**Lameness in cattle**

The incidence of lameness as a major problem in dairy cattle has increased in recent years and has been shown to be more common in large herds and a particular problem during the winter housing period. The problem was worsened over the years due to the inadequate size of cubicles and deficiencies in their design and construction. Cows and heifers suddenly introduced to concrete surfaces after calving appear to be more susceptible to lameness. Around 80% of cases of lameness are due to foot problems and the remainder to leg damage. Foot lameness is seen most commonly in the hind feet, particularly in the outer claws. The majority of leg lameness is due to physical damage from badly designed cubicles and to injury at calving. Early diagnosis is important so that the probable causes of the problem can be identified and a control strategy put into action.

 The reasons for dairy cows leaving the herd (being culled) are:

 1. Low Production

 2. Reproductive Failure

 3. Lameness

 4. Mastitis Lameness leads to both low production and reproductive failure. Low production results because a lame cow will spend more of her time lying down at the expense of time spent eating. Reproduction may be affected because a lame cow will not readily exhibit signs of estrus or maintain the proper body condition to cycle and become pregnant. 10 - 20% of lame cows are culled from herd. 80% of lameness occurs in the 1st 3 or 4 months after calving The lesions that cause lameness in dairy cows result in intense pain also causes stress, which debilitate and reduces productivity.

Causes

Lameness only describes a clinical symptom. It may be caused by a wide variety of foot and leg conditions. Environmental, nutritional, genetic factors and infectious are all significant in the production of specific lesions. The most common Cause or predisposing factors of lameness are:

1. Bad management: Dairy cows spend more time on concrete. Dairy cows may spend many hours daily waiting to be milked on muddy and wet ground. Life on "mud" covered concrete, typical of many dairy cattle management systems, predisposes their feet to both infectious and noninfectious hoof disease.

2. Diet: Subclinical laminitis Due to not enough high quality fiber/roughage or too much grain

 3. Genetics: The size of cattle feet Cattle selection for milk production, cattle tends to have fewer foot and leg problems. Abnormal conformation can cause musculoskeletal problems of the limbs, especially the feet.

 4. Bovine foot disease: 1. Infectious Foot Disease 2. Non- infectious Foot Disease

**The economic value of lameness in cattle includes:**

1. losses from decreased production.

 2. cost of treatment.

 3. Prolonged calving interval, and possibly nursing labor.

 4. Loss of milk of 1.7–3 L/day for up to 1 mo before and 1 mo after treatment (because of pain) plus milk discarded because of antibiotic therapy must also be considered.

 5. Lame cows are more reluctant to use automatic milking systems and show visible signs of stress when forced to do so.

 6. At least 10% - 20% of cows in a herd are culled for reasons related to lameness.

7. Rearing replacement heifers is expensive.

 8. Lame cows are less aggressive in their struggle for feed and are more likely to die early or be culled.

 9. Replacement animals are not initially as productive as mature cows.

 10. Cows in poor condition have a greater predisposition to lameness.

 11. Cows that are lame before breeding have a reduced ability to conceive, and cystic ovaries are much more common in lame cows.

**CONFORMATION OF THE FOOT** For a clear understanding of the causes and the prevention of lameness, it is essential to understand the structure of the foot and the horn-forming process. The foot shows the conformation of the foot:

 1. The horny wall of the claw.

 2. The pastern.

 3. The heel or bulb.

 4. The weight-bearing border of the wall.

5. Growth rings.

 6. The interdigital space.

7. The coronet.

 8. The sole; if the claw is healthy, the thickness is 5 to 7 mm.

9. The solar part of the heel; the weight bearing part of the heel.

 10. The white line; the horny connection between the weight-bearing border and the sole.

 11. The interdigital skin.

**Hoof affection in cattle** The hoof affection in the cattle may be in one of the following area:

**A.Interdigital space. B.Claw affection**.

 A.Interdigital space affection:

1. Foot Rot.

 2. Interdigital fibroma.

 3. Interdigital granuloma.

 4. Traumatic injuries of interdigital space

 B. Claw affection:

 1. Overgrowth of the hoof.

 2. Sepsis of the hoof.

 3. Ulceration of the sole.

 4. Double sole.

 5. Chronic necrosis.

6. Pododermititis.

 7. Penetration of the sole.

 8. Bruising of the sole.

 9. Cork screw.

10. Laminitis.

 11. Separation of the sole.

12. Fracture of the hoof wall.

 13. Fractures of the third phalanx.

**Interdigital space affection:**

 **1. Foot Rot •**

 Foot rot is a contagious, infective caused by (Fusobacterium necrophorum) originates in the gastrointestinal tract and is shed into the environment by feces. • It is characterized by a necrotic lesion in the interdigital skin and soft tissues of the foot causing swelling and lameness. • The bacteria can live freely in the soil or in the internal environment of the animal. • The disease recently reaches the upper leg, if not treated immediate with bad prognosis lead to deep infection of the foot. • Reducing foot rot can be accomplished by: 1. Housing cattle in dry, manure-free that have no debris. 2. Footbaths. 3. Feed additives. 4. Vaccines. 5. Isolating infected cattle may reduce the spread of the bacteria to the environment.

Damaging factors which can lead to foot rot include:

1. Stubble fields.
2. Small rocks.

3. Abrasive surfaces.

4. High temperatures with high humidity.

5. Infectious diseases, infection of the coffin joint and interdigital dermatitis.Treatment:

1. Systemic antibiotics.

2. Topical treatment of the wound.

3. The lesion should not be covered or bandaged and the animal

should be housed in a dry, clean environment to promote healing.

4. Dipping path with antiseptic agents reduce the case incidences.**2. Interdigital Fibroma:**

 hyper keratosis or true paploma

 Corn flower appearance

 Mostly in the hind limbs

 Not lead to lameness unless in advanced stages of affection when

touch the ground or in case infection and necrosis or ulcer.

Caused by:

 May be due to genetic factors

 Persistant irritation to the interdigital space by foreign bodies or

severe tension on the interdigital ligaments.

 Chemical irritation leads to over growth of the epidermis and

papilla formation then change to fibrosis.

Treatment

 The treatment by surgical removal and medical application locally.

**3. Interdigital granuloma**

 Caused by:

1. Persistent irritation to the inter digital space ,in heavy weight

cow and bulls

2. Disease like foot rot or foot and mouth disease

 Clinical signs

1. Lameness due to the walk and irritation to the lesion.

2. Lead to necrosis and ulceration

3. Secondary bacterial infection lead to more severity case

 Treatment

1. Surgical removal

2. Fixed the hoof of the animal during walking by ligation or

fixed by suturing the digit with stainless steel wire.

**4.Traumatic injuries of interdigital space:**

 Mild or sever trauma to the interdigital space by foreign

bodies lead to trauma or injuries with different level of

severity

 The severity is related to the damage to the inner tissues and

structures.

 The mild case treated with good prognosis

 The severe case with bad prognosis may needs amputation of

the digit.

**B. Claw affection:**

**1. Over growth of the hoof**

Causes:

 The imbalance between growth and wear.

 Genetic factors

 Diseases like hyperkeratosis

 The floor is always wet results in hoof overgrowth.

 Dairy cows do not walk as much as cows on pasture. This

reduces frictional wear

 The exercise increase in the wear requirement.

 Wet concrete is more abrasive than dry concrete.

 A dairy ration is higher in energy and protein than grass this

increases the growth rate of the hoof

Treatment:

By hoof trimming

 Restoring normal structure, by correct hoof trimming.

 Normal sole thickness is the most important aspect of correct

hoof trimming.

 Hooves should be trimmed or evaluated once or twice a year

to improve comfort and performance.

 The trimmings should be early in the dry period.

 Proper weight bearing on the hoof wall of the inside claw of

the front feet and the outside claw of the back feet is

especially important.

 Hoof trimming is stressful to cows. A 10 percent

reduction in milk yield may be seen directly after trimming

**2. Sepsis in the hoof:**

Causes:

1. Infection to the inner structure lead to suppurative infection

(septic corno pedal arthritis/septic sesamoideal

bursitis/necrosis and tearing of the deep digital flexor tendon)

2. Occurs due to penetration of the foreign bodies

3. infection from others part of the body to the hoof

Clinical signs

1. Acute lameness

2. Swelling in the area the swelling may reach the upper part of the foot

Treatment

1. Treatment by amputation of the digit

2. Drainage of the exudates

3. Use special shoes to elevate the foot to reduce the tension

**3.Penetration of the sole by foreign body**

A stone or fragment of glass or metal penetrating almost through the

sole will cause pain due to pressure on the corium and, if not removed,

will lead to infection.

If the foreign body penetrates through to the corium, infection is

introduced to the dermal level, and an abscess develops. The rapidity of

onset and severity of the lameness depends on the location of the sole penetration.

Treatment

The foreign body should be removed and the track cored out to the

corium with a fine-pointed hoof knife. Creating a large hole is

inappropriate. Pus is often released under considerable pressure.

Antibiotic should be squeezed into the cavity, which closes rapidly. The

opening should not be plugged but covered with elastic waterproof

material to prevent blockage with mud or manure. Bandaging may not be

required, but the animal should be housed in a well-strawed area for a

few days.

**4.Bruising of the sole**

Occur due to foreign bodies and stone or concert stable with out of

infection and sepsis.

It occurs in heavy breed cow, and light hoof.

Increase the tension on the deep digital flexor

tendon, or over growth of the hoof, chronic

laminitis, or due to anatomical anomalies.

It occurs in the lateral hoof of the rear limb and the medial hoof of

the fore limb.

Mostly occurs at the middle and distal third of the sole

The signs are bloody area ,soft sole ,bleeding from the inner area

In sever case lead to separation of the sole the changed to ulcer in

the sole

Treatment

Looking for the cause and try to remove it then trimming to remove

the necrotic parts, put the animal in the soft dry ground.

**5. Cork screw**

Abnormal conformation due to hyper stimulation to the coronary

band.

The lateral wall of the hoof grows abnormally down to cover the sole

and the animal forced to walk on it.

Mostly occur in the lateral aspect of the rare foot.

Not seen less than one year old mostly occur after 3-4 years old cow.

Causes

Genetic factors may lead to this case.

 It may occur due to the affection of the deep digital flexor tendon.

Clinical signs

Lameness only in sever case and in the hoof anomalies due to the

trauma and necrosis to the hoof wall and the sole.

Infection occurs due to contamination.

**6. Laminitis**

It’s an inflammation of the laminae and papillae in the hoof. The

layer of tissue inside the hoof, closest to the hoof wall is arranged in

regular folds. This folded tissue that we are referring to when we talk

about laminae. The layer of tissue in the sole of the hoof is arranged in

irregular folds called papillae. Both laminae and papillae act to absorb

the shock created by the hoofs impact with the ground. They also produce

the horny tissue of the wall and sole. Any time the blood supply to these

tissues is disrupted – through damage to the vessels from internal or

external elements – laminitis can result.

There are three phases of laminitis: acute, subclinical, and chronic.

Acute laminitis is commonly associated with feeding diets too high in

concentrates this lead to rumen acidosis. Acidosis causes the release of

chemicals into the blood stream; these chemicals can gradually destroy

the vessels supplying the hoof tissues with blood. With restricted blood

supply, the laminae and papillae begin to die. The dead tissues swell,

increasing the pressure also compresses the living blood vessels – further

reducing blood flow – and causing intense pen.

Subclinical laminitis is the most common form of laminitis. This

phase of disease can result from physical injury to the hoof or from

damage during acute laminitis; so the layers of tissue between the pedal

bone and the hoof wall begin to degenerate, meaning that the pedal bone

begins to separate from the hoof wall and sole. Untreated the disease will

progress to chronic laminitis.

During the chronic phase of laminitis the damage within the hoof

become permanent and the pedal bone becomes completely separated

from the hoof wall and possibly the sole so the pedal bone rotates makes

the front tip points downward towards the sole.

Clinical signs

1. Typically, in the most acute cases, there may be fever and an

increased respiratory rate.

2. The animal will be unable to walk and will stand abnormally

with the feet drawn under the body.

3. The claws may be warm to the touch, and a pronounced

digital pulse.

4. Pain may be detected in the claws with the use of hoof testers.

Treatment

1. Acute laminitis should be treated as an emergency using antiinflamatory agents to reduce pain, re-establish normal

circulation in the hoof.

2. Removal or correcting the cause.

3. Claws cool are reported to be helpful.

4. Other treatments may include antihistamines may be useful if

given within the first 48 hr.

5. The recovery rate is limited and severe cases require culling for humane reasons

**7. Separation of the sole**

 Due to infection or necrosis

 The separation due to inflammation and accumulation of

transudation and exudates between the sole and the under

layer area.

 Because of bad prognosis these cows should be culled from

the herd.

**8.Fractures of the hoof wall (sand crack)**

 Crack in the hoof from the coronary band down ward or

transverse crack.

 May be vertical or transverseThe predisposing factors are hot weather, trauma, genetic

factors, fatigue, and old age.

 If the crack reach the sensitive area it may be with bad

prognosis

Clinical signs

 Pain during walking.

 Infection may occur.

Treatment

 Clean the crack, debridement from outside.

 Remove circular part of the hoof and sole.

 Special shoes to the sole to hold the hoof from the ground.

 Remove the separated part of hoof, with caution not damage

the sensitive area

**9.Fractures of the third phalanx**

 Rarely and mostly in the front foot.

 Occurs almost in dry season.

Causes

 Trauma; stress and the concert ground are predisposing factors.

 Weak hoof with anomalies leading to fracture of the third phalanx.

 Bone disease like osteomyelitis lead to pathological fracture.

Clinical signs

 Sudden lameness in one or more limb with unable to bear the weight.

 Swelling and may be not, with increase in the local temperature.

 Hoof tester and palpation can use in diagnosis

 X-ray for definite diagnosis.

 Treatment by using special shoes to elevate the hoof from the ground (in the

sole) for 7weeks, and fixed both foot to limitation the movement.

Prevention of lameness

1. Treatment of Foot problems.

2. Feet should be trimmed or examined one to two times per year.

3. High concentrate diets should be fed carefully to avoid acidosis.

4. Cows should have limited time standing on concrete and should

not be rushed when walking on any abrasive surfaces.

5. Cows need a clean, comfortable environment to lie down in.

6. Early treated Lame cows and records should be kept on all

cases.