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INTRODUCTION

The diagnosis and treatment of bovine lameness is often shrugged off and neglected by veterinarians since physical examination of the area involved can be a very tedious task. Likewise, the producer often delays in calling for professional help believing the lameness due to a "sprain" which will soon heal or he is disappointed with the superficial examination and antibiotics given to previous cases. It is well known that fractures don't respond to this regime of therapy.[1] As infectious diseases become controlled or eradicated will we become more concerned about conformational and locomotor problems in cattle?

Veterinarians, much like producers, usually don't get excited about lameness problems since the animal usually doesn't die and often remains in acceptable condition but losses due to lameness do accumulate to sizeable amounts. Some of these losses include: (1) decline in milk output, (2) decrease in body weight, (3) decrease in feed efficiency, (4) premature culling of potentially valuable cattle, and (5) cost of treatment.[1]

One author lists infectious pododermatitis or foot-rot as the most common cause of lameness in beef cattle.[4] This is followed by laminitis, overgrown claws, and vegetative interdigital dermatitis or "corns", in decreasing order of frequency. In a survey conducted at a small slaughter house, Bouckaert found that lameness usually occurs in the hindlimbs in the bovine species in contrast to the equine species, and that foot problems accounted for 88% of the lameness followed by osteoarthritis and septic arthritis with 5% and 4% respectively. The lateral or abaxial digit of the hindlimb was more frequently and more severely affected in two common foot problems, chronic laminitis and abscess formation. At Stange Memorial Clinic,

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Iowa State University, approximately 34% of lameness cases were diagnosed as sole abscesses, approximately 17% as arthritis problems, and approximately 8% each for fractures and for osteomyelitis requiring claw amputation. The remainder of the cases were nearly equally distributed among many causes. The survey included cases from October, 1965 to August, 1971.

Frank states that an examination for the cause of lameness should always include the foot and after this the stifle joint should be closely examined.[5] Conformation should be noted since some beef breeders have selected for a blocky conformation with straight, short legs which may predispose to osteoarthritis. The limbs should be straight enough to support the body weight without placing excessive stress on the joints but with enough angulation so that concussion is absorped by muscles, ligaments, and tendons.[1] The animal should stand squarely on all 4 feet and the claws should be of equal size and be placed closely together.

FOOT CONDITIONS

Since pastured cattle do a great deal of walking they wear off the hoof walls and soles sufficiently so that trimming usually isn't necessary. The feet of stabled cattle should be trimmed twice a year and in general the shorter a hoof is trimmed the better, but care should be taken to avoid penetrating the sole especially at the heel. When claws become too long a toe can break off including and exposing the sensitive lamina. Elongated toes place undue stress on the weakest part of the sole (junction of the caudal and middle thirds) which can lead to ulceration and prolapse of the pododerm.

Foot Rot

Infectious pododermatitis is the major cause of lameness in both beef and dairy cattle. A crack in the skin or anaerobic conditions produced by some microbe must be present before *Spheropherous necropherous* can invade. If the skin over the lesion is relatively intact the foot swells and the animal is very lame. All cases of foot rot produce some degree of debility and decrease in production varying from slight to severe. Although most cases of foot rot are diagnosed by the producer we should be careful to differentiate it from puncture wounds, lodged stones, laminitis and interdigital fibroma.

The treatment and etiology of foot rot is probably more obvious to us than the possible sequela. The coffin and pastern joints can be invaded with the development of a septic arthritis and osteomyelitis. The interdigital tendons and ligaments soon become necrotic and functionless. Amputation of the affected claw often yields marked improvement.

Sole Abscess

It is easy to visualize how injuries to the sole such as penetrating objects can lead to sole abscesses but this condition can also result from foot rot. Nails, wires and other pointed objects can enter the hoof causing a suppurative pododermatitis or they can enter the soft tissue of the interdigital area. *Sph. necropherous* and *Corynebacterium pyogenes* are often found in the resulting abscess.

Severe pain is manifested by the elevation of the foot by the animal especially if the joint capsule is involved. One should look for one or more discharging fistulas as he trims away the superficial sole. They may be found in the subcutaneous tissue of the interdigital area, in the pododerm beneath the sole, or within the joint capsules of the coffin, pastern or fetlock joint.

Paring out all necrotic sole and allowing the abscess to drain is satisfactory if the abscess is extra-articular. Amputation of the claw is necessary if a joint is involved.

Contusion of the Sole

Trauma to the sole causing hemorrhage is often the etiology of this condition, but in some cattle it is believed to be due to increased traction of the deep flexor tendon. In the latter case, the toes often have grown to an abnormal length thus overstretching the deep digital flexor tendon. This lesion is most often seen on the

lateral claws of the hind legs.[4] In one survey of some 1200 bull digits, about two-thirds of the contusions were located between the middle and posterior thirds of the hoof close to the axial margin where the deep flexor inserts into the third phalanx (P_3). One should watch for this condition in untrimmed feet of stabled cattle, in cattle with a pidgeon-toed stance of the hind feet and in animals with dropped soles or those with flat feet. This condition is more prevalent in heavy cattle.

If the contusion produces only slight hemorrhage, thin longitudinal red stripes will be seen after trimming away the superficial layers of the sole. If more severely injured the horny sole appears reddened and feels soft and rubbery. This progresses to black spots in the sole. After the horny sole degenerates the corium is exposed and may prolapse. This irritation causes granulation tissue to form but this can become infected. Chronic infection can lead to necrosis of the deep flexor tendon at its point of attachment to P_3 with resulting rupture of the tendon and tipping up of the toe.

Treatment consists of trimming all the digits to correct the weight bearing surface, removing necrotic tissue and bandaging. Amputation of the claw may be necessary if the tendon is involved. Blocking the healthy claw with a wooden block may be beneficial in that the diseased claw is rested. The producer should be informed about conformational predispositions and that the feet of stabled cattle should be trimmed twice a year.

Overgrowth of the Hoof Wall

In this condition the lateral wall of the claw curls beneath the sole causing lameness. It is associated with a base narrow conformation. This gives the appearance of well developed rounds and this trait might be selected for. It is most common in bulls of the English beef breeds and the lateral claw of one or both rear feet are involved. Because of weight distribution the front feet are involved in cows. No lameness is seen until the animal is at least a yearling. It is possible that it can develop in association with chronic lameness of the opposite leg or when pain involving a medial claw is relieved by placing the leg well under the body.

Upon examination the lateral claw looks smaller and the space between the overgrown horn and the sole may be filled with moist, dark, malodorous material.

After trimming off the overgrowth the axial wall of the affected claw should be trimmed slightly closer than the abaxial wall. This condition tends to recur so the feet should be trimmed regularly. The conformational fault can often be corrected when the condition is found in animals under 18 months of age. By building up the lateral walls with acrylics and leaving in place for 6 months the bones involved frequently correct their alignment.

Interdigital Fibroma

"Corns" are seen in both beef and dairy cattle but their occurrence is higher in beef cattle. Some cases are probably due to poor foot conformation, but many cases result from animals being excessively fat. The thinking is that fat in this area pushes down to cause an outpouching of the interdigital connective tissue. Skin overlying this area thickens and projects downward. This protruding skin may become infected and necrotic. Usually the greatest mass is found in the middle or anterior third of the interdigital space.

"Corns" can recur following surgical removal if the underlying cause isn't corrected. Wiring the toes together along with surgical excision may be more corrective.

Sand Cracks

These cracks in the hoof wall can originate at the coronary band and proceed distally or they may originate on the weight bearing surface and progress proximally. Lameness is due to infection of the sensitive lamina or pinching of the sensitive lamina. Excessive drying of the hoof wall leads to decreased elasticity of the wall and eventually to cracking. In chronic laminitis the excessive abnormal wall growth is quite susceptible to drying and cracking. If the cracks are due to a

laceration to the coronary band the prognosis is poorer.

The hoof should be trimmed and the cracks curetted and filled with acrylic if no infection is present. Local medication will control infection in the crack.

Laminitis

We probably won't be called on to treat founder in the feedlot but perhaps we should consider it when treating rumen engorgement in a valuable breeding animal. It is usually seen in younger animals starting on feed too quickly. One theory is that histamine is formed from decarboxylation of histidine in the gut which leads to engorgment of the vascular bed in the foot.[3] Damage to the hoof producing tissues takes place which results in the growth of distorted hooves.

At first the signs are of severe indigestion. Later a stilted, hesitant gait is obvious. After several weeks, corrugated and elongated hooves develop.

Along with treating for the overload, one should include frequent injection of antihistamines and standing the feet in cool sand. Good results are claimed from injecting 50cc of blood, collected from the jugular, deep intramuscularly.[13]

STIFLE CONDITIONS

Gonitis

Injuries of the stifle joint are quite common in cattle, especially in bulls. Bulls often refuse to serve with a painful stifle and gonitis is one of the most common causes of bulls becoming useless for natural service.[5] Often the affected bulls have a conformational fault in that the rear limbs are too straight which seems to be more common in Angus bulls.[7] Fibers of the cruciate ligaments frequently rupture at their point of insertion. Bulls often recover from slight ruptures and are lame only a short time. With more severe tears or aggravations of the injury, bony spicules commonly form which renders the animal more permanently lame. The history often reveals a swinging and supporting leg lameness and swelling of the joint capsule after natural service.

Rupture of a cruciate ligament is signified by anteriorposterior movement of the tibia in relation to the femur. Little weight is placed on the leg when walking. Due to the tibia slipping caudally against the gastrocnemius tendon on flexion, a kinking in this region can be seen externally.[8] Pain and swelling probably will be absent here. Rupture of both ligaments is not rare.

Meniscal tears are also very common and may occur concurrently with cruciate ligament rupture or avulsion of the collateral ligaments. The articular cartilages of the femoral condyles become eroded due to uneven contact with the torn cartilage. An audible single click is heard when the animal is forced to move.[13] The click may disappear after a week but often can be heard by placing the stethescope bell into the rectum on the floor of the pelvis. A grinding noise is heard externally as chronicity develops and the synovial sac becomes distended. The animal is acutely lame and keeps the stifle flexed slightly. Radiographically, erosive lesions can be seen on the posterior aspect of the tibial plateau three or more weeks after the injury. Mineralization can be seen at the anterior attachment of the joint capsule to the tibia. The most significant finding is a spot of mineral deposition in the posterior wall of the joint capsale just above the posterior lip of the tibial plateau.[13]

The medial or lateral collateral ligaments can avulse as the result of falling or from the force of a blow. Since most blows occur from lateral to medial the medial ligament is most commonly affected. Abnormal joint looseness may lead one to suspect this lesion. By forcing medial to lateral motion of the joint when the animal is bearing weight on the limb one can support the diagnosis. The avulsed portion of bone is often visible radiographically.[13]

The goal of treatment for meniscal tears is the replacement of the condylar erosions by fibrocartilage and absorption of the affected meniscus.[13] Prognosis is always guarded since the bull can remain lame even after optimum healing. A

walking cast should be placed on the limb and left to remain for 6–8 weeks with limited exercise for a month following the period in the cast. Injecting the collateral ligaments with 2–3 cc. of a sclerosing agent may help prevent joint looseness if the ligaments ruptured partially with the meniscal tears.[13]

A walking cast placed on the affected leg for 4–6 weeks is used to permit the avulsed portion of bone to reunite. Prognosis is more favorable for this condition than for the other stifle injuries.[13]

HIP CONDITIONS

Coxofemoral Lameness

The two most common conditions are luxation and subluxation of the hip joint. Luxation is most often seen in cows following breeding or calving. The femoral head is usually displaced dorsally and anterior to the acetabulum but can be displaced caudally to the acetabulum or ventrally into the obturator foramen. With upward-anterior luxation a marked swelling is seen about the gluteal region and the stifle will be turned out and the hock in, while the limb is dragged. If the femoral head is luxated ventrally into the obturator foramen the lameness is less severe and the trochanter major is lower and less obvious than its counterpart.[13]

Although most animals are slaughtered, one author reports that some animals can regain sufficient use of the leg to get around without pain since a psueodoarthrosis of tough connective tissue forms.[11]

Rupture of the round ligament permits subluxation. Severe lameness is seen initially and a double clicking sound can be heard when the animal moves. This is a double click and is duller than that heard with meniscal tears. The lameness gradually decreases in 3–6 months. There is no practical treatment except for 1–2 months stall rest to minimize arthritis. The prognosis is extemely poor if the animal can't get up.

OTHER CONDITIONS

Osteoarthitis

Degenerative joint disease is manifested as a slow progressive lameness seen in animals more than 5 years of age. The large, freely movable, weight-bearing joints are affected with this chronic debilitating disease. Damage to the articular cartilage caused by injury or misalignment of the joints results in degeneration and hypertrophy of bone and cartilage. In one report an unusual number of cases of osteoarthritis were associated with three abnormal joint alignments: elongated toes, straight hocks, and excessive weight.[10] These conditions would obviously cause a constant irritation to the joints. In a report from a bull stud, it was found that the hock and stifle were most frequently affected.[9] Ankylosis, calcification and muscle atrophy developed and rendered the bulls useless. Radiographically, the changes seen are roughening of the articular surfaces and periarticular lipping.

Pain is present and is seen as lameness. The animal loses body condition and milk yield drops. Periarticular tissue thickens and this is seen as an enlarged joint. Crepitus may be heard in advanced cases and muscles atrophy due to disuse.

Treatment is entirely symptomatic. Methylprednisolone injected intrasynovially gave good results in one report but some joints had to be injected three times.[12]

Spondylitis

Vertebral exostoses usually affect the last 2 or 3 thoracic and first 2 or 3 lumbar vetebrae.[2] The condition isn't uncommon in old bulls. The exostoses occur mainly on the ventral aspects of the vertebral bodies. They often fuse and cause immobility of the region. If this ossification fractures, the fragments can cause injury to the spinal cord or peripheral nerves with a resulting locomotor disturbance, which is usually paretic in nature.

Frank states that the symptoms are characteristic and constant. The muscles of the hindlimb and back become rigid and remain so for a few seconds and the leg

is then jerked forward.[6] This continues for the first few steps the animal takes and then the gait normalizes. Signs are said to be more prominent after just getting up. The prognosis is guarded since there is no treatment.

Many conditions have been discussed but not nearly all of those which can be responsible for lameness. By remembering that certain conditions occur with different frequencies in the cow and in the bull and by getting a good history one is led to think of some specific lameness problems. A good physical exam and the use of radiographs are helpful in making a definitive diagnosis. Proper treatment of the condition and sound advice suggested to the producer can then begin. In this way, the veterinarian can perform a valuable service for the producer and for the cattle industry.

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Morris Animal Foundation News

ITHACA, N.Y.—Scientists at Cornell University have found that viruses are at least one of the causes of urinary obstruction in the cat.

"At this stage we think a virus causes the disease in some cats," reports James H. Gillespie, V.M.D., coordinator of a program in its eighth year at Cornell's New York State College of Veterinary Medicine to study feline viruses.

There may be more than one virus involved, Dr. Gillespie said. One virus, which he found induces the disease, is now recognized as principally causing respiratory disease in cats. The scientists believe this virus finds its way into the urinary tract where it produces cellular changes which trigger the development of obstruction.

Study on this virus has been complicated because two other viruses have also been isolated from the urinary tract of cats with the disease. Mrs. Fabricant has observed that these two viruses induce the formation of mineral crystals in cells in culture. This may explain how obstruction forms in cats, but this must be proven. The Cornell team hopes to overcome this difficulty by working with disease-free cats. The idea is to start with a "clean" cat and then study the effects of each virus individually as it is introduced.

"Our ultimate objective is to find a means of preventing the disease in the cat and also to develop a more successful method of treatment," Dr. Gillespie said. The aim will be to develop a vaccine against the viruses which cause obstruction, he added.

But another very important outcome of the study may be its implications for human health.

"I would like to emphasize that the mechanics here may very well be comparable to what happens in man," Dr. Gillespie said.