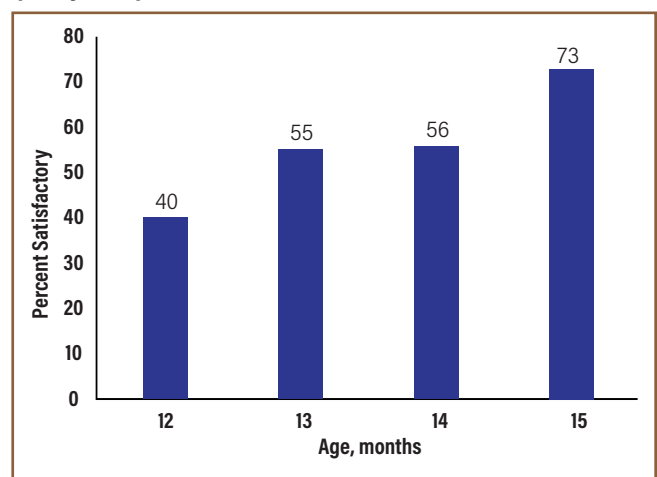
It is important to note that a BSE is not just a semen

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**Fig. 1: Scrotal circumference of bulls of various breeds ranging in age from 12 to 15 months of age (Adapted from Kastelic et al., 2017)**



**Fig. 2: Percentage of yearling bulls of various breeds ranging in age from 12 to 15 months of age having satisfactory semen quality (Adapted from Kastelic et al., 2017)**



examination. Although a BSE is intended to identify bulls expected to have unsatisfactory fertility, it does not guarantee a bull is highly fertile and is not a reliable method to predict relative fertility between two or more bulls deemed acceptable. Conversely, a BSE does identify bulls unlikely to achieve a high pregnancy rate.

The BSE includes: 1) an assessment of conformation, body condition and physical health; 2) scrotal circumference measurement and an examination of scrotal abnormalities, such as frostbite, sunburn, excessive softness, firmness or degeneration; 3) palpation of the entire sheath and penis and examination of the penis during semen collection; and 4) collection of a semen sample to determine semen characteristics such as motility and morphology.

The BSE does not test libido or assess serving capacity. These tests tend to be unreliable, and the logistics are impractical. Therefore, it is important for producers to observe bulls early in the breeding season to confirm libido and mating ability.

There are drastic differences in semen quality according to age (Fig. 1 and Fig. 2). Most producers are unwilling to accept less than 50% of yearling bulls will be judged satisfactory. However, the data indicate as yearling bulls mature, the percentage of bulls with satisfactory semen quality increases.

Bull testes must be a few degrees cooler than body temperature to produce morphologically normal, fertile sperm. For example, in an experiment using infrared thermograms, the scrotums of bulls with apparently normal scrotal thermoregulation were symmetrical left-to-right, with the temperature at the top 4° to 6° Celsius warmer than at the bottom of the testes.

Conversely, bulls with abnormally shaped testes have an abnormal

thermogram, resulting in reduced semen quality. In experiments comparing these two groups of bulls, those bulls with abnormal thermograms had reduced pregnancy rates, as would be expected.

Growth rate of bulls between 6 and 16 months of age does not appear to affect sexual development and reproductive function in beef bulls. However, greater body weight at various ages has been associated with reduced age at puberty and maturity, resulting in larger scrotal circumference at 16 months of age.

Yet, it is important to note bulls receiving high nutrition that resulted in increased body condition have lower daily sperm production and epididymal sperm reserves, and a greater proportion of sperm abnormalities. It has been speculated increased dietary energy may adversely affect sperm production and semen quality due to fat deposition in the scrotum.

From a genetic standpoint, based on a recent genome-wide association study on Holstein bulls with various motility classes, there is evidence of complex genetic regulation of sperm motility and existence of genetic markers useful in marker-assisted selection. Therefore, semen quality may be genetically controlled, and associated genetic markers could be used for genomic selection.

Availability of such genomic approaches for early detection of bull calves unsuitable for semen production will reduce costs associated with raising sub-fertile bulls and potential costs of infertility. However, accuracy of these genomic approaches must be ensured before culling calves based exclusively on genomic approaches.



**PRODUCT INFORMATION**  
NADA #141-450, Approved by FDA

**Banamine®**  
**Transdermal**

(flunixin transdermal solution)  
Pour-On for Beef and Dairy Cattle 50 mg/mL

**BRIEF SUMMARY:** (For full prescribing information, see package insert)

**Non-Steroidal Anti-inflammatory Drug**

Only for topical use in beef and dairy cattle. Not for use in beef bulls intended for breeding; dairy bulls; female dairy cattle 20 months of age or older, including dry dairy cows; and suckling beef calves, dairy calves, and veal calves.

**CAUTION:** Federal law restricts this drug to use by or on the order of a licensed veterinarian.

**DESCRIPTION:** Each milliliter of Banamine Transdermal pour-on contains 50 mg flunixin (equivalent to 83 mg flunixin meglumine), 150 mg pyrrolidone, 50 mg L-menthol, 500 mg propylene glycol dicaprylate/dicaprate NF, 0.20 mg FD&C Red No. 40, and glycerol monocaprylate NF qs.

**INDICATIONS:** Banamine Transdermal pour-on is indicated for the control of pyrexia associated with bovine respiratory disease and the control of pain associated with foot rot in steers, beef heifers, beef cows, beef bulls intended for slaughter, and replacement dairy heifers under 20 months of age.

**CONTRAINDICATIONS:** NSAIDs inhibit production of prostaglandins which are important in signaling the initiation of parturition. The use of flunixin can delay parturition and prolong labor which may increase the risk of stillbirth. Do not use Banamine Transdermal pour-on within 48 hours of expected parturition. Do not use in animals showing hypersensitivity to flunixin meglumine.

**USER SAFETY WARNINGS:** Not for use in humans. Keep out of reach of children. Flunixin transdermal solution is a potent non-steroidal anti-inflammatory drug (NSAID), and ingestion may cause gastrointestinal irritation and bleeding, kidney, and central nervous system effects.

This product has been shown to cause severe and potentially irreversible eye damage (conjunctivitis, iritis, and corneal opacity) and irritation to skin in laboratory animals. Users should wear suitable eye protection (face shields, safety glasses, or goggles) to prevent eye contact; and chemical-resistant gloves and appropriate clothing (such as long-sleeve shirt and pants) to prevent skin contact and/or drug absorption. Wash hands after use.

**In case of accidental eye contact, flush eyes immediately with water and seek medical attention.** If wearing contact lenses, flush eyes immediately with water before removing lenses. **In case of accidental skin contact and/or clothing contamination, wash skin thoroughly with soap and water** and launder clothing with detergent. **In case of ingestion do not induce vomiting and seek medical attention immediately.** Probable mucosal damage may contraindicate the use of gastric lavage. Provide product label and/or package insert to medical personnel.

**RESIDUE WARNINGS:** Cattle must not be slaughtered for human consumption within 8 days of the last treatment. Not for use in female dairy cattle 20 months of age or older, including dry dairy cows; use in these cattle may cause drug residues in milk and/or in calves born to these cows or heifers. Not for use in suckling beef calves, dairy calves, and veal calves. A withdrawal period has not been established for this product in pre-ruminating calves.

**PRECAUTIONS:** As a class, cyclo-oxygenase inhibitory NSAIDs may be associated with gastrointestinal, renal, and hepatic toxicity. Sensitivity to drug-associated adverse events varies with the individual patient. Patients at greatest risk for adverse events are those that are dehydrated, on concomitant diuretic therapy, or those with renal, cardiovascular, and/or hepatic dysfunction. Banamine transdermal should be used with caution in animals with suspected pre-existing gastric erosions or ulcerations. Concurrent administration of other NSAIDs, corticosteroids, or potentially nephrotoxic drugs should be avoided or used only with careful monitoring because of the potential increase of adverse events.

NSAIDs are known to have potential effects on both parturition (see Contraindications) and the estrous cycle. There may be a delay in the onset of estrus if flunixin is administered during the prostaglandin phase of the estrous cycle. NSAIDs are known to have the potential to delay parturition through a tocolytic effect. The use of NSAIDs in the immediate post-partum period may interfere with uterine involution and expulsion of fetal membranes. Cows should be monitored carefully for placental retention and metritis if Banamine Transdermal pour-on is used within 24 hours after parturition.

Not for use in dairy or beef bulls intended for breeding because reproductive safety has not been evaluated.

**HOW SUPPLIED:** Banamine Transdermal pour-on, is available in 100-mL (NDC 0061-4363-01), 250-mL (NDC 0061-4363-02), and 1-L (NDC 0061-4363-03) bottles.

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5/2017

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