Feet and Leg Problems in Dairy Cattle

J.K. Shearer, Russ Giesy

Lameness is a problem of increasing importance to Florida dairymen. This is in part due to constraints imposed by environmental regulation and modifications to reduce environmental stress which require confinement of cows to smaller areas for longer periods of time. The trend toward confinement housing has resulted in a number of changes including: 1) confinement of cows to harder, wetter, more abrasive, and/or in some instances slipperier floors; 2) decreased opportunity for exercise; and 3) rations containing more concentrates and less roughage. These factors, either alone or in combination, contribute to an increase in the rate of hoof wear, greater potential for metabolic dysfunction, and a higher incidence of feet and leg injury or disease.

A proper understanding of lameness conditions in terms of what they are, how or why they occur, and what to do about them is essential to minimize production losses as well as the loss of cows from these and related problems. In the following, the incidence of feet and leg problems is reviewed, which includes consideration of those factors which influence its prevalence. A case report of a herd lameness problem also is presented. The final section discusses some of the more common causes, treatment, control, and prevention of lameness conditions in dairy cattle.

ININCIDENCE OF FEET AND LEG LAMENESS

Specific information concerning the incidence of foot diseases in cattle in the United States is limited; however, it is believed to be similar to that reported from the United Kingdom. One such survey of 48 veterinary practices involving 1821 herds found that the average annual incidence of lameness requiring treatment by a veterinarian was 5.6% of cows. Of these, 88% involved the foot. The majority of foot lesions (84%) involved the hind feet with 85% occurring in the outer claw. Foot lesions, in order of descending occurrence, were listed as: footrot (16.3%); white line abscesses (15.6%); sole ulcers (13.6%); punctured sole with pus (10.4%), and underrun heel (8.7%). Upper leg lameness accounted for the remaining 12% of treated lameness conditions, with 76% of these associated with the hind limbs. The most common cause of upper leg lameness was trauma. Two other surveys have reported average incidences of treated lameness at 6.3% and 7.3% annually. Whereas, the veterinarian generally sees only the worst cases the actual rate is likely much higher.

Specific information relative to lameness on Florida dairies was accumulated from a 1987 study which compared foot lesions from 14 midwestern dairy herds (1492 cows) with foot lesions from 8 Florida herds (720 cows). Evidence of foot disease was monitored and scored on all cows presented for hoof trimming. Results indicated that the incidence and tendency toward laminitis was significantly greater in Florida dairy cattle. On the other hand, footrot and interdigital fibroma (korns) were less commonly a problem in Florida compared to midwestern dairy herds. These data support the clinical impressions of many in Florida and suggest the need for continued emphasis on the establishment of proper feeding, housing, and management practices.

1. This document is Fact Sheet DS 68 of the Dairy Production Guide, published September, 1992, Florida Cooperative Extension Service. For more information, contact your county Cooperative Extension Service office.
2. Associate Professor, College of Veterinary Medicine; Ext. Agent I, Hillsborough County, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville.
Case Report: Severe Laminitis Outbreak on a Florida Dairy

During the summer of 1990 a serious outbreak of laminitis resulted in tremendous financial loss and the premature culling of more than 100 cows. Peak losses associated with reduced productivity, increased labor expense, drug and veterinary costs, and culling were incurred during the months of July, August, and September. Of cows culled, more than 60% were first lactation animals less than 60 days in milk.

The clinical syndrome varied but for most animals lameness began very early in lactation with symptoms typical of acute laminitis as evidenced by pain in all four feet and an extreme reluctance to stand or walk. Some never recovered from this stage, whereas others improved with time. Still others did not show any of the typical signs of laminitis but became acutely lame in one foot or two feet only. Several of these progressed to more severe forms of foot sepsis which extended to soft tissues and joints of the foot and fetlock. Many of these did not recover and ultimately had to be destroyed or culled from the herd.

Review of the feeding, housing, and management practices up to the point of the outbreak revealed several potential contributing factors. The milking herd ration was a nutrient dense ration which in retrospect lacked sufficient fiber. Long hay was not available to lactating animals and the introduction of first lactation heifers to the milking ration may not have been gradual enough to avoid lactic acidosis and the laminitis that subsequently developed. A second factor that likely influenced the problem experienced in this herd was the placement of first lactation animals on concrete in a newly constructed shade barn in May, approximately 1 to 2 months prior to the outbreak. The combined effects of the high concentrate to forage ratio, rapid introduction of high energy feedstuffs, and confinement on new concrete are believed to have been major contributors to the laminitis and related foot problems that developed in this herd.

Lameness as a Cause for Culling in Florida

Lameness is reported to be the third most common cause of culling behind reproduction and mastitis. Depending upon the definition of culling, this may be a bit confusing. For example, cows which leave the herd by way of sale for dairy purposes or those which leave due to low production are removed for "voluntary" (at the will of the dairymen) reasons. Those which leave the herd due to reproductive failure, disease and injury, death, mastitis, or due to feet and legs are involuntarily lost from the herd. Since the loss of animals for such reasons is not at the discretion of the dairymen they are termed "involuntary." Culling is a voluntary procedure applied to eliminate cows with low milk-producing ability.

Lameness severely limits milk production and reproductive performance. Estimates are that cattle which become lame and are not attended to can experience a 20% loss in milk production over an entire lactation. Lame cows do not go to pasture, spend little time at the feed bunk, and prefer to lie down most of the time. If the cow does not eat she cannot produce nor maintain body weight. Under these conditions she becomes a cull for reasons of low production. British surveys indicate that cattle sold to slaughter as a result of lameness have carcasses worth only one half as much as those sold to slaughter for other reasons. Reproductive performance is similarly reduced. In one study lameness resulted in prolongation of the calving interval by 33 days.

In this context, it is not difficult to visualize lameness as an important underlying factor in determining a cow’s longevity in the herd. DHI state summary statistics from 138 Florida herds (average herd size of 401 cows) are displayed in Table 1. These data from the section "Yearly Summary of Cows Entering and Leaving the Herd" specify the reason(s) why cows left herds. Considering all cows (all lact.) and excluding those animals sold or culled from the herd for voluntary reasons (dairy (13), or low production (45)), feet and leg problems accounted for 6.7% (7/103) of cow loss from Florida dairies for involuntary reasons (i.e. reproductive failure (36), disease/injury (25), died (21), mastitis/udder (14), and feet and legs (7)).
Table 1. Table displaying data on the number and reason why cows left Florida dairy herds (Adapted from DHI State Summary Statistics, February, 1991.)

<table>
<thead>
<tr>
<th>Dairy</th>
<th>Low Prod</th>
<th>Repro</th>
<th>Disease Injury</th>
<th>Died</th>
<th>Mast/ Udder</th>
<th>Feet/ Legs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st lact.</td>
<td>6</td>
<td>15</td>
<td>11</td>
<td>7</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>2nd lact.</td>
<td>3</td>
<td>13</td>
<td>9</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>3rd lact.</td>
<td>4</td>
<td>17</td>
<td>16</td>
<td>13</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>All lact.</td>
<td>13</td>
<td>45</td>
<td>36</td>
<td>25</td>
<td>21</td>
<td>14</td>
</tr>
</tbody>
</table>


Lameness

Genetic factors can predispose an animal to hoof problems as abnormalities in feet and leg conformation are highly heritable. Abnormally straight hocks, weak pasterns, sickle hocks, splay toes, or overlapping toes are associated with an increase in the incidence of lameness.

Cow legs should be sturdy with a strong pastern and good flexibility in the hock. The ideal conformation of the cow’s foot should be short, steeply angled, high in the heel, and even clawed. The sole should be slightly concave with the majority of weight being distributed over the hoof wall. Some suggest that the ideal hoof angle is 50 to 55 degrees for front feet and 45 to 50 degrees for rear feet. Unfortunately, most are about 43 degrees. Studies have shown reduced survivability in first calf heifers with low hoof wall angles.

Environmental Considerations

The dairy cow evolved as a land animal and not one adapted to standing on hard, abrasive surfaces. In today’s modern confinement systems cows spend a majority if not all of their time on concrete. A further complication of confinement housing is restricted exercise. Cows just do not have the same freedom to move about as they once did in traditional housing systems. Further, their options for resting are limited in confinement to a free stall or the alleyway. Considering what would be most natural for the cow it is not hard to see why confinement generally increases feet and leg problems.

Concrete, depending upon how it is formulated and mixed, is capable of creating an extremely abrasive surface for cows’ hooves. New concrete is more abrasive than old and wet concrete is up to 83% more abrasive than dry concrete. Studies show in fact that cattle hooves wear more than they grow during the first 2 months on concrete. Animals on wet concrete suffer doubly; first, because of the increased abrasiveness associated with the wet concrete and secondly, because wetness softens the hoof horn thereby permitting an increased rate of hoof wear. A further cause of increased hoof wear occurs from crowding or rushing cattle which results in increased hoof wear from the twisting and turning on rough abrasive concrete. For this reason design of facilities which incorporate ideas for easing cow movement thereby reducing rotational forces on hooves are important housing considerations.

Smooth concrete, on the other hand, reduces wear and promotes hoof overgrowth. It is also slippery and predisposes to cow injuries, usually of the upper leg, from falling. Grooving the surface of smooth concrete floors increases traction and, while a costly venture, is well worth the expense to prevent injuries from falling.

Environmental influences have a major impact on feet and legs. Cattle on concrete for long periods of time are prone to lameness. It is best if they can be off concrete for at least 10 to 12 hours per day. Grass pastures or dirt lots which provide cows with a break from the concrete will reduce lameness problems.
NUTRITION AND FEEDING MANAGEMENT

Nutrition and feeding management are major considerations whenever a herd begins to experience a high incidence of foot problems, in particular, those associated with laminitis. A primary goal in feeding is to maximize dry matter intake in order to optimize milk production yet avoid conditions which might lead to rumen acidosis and laminitis. Consequently, it is a fine line between what is best for health and production and what may predispose to problems.

In Florida, a major dilemma involves feeding strategies for summer heat stress. During hot weather most dairies attempt to increase the nutrient density (increasing the concentrate to forage ratio of diets) of rations as a means of maintaining dry matter intake rates. In itself this can be troublesome if not monitored carefully; however, in addition it is a normal tendency for heat stressed cattle to eat less frequently (feeding during cooler times of the day only) but more at each feeding. The combined effect of these types of rations and feeding patterns increases the risk for rumen acidosis and laminitis in hot weather. Feedlots, for example, emphasize keeping feed in feedbunks at all times and encourage intake numerous times daily in order to avoid rumen acidosis.

In general, cows should receive a well balanced ration, not exceeding 60% concentrates with 5 to 15 pounds of long-stemmed hay. Lactating cows and heifers should be introduced to the milking herd ration gradually. The addition of sodium bicarbonate in quantities of up to 1% of the ration will reduce rumen acidosis and may be helpful. Measures to reduce heat stress and encourage feed intake throughout the day will minimize production losses as well as limit potential for lactic acidosis.

Hoof Trimming

While some would like to ignore the need for hoof trimming, it is a necessary health management procedure. Dairy cows simply will not produce to their full potential unless given the advantage of regular foot care. Further, beyond the obvious benefit of improved productivity, it is inhumane (in fact irresponsible) to neglect needed trimming of severely overgrown hooves. Herds are advised to adopt a foot care program in which hooves are trimmed at a minimum of twice per year.

The availability of hoof trimming services varies. For some, it may be necessary to do their own. In general, hooves should be trimmed in such manner as to return the load bearing surface to the outside walls of the hoof. Body weight should be evenly distributed between claws so that the foot and lower leg maintains normal conformation. This reduces stress on ligaments, tendons, and joints. When feet have overgrown to the point of causing abnormal conformation, frequent trimming over a period of several months may be necessary.

Footbaths

The effectiveness of footbaths has not been thoroughly studied. Limited information suggests some benefit from their use in herds suffering lameness associated with diseases of the interdigital skin and heels. Footbaths are considered to be less helpful for treatment of conditions involving the hoof such as laminitis, sole abscesses, or sole ulcers. Primary reason for this is thought to be due to the poor absorption of footbath chemicals by the hoof itself.

Footbaths should be located in routes regularly travelled by cattle. Most tend to end up in exit lanes from milk parlors. Size varies but most advise that they be at least 30 feet long and 6 inches deep. This ensures sufficient contact time and coverage. A footbath containing water preceding the chemical bath is also recommended. Cleansing feet in the water bath prior to entry into the chemical bath extends the life of the chemical bath.

Copper Sulfate - Wet Bath

Ten percent solution equals 16 pounds in 20 gallons of water.

1. Hot water will hasten dissolving. Addition of some vinegar will aid dissolving in hard water. The solution must be kept reasonably clean since manure will deactivate it. Copper sulfate should not be allowed to contact metal due its corrosive properties and because contact with metal may inactivate the copper sulfate.

2. It is irritating to the feet and should not be used repeatedly at a concentration greater than 10%.
3. Sheep are very sensitive to ingested copper and will be poisoned by it if the residue is discarded where they have access to eat it.

**Copper Sulfate - Dry Bath**

Add 1 part powdered copper sulfate to 9 parts slaked lime.

**Formalin**

Five percent solution equals 1 gallon of 36% formaldehyde in 19 gallons water.

1. It is very irritating when inhaled and should only be used or mixed outdoors. It is also irritating to the skin and feet and should not be used repeatedly as a footbath at greater than 5% concentration. Formalin tends to harden the hooves with repeated use. Any residue solution should be discarded and a fresh batch mixed before each use. Otherwise, the mixture may become too concentrated from evaporation.

2. Formalin is monitored by the Environmental Protection Agency under SARA Title III and all suppliers and/or distributors are required to keep records of sales. No more than 500 lbs should be kept on site at any one time.

**Zinc Sulfate**

Twenty percent solution equals 34 lbs powdered, agricultural grade zinc sulfate monohydrate (36%), per 20 gallons of water.

1. This is non-irritating to the feet and can be used daily.

2. Effectiveness for controlling foot problems in cattle is largely unknown.

**SPECIFIC CAUSES OF FEET AND LEG LAMENESS**

Upper leg lameness accounts for only 10 to 15% of lameness in dairy cattle. Of those that occur, most are in the rear legs and are associated with injuries associated with calving and trauma. Specific causes include: paralyses, fractures, dislocations, cellulitis (inflammation of the subcutaneous soft tissues) of the hock joint, and rupture of the gastrocnemius tendon.

**Paralyses**

Paralyses result from nerve damage. Depending on severity lameness that results may be temporary or permanent. In order of occurrence (from most frequent to least frequent) they are: peroneal; obturator; radial; femoral; tibial; and sciatic nerve paralysis. The most common of these, peroneal and obturator, are described below.

Peroneal nerve paralysis is a common secondary complication with milk fever, downer cow syndrome, or other condition which may cause a cow to remain down for an extended period of time. The peroneal nerve innervates the rear legs and due to its anatomical location is highly susceptible to damage in the "down cow" situation. Prolonged pressure on the lateral aspect of the stifle joint, as occurs when cows are down, will cause damage to this nerve. In general the longer the cow is down the more severe the potential damage to this nerve. It is characterized by "fetlock knuckling" in the affected rear leg(s). There is no specific treatment and most will recover spontaneously in 1 to 2 weeks or less. Cow lifts with shoulder and hip support and wide belly bands for uniform distribution of the cow’s weight are helpful.

Obturator nerve paralysis occurs almost invariably as a result of calving difficulty. The obturator nerve courses through the birth canal eventually branching out to supply muscles of the inner rear legs. Due to its location in the birth canal it is subject to damage at calving. Prolonged pressure as occurs when calves become lodged in the pelvis for an extended period of time creates the potential for temporary or even permanent paralysis as a result of damage to this nerve. Severely affected animals are unable to rise. Those which are able to stand are predisposed to "doing the splits" or falling as a result of the loss of innervation to the inner thigh muscles which under normal conditions keep the legs properly aligned and positioned for standing. Surprising to some it’s not so much the size of the calf that causes obturator paralysis but the length of time that the calf is lodged within the pelvis exposing the obturator nerve to continuous pressure for a prolonged period that results in paralysis.
Good footing is essential to cows suffering obturator paralysis. As with other paralyses there is no real specific treatment beyond supportive care. Protecting these animals from environmental exposure (solar radiation), providing them with feed, hay, and water, and occasional lifting and/or repositioning is probably most important to their recovery.

**Fractures**

Fractures most frequently result from traumatic injury. Whereas, long bone fractures in young animals can often be simply repaired with plaster casts, such is generally not the case for fractures in large heifers or adult cows. Instead, fractures in adult cattle often lead to slaughter of those affected. A cardinal sign with limb fractures is the lack of weight bearing on the affected leg. Animals will carry the fractured limb and avoid bearing any weight on it.

Fractures of the pelvis and spine are most often associated with falls. They tend to occur near calving or during the first 100 days or so of lactation. The provision of non-slip flooring is a key factor in minimizing such problems.

**Dislocations**

Dislocations of the coxofemoral (hip joint) are difficult to correct in cows. They can be the cause for moderate to severe disability and are best handled on a case by case basis. As with other causes of upper leg lameness these generally result from traumatic injuries.

**Hock Joint Cellulitis**

Hock joint cellulitis (swollen hocks) is often times more of a cosmetic problem than a lameness problem. However, where the incidence is high it reflects a problem that may be related to lack of a sufficient number of stalls, flaws in stall design, or cow habit/behavioral patterns in which cows choose to lie on concrete rather than in available stalls. The problem disappears when cows are given access to pasture or dirt lots. Lameness can be severe in those cases where the infection extends into the hock joint.

**Rupture of the Gastrocnemius Tendon**

Rupture of the gastrocnemius tendon is an occasional observation in downer cows. It causes severe disability, and for all practical purposes, is not correctable surgically. Examination of downer cows should include some assessment of this important structure before treatment is instituted. Surprisingly, some will be able to stand despite rupture of this tendon. The only real option for these cases is slaughter or euthanasia.

**Lameness Associated with Diseases of the Foot**

The majority of lameness (90%) is associated with diseases of the foot. Consequently, it is the place to start when examining a cow for lameness. Regardless of the impression that the lesion causing lameness may be due to an upper leg injury, it is absolutely essential to do a thorough examination of the foot. Only after a possible foot lesion has been ruled out should examination for an upper leg problem proceed.

Foot work is hard work. It is time-consuming, sometimes frustrating, and almost always filthy. Inadequate restraint and handling facilities are major obstacles to getting it done. Consequently, lameness in some operations, regardless of cause, is treated with a "shot of pen-strep." If the condition is footrot (which it usually is not), this approach may affect a cure. If not, the door has been opened to much more serious problems that may not be resolvable.

Based on a 1987 study comparing foot lesions observed during trimming, it would appear that the predominant foot problems in Florida dairy cattle are associated with laminitis. Further, this tendency toward laminitis in Florida dairy cattle was greater than that observed for midwestern dairy herds. There are number of probable explanations for this finding. Looking to the future, it will become increasingly important to fine tune our feeding and management practices to avoid this problem.

In the following we review some of the more common foot diseases of cattle emphasizing recognition and procedures for treating and preventing these conditions.

**Footrot**

Footrot is a contagious disease of cattle characterized by inflammation of the soft tissues of the foot and sudden lameness. The affected foot becomes severely swollen and the cow may resist putting weight on it. The typical lesion begins as a superficial lesion in the interdigital skin (skin between
the toes) and progressing rapidly with time to deeper tissues. The lesion has a characteristic foul odor which may be helpful in differentiating it from other conditions. The incidence tends to be higher during the winter months. Confined cattle are believed to be affected more frequently than pastured cattle.

When identified early treatment with antibiotics (Penicillin, Oxytetracycline) is very effective. Treatment should include cleaning of the interdigital space and topical treatment with Kopertox (Fort Dodge Laboratories). Control and prevention can be aided through the use of footbaths containing 2 to 5% formalin or 5 to 10% copper sulfate solution.

Laminitis

Laminitis, also known as founder, is a diffuse inflammation of the corium (sensitive tissues) of the hoof. The disease occurs as an acute, chronic, and subclinical condition.

Acute Laminitis

The acute form of laminitis occurs sporadically. However, incidence is highest for first lactation animals within the first 60 to 90 days of lactation. Clinical signs include stiffness, pain, and extreme reluctance to walk. Some animals will stand with forefeet placed forward whereas others may stand with their back arched and feet placed more beneath them. Most animals will spend the majority of time lying down. Pain can be exaggerated by forcing the affected animal to rise. Redness, swelling, and tenderness above the coronary band and over the bulbs of the heel may be noticeable. If the animal will permit, one may be able to feel increased heat through the walls of the hoof and over the coronet.

The causes, as eluded to earlier, are likely related to genetics, environmental factors, nutrition, and feeding practices. Some have noted a relationship between laminitis and toxic diseases such as mastitis and metritis, or with metabolic disorders such as ketosis (acetoneamia) and rumen (lactic) acidosis. Regardless of inciting cause, the lesion in the hoof involves a disruption in the microcirculation of blood to the nerve-rich tissues of the sensitive lamina of the hoof. Although localized the inflammation is severe and causes extreme discomfort during the acute stages.

Practical therapy would include treatment with anti-inflammatories such as Banamine or aspirin and movement of the animal to a grass pasture, dirt lot, well-bedded stall, or other area free of concrete and gravel or stone. The animal should be fed hay only and should be reintroduced to concentrate feed gradually over several days.

Chronic Laminitis

Clinical signs associated with the chronic form of laminitis are mild and undetectable with the exception of noticeable hoof wall changes that occur over time. With chronic laminitis, hooves widen, flatten, and develop characteristic horizontal ridges. Lesions of the sensitive lamina are the same as those described for the acute form of laminitis. However, they occur more gradually, resulting in less obvious signs of discomfort.

The cause of chronic laminitis is primarily associated with the feeding of high grain diets. There is no specific treatment short of frequent hoof trimming.

Subclinical Laminitis

The subclinical form of laminitis represents possibly one of the most common and consequently one of the more significant forms of this disease. As implied by its name, clinical signs typical of laminitis are absent. Hence, it is often referred to as a syndrome associated with a number of lesions that occur secondary to a reduction in the strength and hardness of the hoof horn.

Poor horn quality predisposes to an increased rate of hoof wear, greater risk of hoof injury and bruising, and a heightened potential for bacterial invasion of the hoof. As a result, lameness due to sole abscesses or ulcers and other non-footrot lesions increases in the herd. What’s most important is that one recognize whether or not subclinical laminitis is the underlying cause. It’s quite obvious that emphasis on treatment of the resultant conditions without correction of the underlying cause(s) only contributes to continued and likely even greater economic loss.

As with the acute and chronic forms of laminitis first lactation animals within the first 60 to 90 days of lactation are most susceptible. Causes are the same as those described for the acute and chronic forms.
Lesions of the foot that are most characteristic of the subclinical laminitis condition include:

1. visible hemorrhages of the sole that may appear as pink staining of the hoof horn or hemorrhages arranged in the form of striations;

2. particularly soft, yellowish, and/or waxy appearing hoof horn which cuts readily with a hoof knife;

3. an increased incidence of toe ulcers and sole abscesses presumably due to softening of the hoof tissue and separation of the white line.

It has been suggested that a true problem with subclinical laminitis may exist whenever the annual incidence of lameness, excluding footrot, exceeds 5%. Another indicator would be herd records which demonstrate that over 50% of herd lameness is occurring within the first 60 to 90 days of lactation.

It is worth reiterating that when discussing subclinical laminitis, lameness represents an important clinical indicator of an advanced problem. Consequently, simply monitoring lameness is not an effective means of limiting financial losses from foot disease. Instead, regular hoof trimming and evaluation and accurate determination of the causes of lameness is essential. Regular review of the cumulative lesions observed at trimming and during the treatment of lameness forms the basis for early recognition of possible problems with subclinical laminitis.

There is no specific treatment; however, many recommend formalin footbaths which aid in hardening the hoof horn. Prevention is aimed at avoidance of the lactic (rumen) acidosis syndrome. The following list (by no means exhaustive) provides a few practices for consideration with particular concern for first lactation animals.

1. Make feeding changes gradually.

2. Monitor intake of concentrates by springing heifers and dry cows (some suggest limiting these animals to 6 to 10 lbs/hd/day).

3. Feed a total mixed ration (TMR) with a properly balanced concentrate to forage ratio.

4. Increase intake of concentrates carefully during early lactation.

5. Feed should be available at all times and animals should be encouraged to eat frequently.

6. Cows housed on concrete should have access to dirt lots or pasture at least 10 to 12 hours per day.

**Sole Abscesses**

This is one of the most common causes of lameness in the cow. It is characterized by acute and severe lameness almost to the extent that the cow will refuse to bear weight on the affected foot. Unlike footrot, there is no swelling of the foot.

Sole abscesses occur as a result of a hole or crack in the horny sole that permits the entry of contaminants (small slivers of stone, gravel or grit) which secondarily establish an infectious process leading to abscessation between the sole of the hoof and adjacent sensitive soft tissues. As the infectious debris (pus) accumulates, pressure builds up causing extreme discomfort. Unless the pus pocket is drained it will continue to enlarge and migrate until it reaches a soft tissue area in which it can rupture and drain.

Treatment requires drainage of the abscess, if possible, through the original site of the contaminant’s entry. The entry site can usually be visualized following cleaning and paring of the superficial layers of the solar horn. Once the entry site is located careful paring out of the track leading to the pus pocket is required until drainage is accomplished. Care should be taken to establish drainage, yet minimize peripheral damage. The hole established for drainage of the abscess should be packed with small cotton ball soaked in Kopertox (or iodine teat dip). Many animals will show immediate
improvement, whereas others in which abscessation was more extensive may take several days to improve. There is no need for antibiotic therapy unless the infection extends to deeper tissues of the foot.

Sole abscesses are extremely painful. One of the best ways to mediate some of this pain is through the application of a wood block to the unaffected claw of the affected foot. This removes weight-bearing on the affected claw by raising the adjacent claw (Technovit - Dr. Jorgensen Labs). Blocks will eventually fall off after a period of several days to a couple of weeks.

**White Line Disease**

The white line of the sole is an area of fibrous connective tissue that joins the rigid hoof wall to the sole. The soft composition of this area makes it susceptible to penetration by grit or other foreign material that with time can migrate to the subsolar region, abscess and cause lameness. The most common site of occurrence is at the heel-sole junction of the outside claws of the rear feet. It can be a more serious problem when the infection extends to the navicular bursa and associated tissues.

The disease is more common in cattle housed such that their feet are continuously wet or as a secondary consequence to subclinical laminitis.

**Sole Ulcers**

A sole ulcer is described as a circumscribed loss of the horny sole which exposes the corium (sensitive tissue immediately beneath the sole) of the foot. The typical lesion is usually found at the junction of the sole and the heel. Appearance of the lesion will vary according to its maturity. Early ulcers appear as nothing more than a circumscribed area of fresh tissue that may be uncovered in the process of hoof trimming. More mature or long-standing sole ulcers may be covered initially by rough, irregular horn tissue that when pared away exposes granulation tissue which bleeds freely if damaged.

Subclinical laminitis is thought to be a major cause of sole ulcers. The softening of the horn tissue predisposes it to excessive wear and more trauma than would normally be the case. Heel erosion (excessive loss of heel horn tissue) leads to loss of the normal shock absorbing properties of this structure. This causes additional strain and pressure on the heel/sole junction and exacerbates development of the lesion.

Treatment requires removal of the necrotic (dead or decaying) horn tissue followed by elevation of the affected claw by cementing a wooden block on the unaffected claw. All healthy horn tissue should be left in place.

**Warts - Interdigital Papillomatosis**

Foot warts are a sporadic problem in Florida herds, but when they occur they can be quite troublesome. For many herds the problem arrives with the purchase of cattle from infected herds. The lesions occur most commonly on the area just above the heels on the rear feet. They are also frequently observed on the front side of the foot in the interdigital cleft extending into the interdigital space between the claws. Lesions develop finger-like projections and are extremely painful to the cow. Consequently, most cows will resist examination procedures involving touching or manipulation of the wart-like masses.

As one might expect affected cattle show pronounced lameness. Most prefer to lie in their stalls rising only when necessary. This results in reduced feed intake and weight loss which calculates to a significant reduction in milk yield. One study reports a decrease in milk production by 20 to 50% in affected animals.

Exact cause of the disease is unknown but appears to have an infectious component and may be related to environmental factors. The condition seems to thrive in situations which predispose to chronic irritation of the skin where feet are continuously dirty and wet.

Treatment varies with severity. Surgical removal with topical treatment and bandaging is reported to be the preferred method for affecting a cure. Autogenous vaccines (vaccines made from the warts themselves) do not appear to be effective. Some have claimed success through the use of formalin footbaths or from directly spraying the lesions with the formalin footbath solution at each milking.
SUMMARY

Feet and leg problems are a major health concern and as the trend toward confinement housing continues the incidence of lameness will likely increase. The causes and predisposing factors are many and include: nutrition and feeding; housing and environment; concurrent disease; management factors; and genetic influences. The majority of lameness (90%) occurs in the foot. In Florida the major cause of lameness appears to laminitis and related conditions. Routine examination of lame cows and of feet at the time of trimming can provide valuable information regarding subclinical foot diseases such as subclinical laminitis. In short, times have changed. Regular foot care and hoof trimming is not a luxury we provide to the cow, it is a must if we expect to achieve maximum productivity and longevity from her. It is investment - just the same as teat dip - only in this case, the investment is to insure her ability to walk. That is every bit as important as insuring good udder health.