TROUBLE SHOOTING HERDS WITH POOR TEAT CONDITION

David A. Reid[1] and Andrew P. Johnson[2]
[1] Rocky Ridge Veterinary Service, Hazel Green, Wisconsin
[2] Total Herd Management Services, Clintonville, Wisconsin

Veterinarians and milk quality consultants are frequently asked to investigate situations concerning poor teat skin condition or teat end problems end problems. A variety of agents and mechanisms can cause changes in teat skin condition and teat end appearance. These can be classified as:

- Milking machine effects
- Environmental effects
- Infectious agents

When teat end conditions begin to deteriorate, dairy management typically institutes change. Most commonly, the first changes are a change in post-milking teat dips and a switch to a different style of inflation. Unfortunately, these responses often have minimal or no effect on the general teat condition in the herd. One reason for this lack of response is that in many herds the only teats examined are cows in the treatment pen, because management personnel have treatment responsibilities on the dairy.

The Teat Club International group presented several excellent papers at last year's National Mastitis Council's meeting. One paper discussed statistical analysis and set guidelines for answering the question of how many cows need to be examined in order to determine if teat condition and teat scores are issues on the dairy. An example was a 1500 cow dairy that called in January of 2001, because of teat condition issues. The herdsperson in this dairy was convinced that the herd had significant teat condition issues because most cows in the treatment pen had teat end scores of 3 or more. The local veterinarian was supplied with information concerning teat scoring as developed through the Teat Club International and 346 random cows were scored from each group present on the dairy. The teat scoring showed a 90.6% of these scored cows had teat scores of one to two. However, the score in the treatment pen was 95% scored three or higher. This herd did not have a significant issue with teat end condition.

Most herds typically have between five to fifteen percent of the cows with pointed or round ended teats. When compared to flat–ended teats, these teats end shapes will show more hyperkeratosis lesions. These teats will have these lesions irregardless of how well the milking procedures are performed, how well the milking machine is maintained or how well the milking machine is set and designed to remove units in an appropriate manner. Additionally, in the upper Midwest teat end scores will increase during colder months of the year. There is typically a sharp increase in teat condition and teat end scores two to three weeks after the first hard frost and the onset of colder weather.

The best way to approach problem teat end herds is to obtain a thorough history from herd management personnel. Determining the products used for pre-dipping and post-dipping is also

important. Over the last several years there has been a trend by teat dip manufacturer's to develop products specifically designed to condition teats and/or prevent freezing of teats during colder months of the year. These products can be effective if their use begins prior to the first onset of cold weather and teat condition is relatively good in the herd. Beginning use of these products after there is extensive hyperkeratosis on teats may help teat end condition, but the authors have also seen situations where there may be significant increases in somatic cell count. These products typically contain organic acids and do not appear to control many of the environmental and contagious bacteria as well as quality iodine and chlorhexidine teat dips.

It is important to evaluate teat end condition scores in pens that management feels has problems. Most experienced veterinarians can recognize some of the characteristic lesions that are present with the common infectious agents. The most common infectious agent experienced in the field is herpes virus. These lesions are significantly worse in heifers and can involve the sides of the teats but may only involve the actual teat end opening. These animals typically are difficult to milk, are resistant to being touched and often have an increased level of mastitis because of the sensitivity of their teats.

The two main teat conditions typically seen are poor teat skin condition resulting in chapping and cracking the teat skin and hyperkeratosis. In addition to the previously discussed relationship with teat shape, the degree of hyperkeratosis on teat ends is directly correlated with milking duration. The main objective when performing evaluations in problem herds is to evaluate both the milking management procedures and the milking machine performance. Dairymen usually look first at milking machine performance when in reality the udder preparation and milking procedures may be a key factor to the development of poor teat skin and teat end condition scores. The problem can be with low flow and relatively high vacuum either when the machine is first attached, after the cow has finished milking, or at any time during the milking. Teat Club International has reported the primary correlation to hyperkeratosis is the length of time cows have low milk flow, defined as less than one kilogram per minute milk flow rate.

Conventional wisdom states that when teat end condition deteriorates, it must be related to the vacuum level and therefore the vacuum level is lowered. Lowering system vacuum lowers the vacuum under peak milk flow conditions and extends the milking, leading to a negative effect on teat end scores.

A complete milk system evaluation according to the protocol for airflow evaluation published by the National Mastitis Council is the best way to evaluate the milking equipment on a problem dairy. Several areas of equipment analysis are significant to overall teat end health. The NMC recommendations and the ISO standards call for a minimum of 150 milliseconds of D-phase and/or 15% of the pulsation cycle with a minimum of 150 milliseconds of D-phase. All major brands of pulsators sold at the typically installed ratios in North America will have over 200 milliseconds of D-phase when graphed on the cow during milking or with teat cup plugs installed in units and vacuum turned on to the units. Many technicians testing milking equipment in the field fail to realize there is a significant difference in the D-phase depending on whether pulsators are graphed actually milking a cow or plugged off the cow compared to simply graphing pulsators hanging idle in the parlor. This difference is somewhat dependent on the pulsator

brand. However, as a general rule there is between a 25 to 35 millisecond difference in most of the common pulsators if they are graphed on the cow actually milking or with teat cup plugs compared to hanging off the side of the cow. As parlors become larger, many technicians are not graphing while units are attached to the cow, but simply graphing when units are hanging in the parlor. If they understand this difference, there is not a problem graphing pulsators this way. Pulsators on many farms are "passed" when D-phases are significantly reduced compared to other pulsators in the barn. Field experience indicates that when D-phases fall below 200 milliseconds there is likely to be some increase in teat end irritation resulting in hyperkeratosis.

Milking duration is influenced by take off settings. Most factory default settings for take offs result in cows being over-milked. Reductions in average milking durations between one to one and one-half minutes can commonly be achieved on most dairies by changing take off settings from factory set points. Reducing milking duration will improve teat skin and teat end condition.

The NMC protocol states that claw vacuums should be maintained between 10.5" to 12.5" Hg under peak milk flow conditions. Peak milk flow claw vacuums between 11.5 to 12.5" will decrease milking duration and increase flow per minute of unit attachment. When higher vacuum levels are set for a dairy, udder preparation must allow adequate oxytocin letdown and units must be removed when milk flow falls to a low level.

Over-milking is often the result of either inadequate udder preparation or poor timing of unit attachment after adequate udder preparation. One of the goals to reducing the new infection rate is to attach units to clean, dry, stimulated teats at every milking. Oxytocin letdown is important. This is especially true in larger dairies where on many farms there is not adequate contact time to stimulate oxytocin letdown prior to units being attached. This is easily observed on farms by watching milk flow after units are attached to cows. Depending on the production level of the cow there will be between 2 to 5 pounds of milk produced from the teat and gland cisterns of a high producing cow. Milk flow will be visible as the milker is attaching individual teat cups to the cow. However, often flow ceases for a significant period after the initial cisternal dump of milk. This is called over-milking at the front end of milking. Even if take off settings have been modified, when poor udder preparation is practiced, there will still be significant periods of low milk flow below the threshold level that has been characterized as creating teat end hyperkeratosis. Another problem commonly seen on dairies is that udder preparation is adequate to stimulate oxytocin letdown but there is a long lag-time between when the teats are first touched until the units are attached to cows. Lag times over two and one half minutes will create a significant period of very low flow toward the end of milking. Use of the Lactocorder or analysis of individual cow production from milk meters over time clearly shows the effects of delayed unit attachment to well stimulated cows.

Time considerations are important in udder preparation. It requires a minimum of 10 to 12 seconds of actual contact time on the teats to stimulate adequate oxytocin letdown. Teats will become plump when milk letdown occurs approximately another 25 to 30 seconds after the conclusion of the manual stimulation. Unit attachment should be between 45 to 75 seconds after the teats are first touched during the udder preparation process. Frequent observation in the barn is necessary to ensure there are minimal cows with no milk flow at the front end of milking.

There are definite differences in teat dips and their ability to either heal teats that are chapped and cracked or to create issues of teats cracking and chapping. Many dairies with a hyperkeratosis problem will benefit by modifying the udder preparation procedures. Cloth towels used during udder prep in many cases are not used directly against the teat end in an aggressive manner. Simply changing the procedure in the parlor to making one circular motion on each teat followed by flipping the towel and aggressively pinching the teat end will remove some of the keratin present on the teat ends. This is especially true if teat dips are selected that soften keratin. Typically keratin hanging off teat ends is very hard and dense. One class of teat dips have been very effective in softening keratin are the chlorus dioxide dips. These are currently available in the U.S. from several manufacturers. In the authors experience, these dips appear to do a better job than most teat dips in softening the keratin on teat ends. This allows the keratin to be removed with aggressive action during udder preparation procedures.

The key mechanical factors needed to improve teat condition and reduce teat end lesions are adequate oxytocin let down, adjustment of take off settings and vacuum levels, and maintaining pulsation D-phase above 200 milliseconds. It is important to realize that even when the udder preparation and mechanical settings are optimized, a small percentage of animals will still have hyperkeratosis lesions because of teat shape and length.