

# Prophylaxis: Breeding, Feeding, Housing and Hoof Trimming

Harold E. Amstutz, D.V.M.

Department of Large Animal Clinics

School of Veterinary Medicine

Purdue University

West Lafayette, IN 47906

## Introduction

Prevention of ruminant digital disease is the modern approach to this increasingly recognized economically significant problem. Successful cattle breeders and feeders are no longer satisfied with successful treatment of a lame animal. They demand to know why the animal became lame and how to prevent further lamenesses in their herds. They are aware that when an animal becomes lame a financial loss has already occurred and treatment only limits the amount of loss. Only a small profit is realized per healthy animal under ideal conditions and a herd lameness problem very quickly leads to economic disaster. When treating a lame animal it is, of course, essential that treatment be successful but the prophylactic advice offered is often of far greater economic benefit to the cattle owner. In order to give sound advice we must be knowledgeable not only in cattle diseases but also many facets of cattle husbandry; such as breeding, feeding, housing, and hoof trimming.

## Clinical Features and Discussion

### *Heredity*

Many lamenesses could be prevented if proper attention were given to selecting breeding animals with correct foot and leg conformation. Greenough MacCallam and Weaver<sup>1</sup> list the following normal foot and leg angulations:

Tibiotarsal metatarsal - 129 to 134°

Radioulnar metacarpal - 180°

Pastern angulation to the ground, forelimb 50-55°

Pastern angulation to the ground, rear limb - 55-60°

Dorsal border of hoof with horizontal, forefoot - 50-55°m

Dorsal border of hoof with horizontal, hindfoot - 55°m

Wide variations in the size of medial and lateral claws predispose to lameness since the large claw bears a disproportionate amount of body weight and excessive trauma occurs. The hoof wall should be relatively straight, the bulb deep and sole concave.

Conformational defects of the digits often result in lameness and have a high degree of heritability.

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*Paper presented at the 5th International Symposium on Disorders of the Ruminant Digit, August 24-25, 1986, Dublin, Ireland.*

Some heritable conditions such as mulefoot (syndactyly) are visible at birth while others such as vegetative interdigital dermatitis (hyperplasia interdigitalis) do not appear until later in life due to complicating causative factors.

Any animal exhibiting a serious genetic defect of the digits should not be used for breeding purposes.

Whenever a serious heritable defect occurs in the progeny of a bull being used for commercial semen production, the condition should be reported to the semen producer management so they will be aware of the fact and can take appropriate action. Cattle breeders should make use of the genetic information furnished by semen suppliers on bulls being considered for use in their herds.

In the past, when cows produced only one calf per year, they were not considered to be a very serious threat to the genetic pool if they carried a recessive gene for a locomotor defect. With the advent of embryo transfer and the possibility of hundreds of progeny from one cow in her lifetime, she too is now recognized as a potential gene-pool polluter.

### *Nutrition*

Prevention and control of nutrition-related lameness is primarily based on the prevention of laminitis, because so many foot lamenesses are associated with compromised integrity of hoof structure, which is the result of laminitis. Laminitis almost always is associated with feeding a concentrated ration that is high in carbohydrates (starch), high in protein and low in long fiber. Abrupt change to such a ration, accidental access or long term feeding can all result in varying degrees of laminitis.

Prevention consists of feeding a 12 to 15% protein and at least 17% fiber ration on a regular basis.

All ration changes should be gradual and extreme care should be exercised to prevent accidental access to high concentrate rations. Buffering agents such as sodium bicarbonate added to rations at the one to two percent level have been beneficial in preventing laminitis and are widely used in dairy rations. Long term feeding of high concentrate rations is practiced in feedlot beef animals intended for slaughter at an early age. Many of these animals suffer from laminitis as they approach market weight but this causes little concern because of their short life span. In the case of high producing dairy cows, buffering agents during lactation

and a high fiber and low concentrate ration during the dry period minimize the chances of laminitis developing. Mineral deficiencies are occasionally the cause of digital lameness. Some of the most frequently diagnosed deficiencies are calcium, zinc and copper. Prevention dictates that rations contain these and other essential minerals in adequate amounts.

Feed damaged by mold, ergot containing grain or endophyte contaminated fescue may all cause lameness and should be fed with extreme caution, if at all.

### *Housing*

Cattle maintained in a pasture environment have relatively few lameness problems but economics has dictated confinement of many intensified dairy and beef enterprises. Confinement has increased lameness problems many fold. Both walkways and freestalls in confinement systems have contributed to this increase.

Walkways are usually solid concrete or slats. Solid concrete floors are initially given a rough brush finish that provides good footing, but after several years of continuous cattle usage and mechanical cleaning with metal scrapers, the surface becomes so smooth and slippery that cattle walk very cautiously with short steps and on tiptoes to keep from falling. This manner of walking results in malformed and overgrown claws. Various methods are used to roughen these slippery floors. The most popular method is diagonal grooving of all surfaces where cows walk or stand.<sup>2</sup> Grooves  $\frac{1}{2}$ " (12mm) wide,  $\frac{3}{8}$ " (9mm) deep, and  $3\frac{1}{4}$ " (9.4cm) apart have been very satisfactory.

Other methods occasionally used to roughen slippery floors such as muriatic acid, hydrochloric acid, jack hammers, and scabblers, have not been as satisfactory. Various slat widths and gaps have been recommended. Pinsent<sup>3</sup> recommended that the slat width be 125 mm and the gap 40 mm. Slat should have a rough brush-troweled surface with tapered sides.

Free stall construction recommendations have also varied widely. Britt<sup>4</sup> recommended the following:

A 48" (122 cm) stall width appears best for 1100 to 1400 lb.<sup>a</sup> Holsteins. The minimum length should be 7 $\frac{1}{2}$ " (229 cm) though 8' (244 cm) stalls work very well.

Rear curb should not be over 10" (25cm) above the alley floor, and there should be a small lip not over 2" (5cm) at the rear of the stall to keep the bedding from being raked out by the cows. The floor of the free stalls should be at the same height as the curb, less the lip for bedding saving, and the front floor should be slightly higher than the rear of the stall. A 4% slope from front to rear has been satisfactory. Some stalls use a brisket board at the front floor that is 5'6"-6' (165-180 cm) from the rear of the stall. This board sticks out of the floor 4-6" (10-15 cm) and slopes away from the cow at a 45° angle. It also keeps the cow from lying too far forward in the stall.

<sup>a</sup>—equivalent to 500-640 kg.

Stall dividers made from looped pipe make it easier for cows to get up and decrease the chances for injury.

Free stall floors have been constructed of many materials, with concrete and clay being most frequently used. Based on cow usage when choices are provided, clay floors are apparently more comfortable than concrete but require more maintenance. Discarded automobile tires laid flat and the open spaces filled to one half the width of the tire with ground have recently been highly recommended.<sup>5</sup> Bedding or floor surface coverings vary widely; carpeting, rubberized material, straw, sawdust, wood shavings, and sand are used most often. Sawdust shavings and chopped straw bedding on clay-base free stalls was preferred by cows in Albright's study,<sup>6</sup> and cows had fewer feet and leg injuries. Albright also found that digit problems were higher in stanchion stalls than in loose housing barns.

It is not considered necessary to have a free stall for every cow, because not all cows use free stalls at the same time.<sup>7</sup> Increasing animals-to-free stall ratio above 4:3 is not recommended, because the average resting time is decreased at a greater ratio. Foot health is compromised when animals have to stand for extended periods of time on manure-covered concrete floors while waiting for a free stall to become available or while waiting for extended periods of time in a holding area to be milked.

Cows confined to a free stall barn with small concrete holding and feeding areas have their feet constantly bathed in feces and urine. Within a year or two the hoof softens, heel fissures develop, sole ulcerations appear and hoof growth accelerates. Animals soon become extremely lame, milk production drops and general health deteriorates.

Cows benefit by being removed from such stresses during the dry periods. They should be placed on ground exercise lots and fed a ration high in fiber and very low in concentrates. These exercise lots often become quagmires in high rainfall seasons. Some solutions are adequate drainage, creating ground mounds, spreading crushed rock, applying four tons of lime per acre, concreting heavily used portions of the lot and increasing lot size.

When low spots or entrances to buildings are filled with material to prevent the development of mud holes, one should use smooth stones rather than coal cinders or sharp stones, which would penetrate interdigital tissues or hoof soles.

### *Foot Trimming*

Foot care should begin early in life. When heifer calves reach six months of age their feet should be examined and trimmed, especially if they are confined on soft footing such as built-up litter<sup>8</sup>. Heifers should have exercise if they are to develop strong feet and legs. Lack of exercise often results in weak pasterns and wide-spread claws.

Most yearling heifers should have their feet trimmed at least once if they are confined, but it is usually not necessary if they are grazing. When heifers are added to the milking herd as two-year-olds, an excellent opportunity arises to

examine their feet for abnormalities and attempt corrective trimming if indicated.

Confined cattle will benefit from foot trimming at this time and at least once a year thereafter for the remainder of their lives.

Hoof trimming can be performed with the cow in the standing position, cast on the ground or restrained on a tilt table. The author prefers a tilt table but this facility is not always available and other restraint becomes necessary. Usual trimming equipment consists of long-handled hoof nippers, search knives (hoof knife), Allgau knife (hoof chisel), electric sander and a good pair of leather gloves. The author prefers to perform the basic portion of the surgery with the long-handled nippers, explore tracts and remove overlapping tissues or loose strands with a hoof knife and smooth the weight-bearing surface with the sander. Excessive use of the sander on the sole should be avoided because it may heat the tissues to a degree that produces necrosis. Feet should be trimmed as short as possible without penetrating the sole or making the sole so thin that the first sharp stone will penetrate it.

The medial claw is usually trimmed slightly shorter than the lateral claw since many cattle toe out and such trimming encourages correct placement.

The axial aspect of both claws should be trimmed shorter than the abaxial aspect producing a sole concavity. This

permits the cloven foot to grasp or cut into the walking surface in a normal manner. It also causes most of the body weight to be borne by the hoof wall, concussion to be borne by the sole and forces the claws together rather than permitting them to spread apart. When an animal has too much set to its hocks as viewed from the side (sickle hocked) or weak rear pasterns, the toes of both rear claws should be trimmed as close as possible and the heel left long. The middle third of the sole and wall should be trimmed short so body weight is distributed equally between the heel and toe and a rocking chair effect is prevented.

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