Control Programs for Digital Dermatitis

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▪ Lameness economics

Lameness in cattle is a common condition that can result in significant economic loss to a producer through a variety of mechanisms. Lame cows do not eat as much as healthy cows and thus produce less milk or less gain. They may have poor demonstration of estrus or become anestrous. Furthermore, they may be prematurely culled due to low milk production, delayed conception or emergency slaughter.

Lameness incidence is described in a number of reports based on veterinary treatments or recall of farmers. Both of these methods underestimate the true incidence of painful conditions of cattle digits. Whitaker worked with good data from 185 herds in England and Wales and recorded an average incidence of 25% in a 12 month period in 1981-82 based on first treatments (18). Of these cases, veterinarians treated 6%, farmers treated 19%, and 1.4% were culled without treatment. The incidence by herd ranged from 2 to 55%. Thirteen Dutch herds served by a university herd health program had a lactational incidence rate of 9 to 49% during a 3 year observation period (1). Veterinary treatment rate for lameness in 1821 British herds was 5.5% of 136,800 cows during the year 1977 (15). Prevalence of lameness in 17 herds in Wisconsin and Minnesota was 14% in summer and 17% in spring (17). The range by herd was 0 to 30% in summer and 2 to 33% in spring. With the increase in incidence of digital dermatitis since these reports appeared, some herds now have treatment rates over 170% per year.4 The authors believe that lameness is now the second most common clinical condition overall and the most common condition in some herds. Treatment rates by veterinarians, farmers, and hoof trimmers were 55% in a survey of 37 British dairies (4) and in the data of our clinic averages 38%. Few animals die but some are so disabled that they are not salvageable. The authors estimate that 1% of lame cows are disposed of without salvage value. Lame cows are often culled for apparent low production or reproductive failure. In 13 Dutch herds culling attributed to lameness was 9% of cases (1). In 185 British herds lameness was given as the reason for culling 5.6% of lame cows (18). In a retrospective case control

study of 427 lame cows in 17 British herds, the lame cows had a 10% higher cull rate (5). Culling for “LAME” was chosen to be 12% based on the data from our clinic.

Veterinarians examine and treat about 50% of lame cows in our practice but this is probably atypical. The authors estimate that veterinarians treat 10% of LAME cases nationwide. The typical time for treating lameness is .35 hr. Farmers or hoof trimmers treat the remainder of LAME cases with an average investment of .5 hr time. Some cases of lameness require drug therapy and others require supplies such as bandages or hoof blocks. The average drug and supply cost for a LAME case is estimated at $20. Milk discard for some treatments (15% of cases) is for 8 days at 25 kg for a total average discard of 30 kg. Milk not made due to LAME was estimated by DeLuyker (7) at 150 kg and by Kossaibaiti (11) at 125 kg for 90 British herds. Delay in conception occurs for cows with LAME in early lactation. The delay was 10 d for LAME before 35 DIM, 30 d for LAME between 36 and 70 DIM, and an average delay of 11 d for all LAME cases; including cows pregnant when lame (12). Dutch cows in 13 herds lame at any time in lactation conceived 7 d later than non-lame herdmates and in 21 herds 9 d later (1, 8). Lame cows in 17 British herds conceived 14 d later than controls (5).

In a comparison with the other most common clinical conditions of dairy cattle, lameness was estimated to be the most costly on a herd basis. Estimates were derived from published reports and data from the records of the Ambulatory Clinic at Cornell University. The average cost per case of lameness due to all causes is estimated as follows:

- case fatality rate of 1% for $12;
- involuntary culling of 12% of cases for $98;
- treatment costs including veterinary fees, hooftrimmer fees, drugs and farmer labor of $23 per case;
- 150 kg milk discard for 15% of cases for $4;
- average lost milk production of 150 kg at $35; and average increased days open of 12 for $30.

With an average incidence of 38% per year, the average total cost per 100 cows per year is estimated to be about $7600.

▪ Causes of Lameness

The infectious causes of lameness common in North America comprise 3 distinct entities. The terminology for these conditions may be confusing with many synonyms in common use, but foot rot, interdigital dermatitis and digital dermatitis are generally understood by most veterinarians. There is often

overlap in the clinical picture presented since a cow may be simultaneously infected with the organisms causing each of the disease entities.

Laminitis is more common in dairy herds than most veterinarians or herd owners would estimate. The onset is usually gradual and the resulting pain is chronic. Infectious causes of lameness can be controlled through hygiene and footbathing or foot spraying. Laminitis prevention requires careful overall herd management including regular skilled trimming. In my opinion, laminitis will be one of the main production limiting diseases of dairy cattle for the next generation of dairymen.

▪ Digital Dermatitis

The condition goes by the name of hairy heel warts, strawberry footrot, verrucous dermatitis, digital warts, interdigital papillomatosis and probably most correctly digital dermatitis. Since 1994 the disease has developed to epidemic proportions in northern Europe and spread throughout North America. One wonders why a disease that was reported originally in 1974 (3) suddenly spread worldwide in dairy cattle in the last few years. It was described in New York Holsteins in 1980 (14) and in Dutch cattle in 1981 (6) but none of the researchers recognized that the condition was the same as others had described. The multitude of appearances of lesions as the disease progresses easily prevented the understanding of the common underlying etiology. An etiology that despite several years of hard work by several laboratories remains as yet unproven (13). Spirochetes are routinely observed in microscopic preparations of lesions but have also been seen in skin samples from herds without the disease (9). Early theories of a viral cause were disproven by the use of viral gene probes (10). Later, the response to antibiotics clearly indicated a bacterial cause.

The earliest lesion recognizable as digital dermatitis is a reddened circumscribed area typically just above the interdigital cleft on the plantar aspect of the pastern, the strawberry lesion. The most striking feature of the lesion is the degree of pain expressed by the cow. Hairs at the periphery of the lesion are often erect and matted in exudate to form a rim. As the lesion progresses focal hypertrophy of the dermis and epidermis leads to raised conical projections appearing much like wet, grey terrycloth. In even later stages, papilliform projections of blackened keratin may extend 10 to 15 mm from the surface, the hairy wart stage. Many cows have simultaneous infection with *Dichelobacter nodosus* leading to significant erosion of the horn of the heels in a hemispherical pattern surrounding the axial space. The hoof may be noticeably overgrown from reduced wear caused by the altered use of the limb. Interdigital fibromas, regardless of etiology, are commonly infected with digital dermatitis in endemic herds. In my experience, after digital dermatitis has been present in a herd for a year or so most cases of lameness are found in the first

lactation animals even though lesions may be seen on the digits of older cows during routine hoof trimming.

There may be an association between digital dermatitis and laminitis in freestall housed cows. Lameness due to digital dermatitis can cause cows to be reluctant to leave a stall once recumbent. This might lead to slug feeding and recurrent ruminal acidosis. The acidosis is a precondition of laminitis.

Individual Cow Treatment

It was reported from California in 1994 that injectable antibiotics, either ceftiofur or tetracyclines were effective in treating digital dermatitis. I have conducted two trials with injectable oxytetracycline and one with feeding chlortetracycline at maximal allowed levels and found the response to be much worse (read nil) than topical application of antibiotics.

I recommend topical treatment of lame cows with oxytetracycline in the form of 5 to 15 cc of injectable oxytetracycline applied on a cotton dressing with a flimsy wrap. I have examined many of these cows after 2 to 5 days and have been amazed at the regression of the lesion and complete elimination of pain. Since the response is so rapid I am using less and less of a bandage so that the cotton will fall off in a few days. There is a reusable nylon bandage, it looks like a bikini bottom with hook and eye closures, available from a small company in Utah.[1] It is easy to apply and is easy to remove in the milking parlor from rear feet. Individuals treated with topical tetracycline although improved immediately may relapse to lameness in 5 to 7 weeks if no herd preventive program is in place.

Herd Control Programs for Digital Dermatitis

I have been recommending that my clients use a 0.1% oxytetracycline foot bath on a twice weekly basis (or more often if needed) since 1991 and have found herd level control to be adequate. I define adequate control at the herd level as less than 10% of individual cows treated for heel warts in a year. In addition, another once or twice weekly foot bath of 5 to 10% copper sulfate seems to provide acceptable control of foot rot and interdigital dermatitis. Footbaths should be long and narrow. An easily constructed bath can be made from a sheet of 1/2 inch plywood cut in half lengthwise with a 2 by 6 frame screwed and glued around the perimeter. The bath should be filled about 10 cm deep and placed on a level place in the return alley from the parlor. If cows slow down at the bath place it far enough from the parlor exit to prevent slow down of parlor throughput.

Another agent for footbathing to control digital dermatitis is lincomycin. Available as a water soluble powder in 40 gram packets from Upjohn Co., Lincomix has provided good control in herds where tetracycline might have

[1] Bovine Booties - Mountain Meadows, 680 South 300 East, Providence, Utah 84332

been ineffective due to interactions with minerals in the water. One packet per 150 liters of water in a foot bath provides about 0.01% lincomycin concentration and has been effective.

Formalin is permitted as a footbathing solution in some districts. It is generally quite effective when used as a 5% solution against all infectious problems of the digit. Before the realization that tetracycline would control digital dermatitis it was our only herd treatment. The primary problem with formalin is the human health hazard associated with the vapors from the bath and the risk of splash injury when changing the bath. Location of the bath far from the parlor in an area with good ventilation is a must.

Herds that have been using antibiotic footbathing program for up to 5 years describe mixed success at present. Some report continued excellent control unless circumstances force a lapse in footbathing. Others claim that control seems to be less effective now than when the program was begun. Those instances of reported failure that I have investigated personally seem to have been a failure of implementation rather than true resistance of the pathogens to the process. Perhaps complacency led to less effective programs. One of the biggest problems with footbathing is manure or mud caked skin. The treatment solutions have only a short opportunity to contact the skin but must reach the skin to be effective. Several strategies are used to increase the effectiveness of topical control programs. I have discussed problems with some dairymen who have increased the footbath concentration of tetracycline to 0.4% and found this effective. Others have installed a rinse bath ahead of the treatment bath that might include only water or have detergent added. Some farmers will rinse the feet of cows while in the parlor. One of the best control programs based on footbathing that I have seen was in a herd with automatic water flushing of the holding pen at 15 minute intervals. The cows had very clean feet when leaving the parlor, which allowed direct contact of the treatment solution with the skin.

Some dairymen are making a solution of either tetracycline or lincomycin and spraying the feet of lame cows daily for a few days as an alternative to footbathing. I recommend that spray solutions be 10 times as concentrated as foot bathing solutions. This can work in small herds in tie stalls with a liter bottle with a hand squeeze sprayer. Jan Shearer has recommended spraying all feet of all cows for a week at about monthly intervals to control digital dermatitis in Florida dry lot dairies.

In the United States all these uses of antibiotics to treat digital dermatitis are extra-label uses that require participation of the herd veterinarian in their selection and monitoring. No milk or meat residues have been detected from topical use of tetracyclines or lincomycin.

There are now many products on the market in the United States with various claims for control or reduction of problems with digital dermatitis. Acidified copper sulfate was applied with a bandage and found to be fairly effective. A

combination of acidified copper sulfate, peroxide, and a detergent applied as a spray was also moderately effective (16). These products are sold as foot bath treatments but have not been evaluated when used in this way.

The Serpens spp. vaccine from Hygeia labs in California has been reported by them to aid in the control of digital dermatitis when used in conjunction with other standard control and treatment programs. The results of only a single scientific trial of the vaccine have been published[2]. The trial used a valid control group and observers who did not know the treatments. The investigators found no improvement due to vaccination done according to the manufacturers directions. There are several anecdotes from other users of this vaccine that suggest it helps in the control of digital dermatitis.

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