

Survey Results of the Occurrence of a Seasonal Teat Lesion Syndrome in Dairy Cows in Wisconsin

**Karen A. Moriello, DVM; Kay Nelson, BS, DVM;
Chester Thomas, DVM, PhD and Geoffery Letchworth, DVM, PhD**

Abstract

Seventy-two dairy practitioners in the state of Wisconsin participated in a telephone survey to determine the prevalence of a seasonal vesicular skin disease of dairy cows. Results of the survey indicated that there was widespread recognition of a skin disease that appears clinically similar to bovine herpes mammillitis but with the following differences: sporadic occurrence, non-infectious pattern of occurrence, almost exclusive predilection for first-calf heifers with severe udder edema, and dry gangrene and sloughing of teats.

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Lesions of the skin on teats of dairy cows result from a variety of etiologies, including trauma, infectious agents, environmental factors and husbandry practices. Regardless of etiology, teat lesions become important because of the economic impact they have on the dairy enterprise. Affected animals with no impairment of mammary function often become difficult to milk and milking efficiency declines. In addition, the skin lesions are at risk of infection with other agents which may then exacerbate the severity of the lesions or lead to mastitis. Virus, bacteria and fungi have been identified as primary infectious agents associated with skin lesion of the bovine teat. Vesicular lesions of the teats are particularly worrisome because they are a hallmark of viral agents, and may require differential diagnosis with exotic vesicular diseases. In North America, the most common viral diseases which result in vesicles or erosions of the bovine teat include pseudocowpox (PCP), bovine herpes mammillitis (BHM), and vesicular stomatitis (VS).¹ The range of signs associated with each of these agents overlap and therefore individual cases may not be readily diagnosed. However, in most cases, differences in the lesions and epidemiology allow diagnosis in groups of affected animals.

During a five year (1984-1988) period, faculty at the School of Veterinary Medicine, University of Wisconsin-Madison have been aware of anecdotal reports of an unusual vesicular disease on the teats of cows that

does not resemble other reported vesicular diseases of the teat.¹¹ This disease has been described by local veterinarians and producers as a seasonal syndrome, occurring more commonly in cold, wet weather. In addition, this syndrome appeared to be more common in first-calf heifers. Early lesions are described as a patch of bluish discoloration on the teat that rapidly progresses to a large flaccid vesicle containing abundant clear fluid similar to what is observed in BHM. Vesicles rupture and the resulting ulcer is slow to heal and, in the majority of cases, the teat is reported to become very dry, hard and leathery in appearance. Veterinarians and dairy producers commonly describe this stage as resembling dry gangrene. In the vast majority of cases, the teat sloughs resulting in the cow being culled from the herd.

Samples from approximately seventeen cows with this syndrome have been examined by one of the authors (GL). To date, routine diagnostics for isolation of viruses, bacteria and fungi have not elucidated a cause. Histologic examination of tissue showed extensive dermal vasculitis, dermal necrosis, or necrosis limited to rete pegs, but no etiologic agents.

The purposes of the study reported here were to survey dairy practitioners in the state of Wisconsin to determine 1) how widely recognized the described syndrome is, and 2) if this syndrome is of significant economic impact to warrant further investigation.

Survey Methods

Questionnaire Form:

The questionnaire form was designed so that the survey could be conducted by telephone interview. The content of the survey was determined after consultation with an epidemiologist (Thomas), dermatologist (Moriello), virologist (Letchworth), pathologist (Dubielzig), immunologist (Schultz) and several veterinarians from south-central Wisconsin familiar with this syndrome. The questionnaire was written with the assistance of the State of Wisconsin Survey Resource Laboratory. The questionnaire was modified after pilot trial and a copy is available upon request.

The survey consisted of 52 questions and was

From the Department of Medical Sciences (Moriello), Pathobiology (Thomas), School of Veterinary Medicine and Department of Veterinary Science (Letchworth), University of Wisconsin-Madison, Madison, WI 53706

¹¹ *Letchworth, G.: Unpublished data, Department of Veterinary Science, University of Wisconsin-Madison, 1984-1988*

divided into several sections. The survey was designed so that the questions eventually focused on a comparison of BHM and the syndrome in question, referred to as Dry Gangrene (DG). This comparison was chosen because BHM is a common vesicular viral disease with which dairy practitioners are familiar. Section 1 consisted of background questions designed to gain information on the type of practice of the respondent and the number of dairy herds in the practice. The respondent was asked to indicate what proportion of the dairy herds he/she visited and to detail the herds *e.g.*, size, number of cows lactating. Section 2 was designed to provide information on the number and type of teat lesions observed. The respondent was asked to rank the following by frequency of occurrence: frostbite, trauma, and management. The veterinarian was asked if they observed viral skin lesions on the teat and udder and, if so, how commonly did they occur in relation to the above diseases. Section 3 of the survey consisted of questions on viral lesions of the teat or udder. The veterinarian was asked if he/she had observed lesions compatible with BHM, pseudocowpox, or other suspect viral diseases. Finally, the respondent was asked if he/she had observed cows with what grossly may be described as dry gangrene, and if so what was the cause. At this point the interviewer explained that we were interested in comparing BHM to a second disease category labelled DRY GANGRENE (DG). This DG category consisted of a disease or diseases which resulted in severe damage to the teat and, eventually what would be described as dry gangrene (hard, leathery) of the teat. In Sections 4-6, the respondent was asked questions detailing the location and appearance of BHM and DG lesions. The veterinarian was asked questions about inter (Section 7) and intra (Section 8) herd patterns of disease outbreaks of BHM, pseudocowpox and DG including age of animals affected, stage of lactation of affected animals, seasonality of occurrence, and intervals between occurrences. The veterinarian was asked to estimate the economic impact of these two diseases on the herds in question. In Section 9, the interviewer asked the practitioner what laboratory services he/she used to definitively diagnose BHM and DG. Finally, the practitioner was asked to indicate what they believed to be the causative agent/factor was in the DG category and what treatments were useful.

Survey Sample:

The sampling frame consisted of Wisconsin veterinarians who were members of the Wisconsin Veterinary Medical Association (WVMA) in 1987 and who were also members of the American Association of Bovine Practitioners. The sample frame was divided into strata corresponding to the nine membership districts of the WVMA. A total of seventy-five veterinarians were chosen by random selection within each membership district, the

^b*Paradox, Borland International, Scotts Valley, CA*

sample fraction from each stratum was proportional to size. An alternative list was also generated. Initially, these veterinarians were mailed a letter explaining that they had been selected to participate in this study and explaining the nature and purpose of the project. The interviewer then contacted the veterinarian to set up an appointment to conduct the telephone survey. Statistical analyses were performed using a commercial software program.^b

Survey Results

Demographics

Seventy-two questionnaires were completed by dairy practitioners from within the state of Wisconsin. These participants were from the primary list. Of the practices surveyed, the mean number of practitioners per practice was 4 with a range of 1 to 9. The mean number of practitioners involved with dairy practice was 4 with a range of 1 to 8.

Responding veterinarians had a mean duration of 15 years of practice experience since graduation from veterinary school with a range of 1 to 42 years. The respondents reported seeing a mean proportion of 33% of the dairy case load in their practice with a range of 10% to 100% (\pm SD .29). The mean number of dairy clients within the practices was 281 with a range of 20 to 700 (\pm SD 171). Respondents reported seeing a mean of 88 dairy clients per month. The mean number of lactating dairy cows per farm was reported to be 58 with a range of 3 to 800 (\pm SD 11.86).² These data correlate well with Wisconsin herd averages.

Diseases of the Teats and Udder

Respondents reported that skin lesions on the teats and udders of cows were most commonly encountered in the fall and winter months. Respondents reported an average of three to four farm visits per month during warm weather and six to eight farm visits during cold weather for skin problems of the teat and udder. Trauma and poor management practices were reported as the most common causes of teat lesions. Viral warts and frostbite were seen occasionally by all respondents. Ninety-seven percent of veterinarians reported observing viral skin lesions other than warts on the skin of the teat or udder. Respondents reported that viral lesions were the least common cause of lesions on the teat or udder.

Sixty-four percent of veterinarians reported observing pseudocowpox (PCP) or BHM in cows in their practice area. Fifteen percent of respondents were unsure if they saw either of these diseases. Of the subgroup of respondents observing both PCP and BHM, 48% reported BHM as more common and 31% reported PCP as more common in their practice. Seventy-three per-

cent of practitioners who observed both BHM and PCP reported BHM lesions as more severe.

Ninety-one percent of respondents reported observing clinical lesions consistent with dry gangrene of the teat. A wide range of potential causes was reported including BHM virus, bacterial infections, frostbite, trauma, udder edema, circulatory problems and idiopathic.

Comparison of BHM and DG

Respondents were asked to compare BHM to a clinical syndrome appearing as dry gangrene, hereafter referred to as DG. Respondents reported observing both diseases mainly on the skin of the teat and rarely on the teat orifice alone. The udder, although sometimes involved in both diseases, was most often reported as only occasionally involved with DG. The escutcheon was involved more commonly with BHM, than with DG. The skin of the vulva was only rarely involved with either disease. Other systemic clinical signs were reported to rarely occur with either disease, however, fever, lameness, and swollen joints were most commonly observed.

Eighty percent of respondents reported observing the early lesions of BHM and 81% reported observing the early lesions of DG. Vesicles were reported as the most commonly observed primary lesions for both diseases; pustules and papules were only rarely observed. Vesicles were reported in 56% of cases of BHM and 51% of cases of DG.

Inter and Intra Herd Patterns of Disease

Respondents reported that cases of PCP and BHM were restricted to certain dairy farmers, in contrast to DG which was sporadic in occurrence. Veterinarians reported a mean of 5 clinical diagnoses in the last year for both PCP and BHM and a mean of 8.5 clinical diagnoses in the last year for DG.

Both BHM and DG were reported to have a seasonal occurrence with most cases occurring in the winter and early spring. However, 50% of respondents reported observing both diseases in late spring and summer. Of the 91% of practitioners observing dry gangrenous lesions (DG), 98% reported that the disease occurred almost exclusively in first calf heifers. Only 58% of respondents observing BHM reported a predilection for first calf heifers; most respondents indicated that BHM was more common in mature cows. Neither BHM nor DG was observed to occur in calves, bulls, or beef cows, however, the number of beef cows and bulls were low in the population. Lesions consistent BHM were variable in the timing of their appearance occurring anywhere from freshening to 300 days into lactation. Surprisingly, 100% of practitioners observing DG reported this disease to occur almost exclusively at freshening. For both BHM and DG, affected cows were bred and raised on the

farm where the case occurred. Respondents estimated a mean of 9% of susceptible cows were affected during an outbreak of BHM and 3% for DG. Forty-seven respondents reported observing clustering of cases of BHM and only 13 respondents reported observing clustering of cases of DG.

Economic Impact

Respondents estimated that 80% of cows affected with either BHM or DG suffered a decrease in production. Losses were estimated to be less severe for BHM than for DG; respondents estimated 15% of cows affected with BHM and 50% of cows affected with DG were culled. Chronic secondary mastitis and difficulty in milking were cited as the most common reasons for culling cows with BHM, whereas sloughing of the teat and loss of the quarter were the most common reasons for culling cows with DG.

Laboratory Diagnostics

A total of 69 paired serum specimens were submitted by 21 veterinarians to the Wisconsin State Diagnostic Laboratory for confirmation of BHM. Seroconversion was reported for thirteen samples (19%). Seven veterinarians observing clinical cases of DG reported submitting tissue, including vesicular fluid samples, to the Wisconsin State Diagnostic Laboratory for bacterial, fungal, and virus isolation. In all cases, an etiological agent was not identified. Fifty-eight percent of respondents felt that laboratory diagnostics were not very useful in the diagnosis or management of teat lesions; rarely did laboratory diagnostics influence clinical treatment or outcome.

Contributing Factors

Most practitioners believed that other factors contributed to the prevalence of BHM and DG. In the order of greatest impact these included: management practices, housing environment, cold, stress, nutrition and udder edema.

Discussion

The results of this survey supported clinical impressions that teat lesions are observed year-round, tend to be more common in the fall and winter, and that veterinarians associate trauma and poor management practices with the occurrence of lesions. Viral lesions of the teat and udder were least commonly observed by practitioners, however the most commonly observed viral diseases were papillomatosis (warts), pseudocowpox, and bovine herpes mammillitis.

Sixty-five (91%) of study participants were familiar with a clinical syndrome which caused dry leathery hard teats that sloughed. Based upon information from

the respondents, this syndrome was widespread in the state of Wisconsin and was relatively common with a mean of 8.5 observed cases per year per respondent. A wide variety of potential causes were named including: BHM, bacterial infections, frostbite, trauma, udder edema and circulatory problems.

Eighty percent of the respondents reported observing early lesions of this syndrome and the clinical progression (Fig. 1-3). Early lesions were reported to begin as a small patch of bluish discoloration on the skin of the teat. This rapidly progresses to a large, flaccid vesicle containing abundant clear fluid. The vesicle ruptures and the resultant ulcer fails to heal and, in the process of doing so, an annular ring of inflammation and erosion develops. This eventually encircles the entire teat. Over days to weeks the affected teat gradually becomes dry and hard. The skin blackens and eventually the teat sloughs. In general, lesions were restricted to one teat.

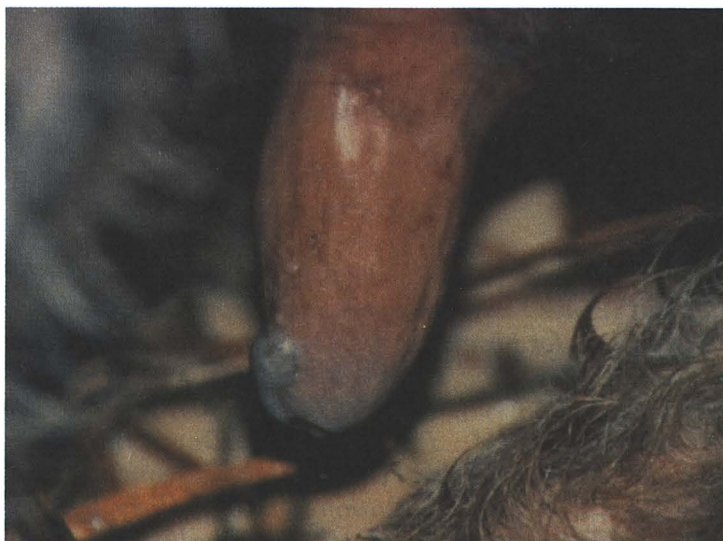


Figure 1. Early lesion on the distal teat of a heifer with the Dry Gangrene syndrome. Note the large flaccid vesicle and bluish discoloration of the teat skin.

Numerous other interesting observations on the occurrence of this disease were reported. This syndrome was believed to be most common in the winter and early spring, however over 50% of respondents reported observing cases in late spring and summer. Cases of this syndrome did not tend to cluster on particular farms. This syndrome was reported to be almost exclusively limited to first calf heifers with lesions developing at calving. Respondents indicated that heifers with severe udder edema appeared to be predisposed. Signs of system illness were occasionally observed and included: fever, lameness, and swollen joints. Rarely, the skin of the udder, vulva, and escutcheon was involved. This syndrome was never observed in calves, bulls, or beef cows.

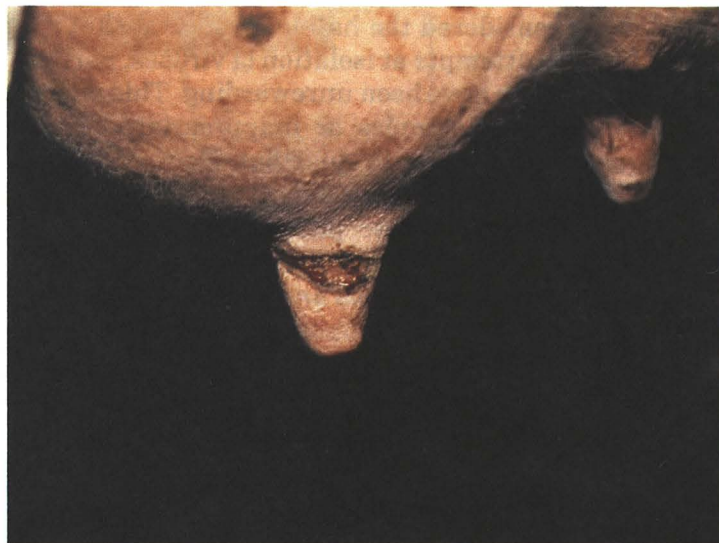


Figure 2. Non-healing ulcer progressing to an annular ring of inflammation. This is the same cow as in Figure 1.



Figure 3. Sloughed teat from cow in Figure 1.

An etiologic agent or definitive cause was not identified in the cases where the practitioner pursued diagnostic testing.

From the limited diagnostic information obtained by the authors and the information provided by respondents, it is tempting to speculate on potential etiologies.

Vesicles are considered the hallmark of viral skin diseases. Limited attempts at isolation of viruses, particularly herpesvirus, have been unrewarding. This may be due to inadequate samples or inappropriate culture techniques for the virus in question. However, many samples received extra-ordinary attention and were cultured in cells highly susceptible to bovine herpesviruses 1, 2 and 4, each of which is likely to be present in high concentrations in lesions and vesicular fluid. Preliminary findings did not support a bacterial or fungal etiology. Tissue samples were processed for aerobic and in one case, anaerobic cultures. Additionally, evidence of a primary bacterial, viral, or fungal etiology was not found on histologic or electron microscopic examination of tissue specimens. Suggested etiologies, while lacking any evidence, include a *Staphylococcus spp.* toxin from an infection elsewhere in the body. It would seem reasonable to assume that evidence of such an infection would be detectable; but animals were generally healthy otherwise. Another potential etiology is frostbite which had been suggested by numerous study participants as a potential cause. Some cases of dry gangrene of the teat may be caused by frostbite, however it is difficult to attribute all cases to frostbite since at least 50% of respondents observed cases in the spring and summer. The strongest association identified was that heifers with severe udder edema appear predisposed. It is possible that the severe udder edema is somehow involved in the pathogenesis of this syndrome. It is very likely that the cause may be multifactorial.

The initial decision to collect information on this syndrome via a survey was based on economic constraints and the anecdotal nature of the syndrome. A telephone survey was a significantly less costly method of collecting information from broad geographic areas compared to site visits. Additionally, before pursuing a costly investigation into the pathogenesis of this syndrome we wanted some evidence that the disease was present in other parts of the state.

There are limitations to the refinement of data collectable by telephone survey. This survey sought the expert opinion of practicing veterinarians, and sought, where possible, to quantitate by category or degree their responses. Agreement on criteria used for categorization or for that matter the accuracy of diagnosis of PCP or BHM between the individual respondents could not be independently verified. Thus, while the authors believe that the results presented are an accurate description of the collective opinion and clinical observations of those surveyed, caution to avoid over interpretation of these results is required.

Finally, this survey was conducted by personal interview. Although every effort was made by the interviewer not to bias the respondent, it is possible that bias is present in the answers.

In summary, this information collected in this descriptive survey supports anecdotal reports of a vesicular disease affecting the teats of dairy cows that results in sloughing. Preliminary information suggests that there is a predilection for first calf heifers with severe udder edema. The syndrome occurs year-round, however it is most frequently observed in the winter and early spring. The occurrence is sporadic and a non-infectious pattern of occurrence was manifested.

This syndrome has a major economic impact due to problems with secondary mastitis and culling. Therefore, in the authors' opinion this syndrome warrants further investigation. The question as to whether or not an infectious agent is indeed involved in the pathogenesis must be answered. Additionally, the association of severe udder edema with the development of lesions must be investigated.

Acknowledgements

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Reprint requests: Dr. K. Moriello, School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI 53706.

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If you don't want pinkeye



Abstracts:

Relationship between negative skin test with Johnin after vaccination and post mortem findings

G.H. Wentink, J.H. Bongers, J.H. Vos, A.A.P.A. Zeeuwen

Veterinary Record (1993) **132**, 38-39

One hundred and seventy-six cattle, vaccinated against paratuberculosis in the first month of life with a whole-cell inactivated vaccine, containing *Mycobacterium paratuberculosis* suspended in a water/oil emulsion, were tested with intradermal Johnin between the ages of five and 14 months. Negative results in the skin test occurred more frequently in animals found positive in post mortem examinations ($P=0.008$) using histological, microscopical and cultural techniques.

Lyme Disease in cattle and horses

J.L. Parker, and K.K. White

Cornell Veterinarian (1992) **82**, 253

This paper reviews 118 papers on Lyme disease, with a particular emphasis on the clinical signs of the disease in cattle and horses. The diagnosis of the disease relies partially on these clinical signs, but a definitive diagnosis requires the causative spirochaete *Borrelia burgdorferi* to be identified. However, the spirochaete is difficult to culture and confirmation of the infection relies more often on serological testing, although the diagnosis can be confused by the occurrence of subclinical seropositive animals. The paper also proposes an approach to the treatment of cattle and horses with Lyme disease.