

# The effects of a new silicone liner on teat end hyperkeratosis

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## Abstract

In the past, high milking vacuum has been identified as a contributing factor to teat end hyperkeratosis. A new silicone liner design utilizing a three-sided Tri-Circle® barrel may hold benefits that counteract or negate the problems associated with high vacuum. A comprehensive study of teat ends at 26 working dairy farms across Pennsylvania indicates that the combination of barrel design and a new high grade silicone blend may ensure teat end health, regardless of vacuum level.

## Introduction

Previous research has indicated that high vacuum is a contributing factor to hyperkeratosis (Bramley et al., 1992). Scoring systems have been developed to quantify the severity of this condition (Mein et al., 2001). Recently, a liner with a unique Tri-Circle barrel shape has been developed to minimize the effects of using a higher milking vacuum. The new barrel design centers the teat during milking while distributing pressure evenly across the surface of the teat. The liner is made from 3-A approved silicone material, and is compounded for a lower Shore A durometer designed for cow comfort. The silicone used in the liner resists chemical and physical degradation, providing high milking performance through a useful life of 3,000 milkings (Shin et al., 2005).

## Objective

The objective of this study was to review real time data from working dairy farms to compare the effects of a new silicone liner design on teat end hyperkeratosis. Teat scoring data from 26 dairies in the eastern United States was used to compare teat end condition prior and following liner installation.

## Material and Methods

Between February 2006 and September 2006 liners were installed on 22 dairy farms in Pennsylvania totaling approximately 7,600 cows with more than 50% of the cows being randomly scored. The cows on these dairies were scored prior to installation of the new liner and 4-6 weeks after installation and some were scored in another 4-6 weeks by an independent veterinarian. Three other dairies representing 2100 cows were scored before the installation of liners and 4-6 weeks after. The installation dates for these was between February 2006 and July 2006. Sixty percent (60%) of the cows were randomly scored at these locations.

## Analysis

The scoring system used on the 22 Pennsylvania dairies was developed by "Teat Club International" which uses a four point scale (1 – 4) to determine the degree of hyperkeratosis (Mein et al., 2001). The scoring system used for the three additional dairies is slightly modified from TCI's system and uses a five point scale (0 – 4). Scoring results were analyzed as first score (prior to new liner install) and last score (2nd or 3rd score on dairy). The scores were compared by the percentage of teats scoring  $\leq 2$ , 3 and 4.

## Results

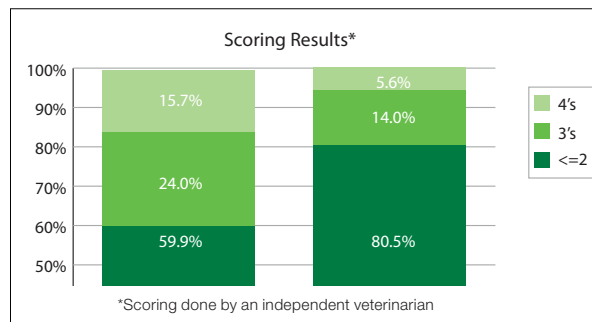
The data collected in Pennsylvania shows a distinctive trend of improvement with hyperkeratosis at the teat end. As shown in figure 1, the percentage of teats scoring at a 1 or 2 increased by 20.6%. The percentage of 3's dropped from 24.0% to 14.0%, and the percentage of 4's dropped from 15.7% to 5.6%. The data displayed in figure 2 also shows distinct improvement at the teat end. The percent of teats scoring 0 to 2 increased by 22.4% from 61.9% to 84.3%. The percent of 3's decreased from 21.5% to 13.4% and the percentage of 4's decreased from 16.6% to 2.3%.

## Discussion

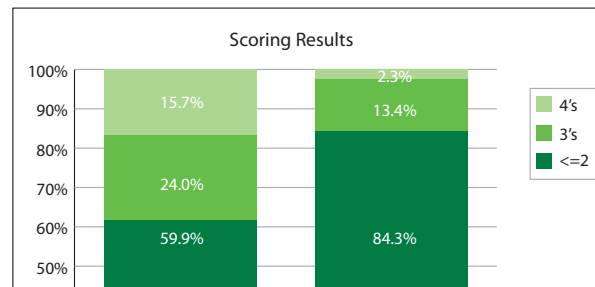
The silicone compound used is different than compound used for organic rubber liners in that it resists both chemical and physical degradation (Shin et al., 2005). It differs from other silicone liners by its tear resistance properties and ability to provide consistently high milking performance. The barrel is designed to minimize the effects of high vacuum at the teat to provide high milking performance.

The liner has a high touch point pressure difference (TPPD) (Nordegren, 1980) which allows it to be used at a higher vacuum. The liner absorbs excess pressure at the teat by distributing it throughout the walls of the barrel during the rest phase of milking. These attributes are important in the liners ability to sustain performance while reducing teat end irritation which leads to hyperkeratosis. In order to receive the full benefits of the liner, the system needs to be set with the correct pulsator ratio, pulsator rate, milking vacuum, and have minimal vacuum drop at the claw.

**Table 1: Teat Scoring - Pennsylvania**



**Table 2: Teat Scoring - Lauren Agrisystem**



## References

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