

# The effect of liner barrel shape on teat end condition

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## Abstract

Many factors influence teat end condition, including weather, genetics, preparation procedures, system settings and teat dips. Liner choice also affects teat end condition since these milking components come into constant, direct contact with the teat ends. The collapse of the milking liner on the teat ends directly correlates with teat end health, with the shape of the liner barrel playing an integral role in how the liner collapses around the teat end. The aim of this study was to observe teat end condition as a factor of barrel shape of the most common liner barrel shapes. Observations were made regarding round, triangle, square and a new Tri-Circle® barrel shape. Teat end scores were compared for 278 dairies across the United States. Dairies that used liners with multi-sided barrels consistently had better teat end health, indicating that multi-sided barrels are not only effective at keeping teat ends healthy, but can also help improve poor teat ends.

## Introduction

Teat end condition (TEC) can be influenced by many factors present in a cow's environment. Weather, genetics, preparation procedures, system settings, and teat dips have been shown to have significant effects on TEC. The milking liner is another variable known to have an effect on TEC. Basic differentiations in liner designs can be made by characterizing the shape of the barrel. For the purpose of this study, liners were classified by the shape of their barrels: round, triangle, square, and Tri-Circle. Each of these shapes can be defined in their open positions as: round – a circular barrel wall with no interruptions, triangle – a three-sided barrel with no interruptions, square – a four-sided barrel with no interruptions, and Tri-Circle – a three-sided barrel with three interruptions.

## Objective

The objective of this study was to compare a large collection of teat condition scores (TCS) characterized by the barrel shape of the liner in use when teats were scored.

## Material and Methods

TCS collected from the National Teat Health Database were used in the analysis. In order for scores to be included in this study, certain criteria had to be met: a minimum of 20% of the herd or 80 cows (if herd size was less than 400) had to be scored, the barrel shape of the liner currently in use had to be recorded, and scoring had to be performed by an individual who passed a qualifying exam. There were 278 dairies that met the requirements in the database. On average, 40% of the milking cows on each dairy were randomly scored. If a dairy had a score entered while using two different barrel shapes, the most recent data for each barrel shape was used.



## Analysis

All four teats of the cows were scored using a system developed by Teat Club International (no ring, smooth or slightly rough ring, rough, very rough) (3). In this study TEC was scored using a numerical system from 1 to 4 (1 = no ring, 4 = very rough ring).

## Results

The results of the study can be seen in Figures 1 and 2. The graph shows the percentage of teats scored at a certain level based on the barrel shape of the liner in use when the TCS were collected. A comparison between Tri-Circle and round (best and worst performers) shows a 30% difference in teats scored  $\leq 2$  and a 20% difference the teats scored 3's. A noticeable difference can also be observed in the number of teats scored as 4's where the Tri-Circle barrel has at least three times less than the other barrel shapes.

## Discussion

The influence of liner barrel shape is evident from the data presented in Figure 1. One conclusion that can be made is that liners with multi-sided barrels had considerably better TCS than liners with round barrels. An obvious difference can be seen by looking at scores from round barrel liners and comparing them to the triangle, square, and Tri-Circle barrel shapes. The importance of this correlation has been shown through research that indicates cows with rough, calloused teat ends are at increased risk of clinical mastitis than cows with smooth teat ends.

Field observations would also be in agreement with these findings. The difference in TCS between barrel shapes should encourage someone looking to improve teat ends to use a liner with a multi-sided barrel.

Figure 1: Teat scores by liner barrel shape



Figure 2: Additional information on herds milked with each barrel shape

Barrel Shape	# of Dairies	Avg. Herd Size	Milking Frequency		Avg. System Vacuum (inHG)
			2X	3X	
Round	193	580	86	106	13.3
Triangle	35	728	12	23	13.1
Square	18	477	5	13	13.3
Tri-Circle	194	652	68	124	14.2

## References

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