

HAIRY HEEL WARTS: FADS AND FASHIONS

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TAKE HOME MESSAGES

- Major risk factors identified for hairy heel warts are: herds larger than 500 cows, purchased replacement heifers, wet and muddy loafing areas, large dairy breeds.
- No one treatment nor control program will work across all herds. The therapy of choice appears to be topical oxytetracycline with precautions taken to prevent antibiotic residue in milk or meat. Foot baths commonly are used in herds with hairy heel warts, but have not been as effective nor economical as topical antibiotic sprays.
- A vaccine has become available which targets one organism believed to contribute to hairy heel warts. Company data demonstrates efficacy while controlled field trials do not. Work continues on the evaluation and development of an efficacious vaccine.

INTRODUCTION

Lameness is an economically important problem in dairy cattle worldwide. Economic losses resulting from lameness arise not only from the cost to treat clinical cases but also from decreased milk production, decreased reproductive efficiency and premature culling. New York researchers estimate the total cost of lameness per 100 cows per year to be nearly \$9000. The average incidence was 30 cases per 100 cows per year with a case fatality rate of 2 percent, involuntary culling rate of 20 percent, and increase in average days open of 29 days. The National Animal Health Monitoring System (NAHMS) Dairy 96 study revealed that 15 percent of the reason that dairy cows were culled for slaughter was due to lameness or injury.

The lameness caused by wart-like growths on the feet of dairy cattle has been given many names. Most commonly the condition is called hairy heel warts (HHW) while other names include, hairy foot warts, digital warts, strawberry foot, raspberry heel, interdigital papillomatosis, or most accurately papillomatous digital dermatitis. Hairy heel warts have existed for many years and were first described in Europe in the mid 1970's and then in the United States in the mid 1980's. By the early 1990's, many dairy operations in the continental United States and Canada had one or more cows afflicted with hairy heel warts. The origin of HHW in the United States and factors that contributed to the rapid spread of this disease are unknown. The sale and purchase of cattle, dairy shows, hoof trimmers, nutritionists, veterinarians and any other farm visitors have been implicated in contributing to the transmission across the country. The disease is found primarily in adult dairy cattle housed in confinement facilities. The incidence is lower in dairy cattle on pasture and is rarely diagnosed in beef cattle. Hairy heel warts have been diagnosed in cattle as young as 6 months of age.

THE LATEST FASHION IN DISEASE

Hairy heel warts have been recognized as a significant disease producing lameness on 40 percent of dairy operations in the Midwest (NAHMS Dairy 96). There is a positive correlation between herd size and prevalence. On dairy operations with less than 100 cows, 41 percent had cattle that showed clinical signs of HHW. On dairy farms with 100-199 cows and farms with more than 200 cows, the farm prevalence of HHW was 64 and 82 percent, respectively. The NAHMS Dairy 96 study also showed that 82 percent of mature cows and 86 percent of bred heifers affected by HHW displayed clinical signs of lameness. It was estimated that 57 percent of all cows reported as lame were affected with HHW. This emerging disease has had a major impact on the dairy industry due to the loss of productivity in lame cows.

Papillomatous digital dermatitis is a superficial skin disease of the bovine. Cattle often stand on their toes and are reluctant to bear weight on their affected heels. 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 fine finger-like projections and are extremely painful to the cow. In naive cattle, even the smallest lesion can produce severe pain so that the animal is non-weight bearing in the affected limb. Most cows 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 reported a decrease in milk production by 20-50 percent in affected animals.

Hairy heel warts are extremely contagious. The exact cause of HHW is still unknown. From results of tissue cultures and the evidence provided by a favorable response to antibiotic therapy, most researchers agree that HHW are caused by invasion of the hoof skin with one or more bacteria and most likely one is a spirochete organism. A major risk factor is the moisture level in the areas where cows stand. Although lesions respond well to antibiotics initially, foot warts will frequently reoccur in animals previously treated.

In a recent field trial performed at the U of I dairy farm, a distinct breed predilection was demonstrated. While performing a topical spray trial, the rear feet of all cows were scored for severity of pain, lesion size and color. Lesion scores were more prevalent in the larger breeds. Ninety percent of Holsteins (120/132) and Brown Swiss (9/10) showed evidence of foot warts, while only 19 percent of Jerseys (5/26) and 45 percent of Ayrshires (6/11) had lesions. Half of the Holstein cows had heel warts larger than 2.5 cm which produced varying degrees of pain, while 40 percent had smaller, less painful lesions. There was no difference between cows with and without foot warts when days since calving or lactation number were evaluated. These results point to a direct correlation between body mass and presence of HHW.

A California study surveyed dairy operations to determine the prevalence of HHW and risk factors related to the disease. Herds with more than 500 cows were more likely to have HHW than smaller herds. Herds with greater than 50 percent Holsteins had more HHW, again suggesting a possible breed predilection. Foot trimmers and foot baths were used on 87 percent of the operations with HHW. Another California study characterized risk factors in herds with greater than 5 percent incidence compared with herds with less than 5 percent incidence. Herds with muddy corrals were 19 times more likely to have greater than 5 percent incidence compared with herds in a drier environment. Those herds that purchased replacement heifers were 4.7 times

more likely to have an incidence rate of HHW greater than 5 percent compared with herds not purchasing replacements.

TREATMENT - PICK YOUR POISON

The therapeutic goal is to control the deep infection of the skin. Early therapeutic approaches included surgical removal with a multitude of topical salves, creams, solutions, crystals or granules. Compounds ranged from antibiotics like tetracycline and lincomycin, to copper sulfate and iodine crystals, to more caustic substances including muriatic acid and formaldehyde. Electro-cautery and freezing were tried to remove the warts but recurrence was commonplace. Although labor intensive, topical antibiotic treatment under a foot wraps have been shown to provide better than 90 percent recovery rates. The bandage should be removed in 3-5 days. Cows should continue to be monitored since reinfection is common.

Antibacterial agents injected systemically require large doses to control the infection. Treatment with penicillin and ceftiofur at extra-label doses for 3 days has been highly successful but economically unrewarding when many cows in the herd are affected. In two different studies, 72 and 87 percent of cows recovered from HHW when high doses of ceftiofur were administered for three consecutive days. Injectable antibiotic therapy may be useful as an adjunct to topical treatment in selected refractory cases.

CONTROL - MORE FADS THAN FASHION

Topical Sprays

Daily, topical antibiotic or disinfectant sprays on the HHW lesions have been successful in eliminating the infection. To obtain penetration of the antibacterial agent, it is beneficial to remove the mud, manure, and debris from the foot prior to any form of topical therapy. Various solutions have come in and out of fashion. The most common antibiotics include tetracycline and lincomycin, while some producers are spraying formaldehyde or chlorine. Many dairy producers have tried teat dip solutions but that can become quite expensive. Five to 10% formalin solutions sprayed directly on the lesion as the cows come into the parlor have had limited success. Spraying formalin often causes cow discomfort and is a health risk for the milkers plus it creates an undesirable work environment. Chlorine bleach and other caustic substances can also become health risks for those applying the topical spray.

Wisconsin researchers compared oxytetracycline, acidified copper solution, acidified sodium chlorite, and a placebo (tap water) over a 3-week treatment period. The lameness score of cows in each of the three treatment groups (12 cows per group) improved over the 3-week period. The lameness score of the placebo (control) group did not improve. There were no significant differences among the three treatment groups. Concern for violative antibiotic residues associated with topical application of oxytetracycline exist. This study showed non-antibiotic topical treatments may be effective therapy for HHW, without the risks posed by antibiotics. In another study in California, cows were treated with topical Lincomycin/Spectinomycin (LS50) applied once a day for 5 days, followed by a 2-day rest period, followed by a second 5-day treatment period. Lesion scores were lowered significantly by LS50 compared with controls 90 days after treatment started.

Treatment schedules that work on one farm may not be effective on the next. Two of the most effective schedules use tetracycline or lincomycin. Mix one packet of Terramycin 343 (Pfizer) in one gallon of distilled or demineralized water (hard water will cause the tetracycline to precipitate). Alternately, mix one packet of Lincomix soluble powder (Upjohn) in 2 quarts of distilled or demineralized water. Use these solutions as a topical spray at the rate of 10-20 cc per foot. Apply to the heels and between the toes while coating visible lesions. This is an extra label use of these products. Consult your local veterinarian for proper labeling and further instructions. During the first week, treat all feet of all cows once daily for 5 to 7 consecutive days. In subsequent weeks, continue daily topical treatment of all cows with visible lesions only.

Foot baths

Foot baths were originally developed to control foot rot in sheep. Zinc sulfate is a common chemical used for this purpose. When these foot baths are used effectively, sheep are paraded through one at a time. The sheep have little time to defecate in the foot bath and contaminate the solution. Some researchers have questioned the efficacy of foot baths for HHW control because they become manure slurries after multiple cow passages. Foot baths with 5-10 percent copper sulfate or 1-10 gram/liter tetracycline have been moderately successful in controlling the disease. To achieve these concentrations add 5 to 10 pounds of copper sulfate in 8.5 gallons of water or one packet of Terramycin 343 (Pfizer) in 25 gallons of water (1 gram/liter). Foot bath schedules range from daily soaks, to twice weekly, to each month for 3-4 days. It is recommended that the foot bath be placed in the return alleys, not in parlor. Dirt and manure should be washed off of the cow's feet prior to walking through the footbath. The solution in the foot bath should be changed when grossly contaminated or after no more than 150 cows have passed through it.

Dairy producers usually prefer to use foot baths to control HHW because they requires less labor. Assuming labor costs are \$10/hour, we can compare the cost to maintain two 50 gallon foot baths (one for each side of the parlor) to topical spray treatment program on a 150 cow dairy. Each foot bath could be used for two milkings (75 cows each side, twice a day) before refreshing. It would require four packets of Terramycin (at \$12 each) to charge both foot baths for one day. Three consecutive daily foot baths with one hour labor each day would cost \$174 or \$58 per day. Increasing the concentration in the foot bath to 5 grams/liter would increase the cost to \$750 or \$250 per day. The same number of cows could be treated by topical spray at 25 grams/liter tetracycline for \$42 per day (3 hours hired labor/day, \$12 for tetracycline).

VACCINATION - MORE CONTROVERSIAL THAN POLITICS

A California-based company has isolated a bacteria, *Serpens species*, from HHW lesions. Using this bacteria, they have produced a vaccine (more properly called a bacterin) and are marketing this product for the prevention and treatment of HHW. A conditional license was granted by the USDA in March 1998, to distribute this product throughout the United States. In order to obtain the conditional license, the company only had to prove that the product was safe (would not cause undue adverse reactions) and pure (made from a single strain of bacteria). To obtain full licensing, the company will have to prove efficacy (ability to prevent and treat HHW) and potency (a measure of relative strength, does it do what it claims to do when used as directed). Many research laboratories throughout the world that are investigating HHW, but Hygeia Labs is the only lab to have isolated the *Serpins species* bacteria from HHW lesions.

The company has conducted field trials at five commercial dairies in California. Over 3,450 cows were involved in these studies since 1996. In these trials, the *Serpens species* bacterin provided a seven-fold reduction in the incidence of new warts in vaccinates when compared to controls. The company claims the bacterin to be 80 percent effective in the treatment and prevention of HHW. Some field trials have also been performed on Illinois dairy operations with apparent success. While the data from these trials has not received critical review, the clinical impression of the veterinarian performing these trials is that lesion scores improved in both vaccinates and controls in all seven herds. Among vaccinated cattle, there were 50 percent fewer chronic cases.

Researchers at the University of California, Davis performed a randomized field study to determine the efficacy of a *Serpens species* vaccine combined with topical treatment with lincomycin for treatment of HHW. Fifty-nine cows with active, painful HHW were randomly assigned to control (29) or vaccinate (30) groups on day 1. Cows were enrolled in the study based on the presence of a visible lesions on one or both rear heels and a pain response. Vaccinate cows were injected on days 1, 14, and 43. Cows were evaluated for lesion score on day 1, 30, 50, 70, and 110. All cows were treated with a lincomycin foot bandage on day 30. Lesions improved on all cows during the course of the trial. Lesion score, pain response, color score, and clinical cure were similar for all cows on day 1 and 30, improved on days 50 and 70, and showed evidence of recurrence by day 110. There were no significant differences between control and vaccinate cows at any of the evaluation dates.

The vaccination protocol for to achieve prevention of HHW with the *Serpens species* bacterin calls for subcutaneous injection of 5 cc on day 0, 30 and 60. A booster dose four months after the third shot in the series and additional boosters every 4-6 months are required to maintain protection. To use the bacterin for treatment of HHW, the directions call for the same injection protocol in conjunction with other appropriate control procedures such as foot wraps, topical sprays and foot baths. The company claims that healing normally occurs within 30-45 days. From discussions with veterinarians using the vaccine, it appears that booster doses may be required in some herds as often as every three months.

The retail price of the *Serpens species* bacterin has been between \$3.50-\$4.00 per dose. Available data shows 0 to 80 percent efficacy. To determine if the vaccine is economically justified, dairy producers will have to calculate the total cost of current control measures and compare with the cost of vaccination (including labor). Keep in mind that the vaccine is not 100 percent effective and some cows will most likely still need treated. Increased milk production is likely under any effective control program and should be considered under each scenario. A safe, efficacious and economical vaccine is desirable for the dairy industry to bring this disease under control. More research is needed to determine the exact causative agents and how best to control them.