Lameness in the pasture bull

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Lameness in a herd bull in the pasture can be just as devastating to breeding performance as any penile injury or orchitis event. Even minor problems, such as a simple puncture wound inducing a sub-solar abscess, can lead to a lack of desire to service females and/or maintain body condition in the pasture. Many issues may resolve themselves over a period of time, but at what cost to reproductive efficiency? In order to facilitate accurate diagnosis and treatment of bovine lameness, the practitioner should have adequate devices available to aid in the restraint of an animal. Hydraulic tilt chutes or tilt tables offer a great advantage when evaluating the lower limb and will often lead to a more accurate diagnosis when such tools are available. Every item available for analyzing lameness in the equine is of value when evaluating bovine lameness.

Analyzing the lame bull

Proper evaluation of the lame bull starts with characterization and localization of the lameness. A practitioner must be careful not to let the caretaker's history persuade him/her into looking at the wrong area. Examine the bull and observe what he tells you. Is there swelling or inflammation present on or around the coronary band? How does he bear weight on his claw? Does he rotate his toes in or out when he moves? Does he subluxate his fetlock? Does he fully flex his tarsus? Hopefully the ability to properly restrain the bull in lateral recumbency is available because standing examination using rope restraint of a compromised limb in a beef animal in a squeeze chute is difficult at best. If a hydraulic tilt chute is utilized, access to the lower limb is excellent; however; access to the upper joints like the shoulder and stifle is limited. As always, the hoof is examined first. If it is overgrown, it should be trimmed and close attention should be paid to any cracks, fissures, or discolored sites. All suspect areas should be pursued with curettage.

Lower limb lameness

Bulls with a history of being developed in a feedlot or gain test may be more predisposed to various foot problems like: white line disease and subsequent sub-solar abscess, axial wall separation, and abcessation due to wall injury. Previous sub-clinical laminitis is usually the causative agent of most of the hoof lameness presented. The desire for carcass data from ultrasound evaluation encourages producers to push bulls with excessive grain diets in order to improve carcass values. This has led to an increase in laminitis and the problems that arise secondary to a laminitic event.

There are varying opinions on how to deal with sub-solar abscesses in the bovine. The preferred method involves elevating the affected claw by applying a block (shaped like the sole) to the unaffected claw. Most often, an antiseptic bandage is applied with or without parenteral antibiotic administration. Some practitioners prefer to use analgesics as part of a treatment plan.

Axial wall cracks and overrun/overgrown walls are diagnosed as part of the visual examination and are the result of over-feeding at some point in the animal's life (usually during the yearling development phase). Like sub-solar abscesses, resolution is achieved with debridement of the separated wall and bandaging. Care should be taken when performing curettage on a lateral wall crack. Cutting too deep into sensitive lamina may cause over-proliferation of granulation tissue and a delay in healing.

Interdigital fibromas are another common lameness problem in herd sires, particularly in bulls that are extremely heavy and have a smaller hoof. The development of the fibroma occurs when the suspensory ligament of the fat pad "breaks down" allowing the fat pad to prolapse distally into the interdigital space. Eventually, hypertrophy of the skin of the interdigital space causes development of the fibroma. These are not usually painful, but if they become large enough to come in contact with the soil surface, the fibroma will get ulcerated and possibly develop a localized infection. Sometimes the fibroma becomes so large that it may be pinched between the claws which causes discomfort and lameness. Resolution of the lameness problem is relatively simple and straightforward with surgical reduction being

the preferred method. It is always recommended that the interdigital fat pat be removed while reducing the fibroma (particularly if the capsule is breached while dissecting the fibroma). The surgical site is left open to granulate and heal by second intention. Some surgeons prefer to just wire the toes together while others provide additional bandage support. Some just prefer to bandage the foot. Usually the surgical site is healed in seven to ten days, and the bull can be placed back in service after an additional seven to ten days of rest.

Hairy heel warts are another dilemma for the herd sire. Most often, they are observed in the younger bull being developed in close confinement (i.e. feedlot or pasture with intensive supplementation). It can become a chronic problem if left unattended. It is particularly contagious in a naïve population of cattle, especially when congregating in areas that have soil with higher moisture content (around water troughs, common pathways through pens, etc.). This problem is easily treated by immersion of the hoof with hoof baths or by a single antibiotic bandage application. Parenteral antibiotics do not seem to be effective as a treatment for resolution of the problem.

Vertical hoof cracks

The prevalence of hoof cracks or fissures observed in practice has increased dramatically over the last few years. Genetics as well as more intense management probably play a significant role in their development. Faster growth, higher concentrate rations, and decreased availability of trace minerals may all play a part in the development of vertical hoof cracks. It is thought that subclinical laminitis following episodes of subclinical rumen acidosis may be the most significant cause of this problem. The push for improved performance numbers as an aid to evaluate and market young herd sires may be the greatest determining factor to continued lameness in these individuals.

Lameness is thought to occur as weight bearing load is applied to the cracked hoof wall with instability of the wall creating abnormal pressure on the underlying structures of the hoof (figure 1) The cracks may occur as an isolated incident affecting one claw, or they may affect several claws at one time. Wall cracks may become infected when soil or other debris collect and are packed within the fissure. This can also induce pressure necrosis of the sensitive lamina.

Figure 1 Vertical hoof crack. The lesion in this picture has the appearance of a rupture which could be the result of mechanical stress and bending.

Repair can be accomplished by curettage of the hoof crack and treatment of any infection present, which can be accomplished by bandaging with antibiotics/antiseptics and parenteral antibiotics if needed. Closure of the defect should not be completed until the surface of the crack is completely dry and hardened. Repair can be performed by drilling horizontally across the margin of the fissure and lacing stainless steel wire across the crack followed by application of a pliable acrylic. Another method consists of application of para-aramid synthetic cloth (Kevlar®, DuPont, Wilmington, DE) intermittently with acrylic compound directly into the fissure followed by stabilizing the hoof wall. Stabilization allows

normal wall growth from the coronary band and usually allows the repair to gradually wear out as the normal wall grows in (Figures 2a and 2b

Figure 2a Repair of a vertical hoof fissure with Kevlar® and acrylic.

Figure 2b Completed application of Kevlar® and acrylic

Septic arthritis of the coffin joint

This condition is a common sequella to chronic infectious processes involving the hoof and/or interdigital space. A common presentation is a diffusely swollen area involving the coronary band and sometimes the entire digit. It is also not uncommon to see a draining lesion in the area of the extensor process or at the heel bulb region. Usually, the animal is significantly lame or non-weight bearing, and most of the time production is limited and can involve serious weight loss. Radiographs usually reveal active osteomyelitis with lytic areas appearing in both the second and third phalanges and an obliterated joint surface (Figure 3).

Figure 3 Osteomyelitis with lytic (black and white arrow) and proliferative bony lesions. Note the obliterated joint space with roughened articular surfaces (white arrow head).

Economical treatment of this condition may be achieved without sacrifice of the entire claw. First of all, a block is applied to the good claw to relieve any weight-bearing on the affected claw. Next,

after thoroughly cleansing the area, a tourniquet is placed proximal to the fetlock and a local anesthetic is injected into the vasculature of the distal limb. Continued preparation involves creating a window to enter the coffin joint for debridement. This can be created at the heel bulb or mid hoof just distal to the coronary band. When draining tracts are involved, it seems better to approach from the heel bulb area. This will allow complete debridement of both the coffin joint and navicular bursa. Occasionally the navicular bone and associated deep digital flexor tendon are involved and must be removed. This is facilitated by entry at the rear of the hoof. A one-half inch drill bit is introduced into the area of the coffin joint/navicular area, and the drill is used as a router of sorts to clean the necrotic material from the joint. The goal is to extend the curettage to a point just proximal to the extensor process of the coffin bone. A large curette is used to facilitate removal of debris and to insure all necrotic bone has been removed. It is necessary to completely debride the affected area lest healing will be slowed markedly. Aggressive lavage of the joint with a sterile antiseptic solution is recommended and facilitated by use of a squeeze bulb to create positive pressure. A pack is usually placed in the joint for two days and a bandage applied. Parenteral antibiotics are administered daily and bandage changes with lavage of the joint are undertaken every two days for two to four times. Once purulent drainage ceases, the limb may be cast above the fetlock for five to six weeks. Casting supports the toe that has been elevated and aids in prevention of tendon and joint laxity. An alternative to casting is simply wiring or applying acrylic between the toes to immobilize the diseased toe. After five to six weeks, the cast may be removed along with the block, and after a recuperative period, the animal should be nearly clinically sound. Most cases are 80% improved in overall lameness, but few are completely asymptomatic.

Injuries of the proximal limb

After a rather lengthy discussion of various problems caused by different etiologies in the lower limb, lameness involving the upper limb is usually the result of one etiology: TRAUMA. Trauma can occur to the limb in many forms: punctures, lacerations, blunt force from other animals, putting a limb where it should not be, or even hematogenous spread of bacteria in the case of localized bruising. Injuries such as long bone fractures to a metacarpal or metatarsal (these are most common) or tibia or radius fractures (most often the result of bulls fighting) are routinely dealt with in large animal practice. These injuries respond well to external fixation via trans-fixation casting or application of Thomas splint/casting.

Subluxation of the fetlock or pastern can occur for various reasons although most are thought to occur after the limb is caught up in a hole in the ground or a cattle guard and attempts to dislodge cause the injury. Limbs trapped in cattle guards will often luxate one or both of these joints during attempts to dislodge. Often times, alignment can occur after a significant amount of traction has been applied to the limb. Usually, a device such as a "calf jack" is placed on the sternum and attached to the hoof by a wire. Holes are drilled in the hoof wall to allow the wires to pass through. This method aids in fatigue of muscle, ligament and tendon associated with the luxation. Brute force is then utilized to replace the joint to its original position. When this cannot be accomplished via closed reduction, the joint is opened and joint surfaces debrided so that reduction is accomplished via leverage. The goal is reduction with subsequent arthrodesis of the affected joint. The bull can still function very well whether the affected joint is in the fore or rear limb. Once the luxation is reduced, the limb is cast (usually full limb and preferably with trans-fixation pinning).

Lacerations to the caudal lower limb (particularly below the fetlock) should be considered as serious as a limb fracture because they can be just as detrimental to overall performance. Lacerations in this area can easily involve the pastern or coffin joint and will likely include a portion of the deep digital flexor tendon sheath. Lacerations to the tendon sheath are rarely cared for properly immediately after the initial insult, and thus require extensive treatment in order to resolve. Proper care should involve installation of a drain in the tendon sheath with aggressive lavage for several days. Vascular perfusion of the lower limb with appropriate antibiotic therapy as well as parenteral antibiotics and analgesics are necessary. Placing a block on the good toe always aids in ambulation and resolution usually occurs

within two weeks. Additionally, placing the lower limb in a light-weight cast does help markedly with recovery after resolution of the infection.

Injuries of the upper limb

Upper limb injuries, particularly of the shoulder and stifle, are probably the most common cause of lameness in the breeding bull after problems with the hoof. In forelimb lameness, if the problem is not found in the hoof, the shoulder is the next most likely area of concern. Shoulder injuries can occur during dismount of cows or other bulls, slipping on slick surfaces, or because of lateral concussive injuries during a bull fight. Most of these injuries are thought to be more soft tissue in nature (i.e. capsular tears or muscle/ligament injury) rather than trauma to the joint surface. Once again, this injury can be difficult to diagnose without proper facilities for restraint. Although the shoulder can be injected while the bull is standing in a squeeze chute, it is preferred to do the injection with the animal in lateral recumbency with the limb properly restrained. Any serious injury such as a proximal fracture of the humeral head or scapula will not show a positive response when the joint is anesthetized. Positive response (meaning resolution of lameness or at least 80% of it) to anesthesia injected into the joint can predict a fair outcome for treatment.

Preference is given to directly medicating the joint utilizing the longer acting corticosteroids such as betamethasone or triamcinolone in combination with hyaluronic acid. Restricting activity after medicating is extremely important with a rest period ranging from 30 to as much as 90 days. Treatment of most shoulder injuries has been very successful, particularly when given rest after medicating.

Much like the shoulder is a usual suspect in forelimb lameness, the stifle is the usual cause of lameness in the rear limb if the hoof is not involved. Most stifle injuries are due to blunt force trauma initiated by another animal. The blow is usually delivered to a preoccupied bull that is in the act of servicing a female or during a bull fight. Most stifle injuries affect the soft tissue structures of the stifle: anterior and posterior cruciates, the collateral ligaments and/or the menisci (primarily medial). A diagnosis may be made by clinical signs alone and the prognosis may be reached by evaluating the degree of lameness experienced by the bull. Diagnostics and potential for treatment may be augmented by the use of a tilt table. With the bull in lateral recumbency, the ability to take radiographs and possibly do a joint centesis are markedly improved, thus a more accurate diagnosis is possible. Increased effusion is common, particularly in more extensive injuries. Effusion is a negative prognostic indicator and radiographs of the stifle are the best tool to reach a proper prognosis, the more caudally displaced the femur in comparison to normal of the tibia, the poorer the prognosis (Figure 4). Aggressive therapy early after injury will aid in the healing of all but the most severe injuries. The best time to treat is within the first two to three weeks after the insult.

Figure 4 Stifle effusion and caudally displaced femur.

The preferred approach to treatment starts with an aggressive lavage of the stifle with saline solution combined with an anti-inflammatory of the practitioner's choosing. Most often, a longer acting

anti-inflammatory is administered to the joint before the bull is removed from the table. A second lavage is recommended about two weeks after the first lavage followed by the injection of a long-acting corticosteroid and hyaluronic acid. Parenteral anti-inflammatories are also recommended initially and during the rest period which may be as long as six months post-treatment. The bull is confineed to a stall for a period of up to 60 days and then a small paddock or pasture for the balance of the period; it is extremely important that each bull be housed separately. The injured bull should not be housed with any other cattle. Those bulls with severe stifle injuries that have the genetic merit to produce frozen semen may benefit from external fixation of the stifle to allow for fibrosis of the damaged structures. Although a Thomas splint will not aid in resolution of the injury, immobilization of the joint and secondary fibrosis of the structures of the stifle will allow the bull to get around sufficiently to produce viable semen.

Fractures of the long bones

With the salvage value of cattle today passing historical highs, the opportunity to repair limb fractures in all cattle makes economic sense. Cattle tolerate external fixation very well with minimal aftercare. Most heal nicely within teo to three months (with additional time for rehabilitation of the limb), and the individual can be put back into production. Any limb fracture below the carpus or tarsus should be cast; the repair may be augmented by the use of a trans-fixation pin placed perpendicular through the bone immediately proximal to the fractured bone (pin placed thru the distal radius if the bull has a fractured metacarpus). For fractures occurring below the stifle or the elbow (fractures of the radius or tibia), the use of a Thomas splint combined with casting of the limb is the best approach. The Thomas splint (T-splint) works best for those animals that are more athletic. Cattle that are very excitable or obese do not handle splinting well. The reason for this is it takes a lot of effort to arise from recumbency with the affected limb in extension and if the animal does not take care when moving with the splint they can fall on the splinted limb and cannot get up once they are down without assistance. Because of this, disposition is an important consideration when evaluating options for repair.

Transfixation casting

Having proper equipment (tilt table) and sedation is ideal for this type of repair. A combination of sedatives and analgesics may be used to facilitate getting the animal into lateral recumbency when a table is not available. Tourniquet placement proximal to the site of pin placement will allow for vascular perfusion with an anesthetic agent such as lidocaine. This provides local anesthesia/analgesia and facilitates placement of the transfixing pin. Although large diameter intramedullary pins (1/4” -3/8”) can be used, the length of time the pin is effective is limited by the lack of solid purchase in the cortex of the bone. Threaded pins that are specifically designed to be used as transfixation pins will remain in place longer and therefore improve the effectiveness of the transfixation cast. Placement of a threaded pin requires the drilling of a pilot hole and a tap to facilitate placement of the pin through the cortex. Several wires are placed through holes drilled in the walls of both claws to aid in manipulation of the limb and allow for proper reduction of the fracture. If need be, traction may be applied using these wires to aid in dis-traction and better alignment of the fracture. Once part of the cast has been applied, the wire is incorporated into the cast insuring a good anchor to the distal extent of the limb. This casting technique, along with aggressive medical management has been used to facilitate healing of compound and commuted fractures of the metatarsus and metacarpus. Typically, the transfixation pin will have to be removed before the cast is ready to be removed because of osteolysis at the pin site. This usually occurs about six weeks after pin placement. The cast is then removed at eight to ten weeks after application, and if needed, a splinted bandage is applied to support the limb for an additional one to two weeks. On average, it takes about two months for rehabilitation of the limb to occur after cast removal (Figure 5).


Figure 5 Transfixation cast in place on a Charolais bull.

Thomas splint application

In order to have the most effective Thomas splint application, it is best to have several different sizes on hand so that the animal can have the most appropriate fit. Splint construction allows for length adjustment, which enables the splint to be custom fitted according to the size of the patient (Figure 6) Usually, the animal is placed in lateral recumbency with the use of a tilt table, rope, casting harness, or by chemical restraint. The splint is applied by placing the limb through the loop and attaching the hoof to the plate at the distal extent of the splint. This is accomplished by drilling holes in the hoof wall and placing wire through the holes and into the foot plate on the splint. Traction is applied to the limb before the splint is locked in place in order to facilitate alignment of the displaced bone. If there is diffuse swelling, a Robert Jones bandage is applied to the limb for seven to 14 days before casting to allow for edema reduction. This is crucial for long-term fracture immobilization. Whenever the limb is of sufficient health, a cast is applied to the limb from the hoof to the loop of the splint, incorporating both the cast limb and the splint together. If good alignment of the fracture site has been achieved, some of the tension on the splint may be relieved to better facilitate the animals ability to move about freely. Applying the cast with the hock in slight flexion is preferable so that movement and use of the leg is maintained. The splint is usually left on the animal for eight to 12 weeks (Figure 7) Length of time is determined by the severity of the fracture and how well the animal tolerates the splint. Rehabilitation may take longer than if transfixation casting is used because of the traction applied to the limb and the way the animal must use the splint. Forelimbs will rehabilitate much faster than rear limbs and exercise is a necessary component to any rehabilitation program. Some individuals experience significant pain after removal of these devices and analgesics administered after removal can greatly facilitate an animal's recovery.

Figure 6 Thomas splint with screws to allow for length adjustment. Loop (black and white arrow). Foot plate (white arrow head)

Figure 7 Thomas splint in place on front limb. Note position of the loop caudal to the elbow and cranial to the point of the shoulder.

Suggested reading

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