Lameness in breeding bulls
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Abstract
Lameness or structural unsoundness often prevents a bull from being classified as a Satisfactory
Potential Breeder. This presentation will review the anatomy and etiology of common causes of
conformation flaws and lameness in breeding bulls. Lameness accounts for tremendous production loss
in the cattle industry and has been identified as a particular concern in animal welfare. Cattle are
relatively stoic animals and often do not show lameness until significant pathology is present. This
discussion will explore anatomic and management relationships with common orthopedic conditions of
the back, hip, stifle and feet in cattle. Additionally, diagnostic and therapeutic options will be reviewed.

Keywords: Bull, lameness, hoof, claw, stifle, fibroma

Introduction
The Computer Generated Breeding Soundness Evaluation (CG-BSE or eBSE) form was
introduced at the Society for Theriogenology Annual Conference.1 The ability to capture photographs of
the bull onto the form is a valuable asset in documenting conformation, body condition and structural
soundness of that animal.

In 2014, Dr. Robert Carson reported on trends of bull breeding soundness examinations utilizing
records over a twenty year period.2 For comparison, three time periods were evaluated: 1993-1995,
2006-2008, and 2009-2013. Data from bulls examined between 2009 and 2013 were put into the eBSE.
Evaluation of those records between 1993 and 2013 revealed 5.4% to 10.4% of bulls presented to the
Auburn University Large Animal Teaching Hospital were classified as unsatisfactory or deferred because
of physical conditions. A large portion of these bulls were either lame or had conformational flaws that
prevented them being classified as Satisfactory Potential Breeders. This paper will review the most
common causes of lameness or conformational flaws in bulls.

Anatomy and conformation
Lameness in cattle is frequently associated with conformation flaws that create abnormal forces
on the back, limbs and feet.3-7 Additional causes of lameness are due to trauma or degenerative changes
associated with heavy weight and aging. Conformation describes the dimensions and shape of an animal,
and deviation from ideal conformation may lead to unsoundness as animals grow due to abnormal
stressors on bones, tendons, ligaments and joints.4 Posture refers to the manner in which an animal
stands, and gait refers to the manner in which an animal moves.

When cattle are viewed from the rear, they should stand with the hind feet approximately as far
apart as their hips. It is unusual to see cattle that are base-wide, that is, their feet are farther apart than the
width of their hips; however, cattle that are base narrow with their feet closer together than the width of
their hips are quite common, especially among beef breeds.6

Screw claw
Cattle that are base-narrow in their rear limbs frequently develop screw claw as the animal grows.
Due to the conformation and abnormal forces on the hind feet, the tendency is for the hind feet to tend
toward supination and the hoof wall of lateral claw (abaxial) hoof wall grows under the hoof displacing
the sole dorsomedially.5,7 Cattle may develop bruises on the sole of that lateral claw which frequently
lead to sole ulcers or subsolar abscesses. Likewise, due to abnormal lines of stress on the hoof during
weight bearing, vertical cracks frequently develop in the axial hoof wall. Additionally, degenerative
arthritis frequently develops prematurely in the coffin, pastern and fetlock joints of affected animals.7
This condition is common in continental breeds of beef cattle and their crosses and, in the opinion of the
author, is becoming more prevalent in other beef breeds as greater selection is being applied to enhance
musculature of the beef carcass. Although the classic twisted or cork screw claw frequently does not develop until the animal is two or more years of age, the conformation leading to this condition is evident at weaning. Animals with this conformation are usually heavily muscled and base narrow when viewed from the rear.

When viewed from the side, there should be obvious but not excessive angulation of the joints of the rear limb. There should be approximately 130° between the femur and tibia and approximately 145° of angulation between the tibia and the metatarsus with the tuber calcaris directly below the caudal aspect of the tuber Ischiae. Animals with excessively straight rear legs (post legs) are more prone to develop joint, tendon and hoof diseases. In the author’s experience, large breed beef cattle with this conformation are more likely to develop cartilage disease in the stifle than more moderate conformation cattle.

Front limb conformation is also correlated with soundness. When viewed from the front the distance between the feet should be slightly less than the width of the shoulders, and the hooves should point straight ahead. Cattle that have toes that point out (laterally) are more likely to develop abnormal hoof growth similar to screw claw in the rear hooves. The adjacent toes on one hoof should be equal length, and the distance from the coronary band to the sole at the heel should also be equal.

Laminitis

Chronic or sub-clinical laminitis is quite common in beef cattle due to the common practice of high concentrate feeding to achieve rapid growth and high yearling weights. Clinical or sub-clinical laminitis in cattle may cause an array of hoof problems and is frequently the predisposing cause of lameness. Cattle develop overgrown “slipper” hooves and frequently suffer vertical or horizontal fissures in the hoof wall due to loss of flexibility of the hoof. Subsolar hemorrhage, bruising and ulceration are frequent sequelae to chronic laminitis. Additionally, the affected hooves often grow excessively long which changes the angles of the coffin, pastern and fetlock joints thereby leading to abnormal stresses on these joints and their supporting soft tissue structures. These hoof growth changes lead to white line disease and separation of the hoof wall from the lamina of the hoof. Premature degenerative joint disease is a common occurrence in severely affected cattle.

Interdigital fibroma

Interdigital fibromas, also called interdigital hyperplasia or corns, are proliferative growths of the skin of the interdigital space caused by dermatitis or chronic irritation. The condition is more common in bulls than females and more common in heavy versus lighter weight animals. Bos indicus crossbreed cattle appear to have a higher incidence of interdigital fibroma than Bos taurus cattle. Cattle that have a very wide interdigital space and cattle that are extremely narrow in the interdigital space appear more at risk for development of this condition than cattle with normal interdigital conformation. Rarely does the problem develop in cattle less than two years of age and most animals presented for treatment are four to seven years of age. It is troubling that in recent years significantly more two year-old Angus bulls have been presented to our teaching hospital for removal of these growths.

Treatment for interdigital fibroma involves surgical excision of the hyperplastic tissue utilizing local or regional anesthesia. After thoroughly cleansing the area for aseptic surgery, grasp the apex of the interdigital mass with towel forceps. Begin on the dorsal surface and make a longitudinal skin incision along each side of the mass being careful to preserve the axial coronary band. Continue the dissection caudally until the entire hyperplastic tissue is removed. Remove any protruding interdigital fat with blunt dissection and apply topical antibacterial powder on sterile non-adherent surgical gauze over the incision. Wire the toes together to hold the bandage and to prevent separation of the claws. Remove the bandage in approximately five days and continue to confine the animal to a dry area for another two weeks. Systemic antibiotics are rarely indicated unless the interdigital fat pad is infected prior to surgery. Some surgeons routinely remove the interdigital fat pad; although, this technique slightly prolongs postoperative healing.
**Stifle injuries**

Stifle injuries are common in cattle, and one or more structures may be involved. Rupture of the collateral ligament produces the least degree of lameness, and cattle with this condition are only slightly lame. Cattle with stifle injuries are generally reluctant to kick and are easier to examine than an animal without injury in this joint. The injury is most easily diagnosed by watching them walk away from you to observe instability during the weight bearing portion of the stride. Medial-to-lateral instability will cause the stifle to deviate either medially or laterally toward the affected side when the animal is bearing full weight. While standing behind the restrained animal, place fingers of one hand on the medial aspect of the stifle joint while abducting the lower limb. If the medial collateral ligament is torn there will be excessive joint space while the leg is abducted. Place the fingers of one hand on the lateral aspect of the stifle and adduct the lower limb to examine for excessive motion if the lateral collateral ligament is torn. The torn collateral ligament may be visualized by a skilled ultrasonographer.

Meniscal injuries cause the next most severe degree of lameness in cattle. The most common meniscal injury is similar to other species in that the posterior horn of the medial meniscus is injured more commonly than the lateral meniscus. With acute injury, there may be evidence of joint effusion. Lameness will be evident during weight bearing and because the animal does not advance the limb normally while walking. The injury appears to occur more commonly in heavy muscled beef bulls than in other cattle. There may be an audible or palpable “click” during the weight-bearing portion of the stride. This damaged meniscus may be visualized by a skilled ultrasonographer.

The third common and most severe stifle injury is rupture of the anterior crucial ligament (ACL). This injury causes marked lameness and usually obvious joint effusion. The animal is very reluctant to bear weight on the affected limb, and the mass of the animal usually precludes palpation of the classical anterior drawer sign as may be detected in dogs. However, many beef cattle with this injury will tolerate flexion of the affected limb whereby the veterinarian may be able to detect excessive motion in the stifle joint and perhaps grating of bony surfaces due to loss of articular cartilage.

These stifle injuries are discussed together as they all appreciably shorten the productive life of cattle. Additionally, animals with an initial collateral ligament tear may quickly develop degenerative joint disease due to joint instability and abnormal wear of joint surfaces. Cattle with an initial meniscal tear likewise have the added risk of suffering cruciate ligament tears due to the atrophy of leg muscle that frequently and rapidly accompanies this injury and more severe loss of stability of the stifle joint. Cattle with cruciate ligament tears suffer severe joint instability, rapid muscle atrophy and frequently quickly develop meniscal tearing and loss of articular cartilage.

Therapy for any of the above conditions consists of confining the animal to a stall or small paddock that is level and free of mud for six to eight weeks. Bulls with anterior cruciate ruptures should not be used for breeding for a minimum of six months. Animals with this injury usually do not return to soundness and have permanent muscle atrophy on the injured limb. Analgesics are not recommended during the acute phase of the injury as animals so treated may use the limb excessively and sustain additional trauma to the joint. However, anti-inflammatory agents, joint lavage, polysulfated glycosaminoglycans and other therapies utilized in management of joint injuries in the equine athlete may prove beneficial in conjunction with a few months convalescence to assist a bull through a breeding season.

**Shoulder injuries in cattle**

Fortunately shoulder injuries are relatively uncommon in breeding cattle. Fractures or bruises of the shoulder are occasionally encountered in lightweight cattle while being worked in a chute which is usually due to excessively wild or excited cattle and/or inadequate footing, maintenance, or design of the working chute.

Fractures of the scapula or humerus occasionally result from bulls fighting. These injuries are readily diagnosed by the degree of lameness and swelling accompanying the injury. The spine of the scapula, humerus and shoulder joint are difficult to palpate in heavily muscled beef cattle, especially beef
bulls. Additionally, quality diagnostic radiographs are difficult to obtain due to the size and conformation of these animals.

Fortunately, fractures of the scapula or humerus often heal with stall rest in beef cattle. Contracture and swelling of the heavy muscles of these animals serve to reasonably splint the injured bones. These animals should be confined to a stall for a minimum of eight weeks followed by at least four months confinement in a flat paddock area. We do not recommend analgesic therapy as freedom from pain may induce the animal to excessively use the injured limb creating additional traumatic injury and potentially further displacing bone fragments.

Spinal injuries or disease

Diseases or injury of the spine are common among large bulls. Discospondylosis or spondylosis is commonly caused by repetitive trauma and increases with age and activity. The resulting, severe proliferative bony and fibrotic arthritis of the intervertebral joints may cause nerve root entrapment, and potentially spinal compression and pain. This condition may be confined to only one intervertebral joint but more often affects several in varying stages of progression. The hind limbs and spine are mainly affected. The proliferative bone growth may form arthritic bridges between vertebrae. These bony bridges may fracture, producing an acute crisis episode of pain or weakness. Probably less likely, fibrocartilagenous emboli may enter the blood stream resulting in stroke-like symptoms of the spinal cord.

Another spinal cord condition which may affect breeding soundness is spastic syndrome which is a latent recessive condition generally developing at two to seven years of age. This syndrome is characterized by spastic contractions of the muscles of the hind limbs and back. These contractions are often mild and are most evident when the animal first rises after lying down. The syndrome usually persists for the lifetime of the animal and contractions are often exacerbated by arthritis or other painful conditions. In some bulls, the contractions tend to progress to more frequent and more severe episodes in the standing animal. Spastic syndrome condition is probably inherited as a single recessive trait with incomplete penetrance.

Conventional radiography or nuclear scintigraphy or bone scan may be useful for identifying or localizing lesions in the vertebral column, hips or limbs of bulls. Bone scan has been used for various applications in horses for many years and currently many private practices and most veterinary schools have gamma cameras. These cameras are used to image an injected radionuclide in the animal. Skeletal scintigraphy is quite sensitive and is well suited for detecting acute abnormalities as radionuclide uptake often precedes radiographic detection. Scintigraphy can also be useful in locating potential areas of abnormal osseous turnover in cattle with chronic or vague lameness.

The authors have used radiography, ultrasonography and nuclear scintigraphy to localize and characterize sources of lameness in cattle. Several of these bulls returned to soundness and had semen collected for cryopreservation following intra-articular corticosteroid injection or steroid epidural therapy delivered through a spinal catheter. Similar to the equine patient, bulls may benefit from systemic or intra-articular glycosaminoglycan therapy and other anti-inflammatory modalities.

References
