

Influence of cow characteristics and premilking udder preparation on milk flow and teat condition

Successful parlor management is reflected in high parlor efficiency, excellent udder health, premium quality milk, and milking personnel working to harvest milk from cows as gently, completely, and promptly as possible. Achieving optimal parlor performance requires management and monitoring of parlor maintenance, cow performance, and implementation of sound milking routine by well-trained milking personnel. Data from electronic milk meters that measure milk flow parameters such as two minute milk (lb), unit on time (sec), time in low flow (sec), and bimodality of milk let-down are valuable measures to monitor parlor performance and milking routine.

Milking machine induced short-term changes in teat condition such as color changes (i.e. red, blue), swelling near the teat base, and firmness at the teat-end assessed within the first minute after unit detachment is a practical tool to evaluate parlor performance and milking routine.

Two minute milk is defined as the amount of milk (lb) harvested within the first two minutes after attachment of the milking unit and is considered a good indicator for proper milking routine, i.e. premilking udder preparation. Unit on time is defined as the milking duration from unit attachment until initiation of unit take off. Time in low flow represents the seconds spent below 2.2 lb per minute flow rate on an individual cow milking. Poor premilking udder preparation, milking routine (e.g. manual milking mode), and improper automatic take off settings can increase time in low flow. Bimodal milk let-down is defined as delayed milk ejection at the start of milking. Initial release of cisternal milk is then followed with some delay with milk from the main mammary alveolae. Figure 1 depicts a milk flow curve showing a bimodal milk let-down.

Consideration of interactions between cow characteristics and premilking udder preparation can help to improve parlor efficiency and short-term changes in teat condition postmilking.

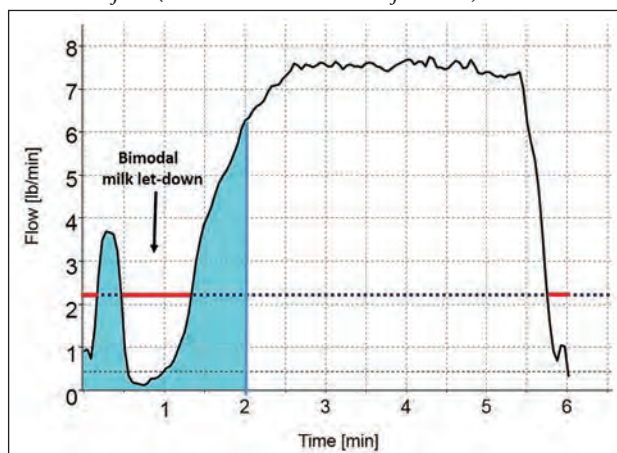
In a longitudinal study involving 384 milkings in one 3x herd we investigated the influence of cow characteristics and milking routine on milk flow parameters and short-term changes in teat condition. The objective was to study the association between cow characteristics [parity, stage of lactation, teat-end shape (pointed, flat, round), and milk yield], premilking udder preparation [stripping time and lag time (time interval between end of stripping and unit attachment)], and the milk flow parameters, two minute milk, average unit on time, time in low flow, and bimodal milk let-down. A secondary objective was to investigate the relationship between cow characteristics, premilking udder preparation, the aforementioned milk flow parameters, and short-term changes in teat condition.

Our data indicates that cows with pointed teat-end shape had substantially lower two minute milk compared to cows with flat or round teat-end shape, respectively. For every second increase in stripping time two minute milk increased by 0.1 lb. Lag time had different effects on cows with different teat-end shapes with the greatest impact in cows with flat teat-end shape. For every additional 10 seconds spent between stripping and unit attachment two minute milk increased by 0.7 lb.

Moreover, our data showed that parity was significantly associated with unit on time with primiparous cows having the shortest unit on time (3 min 52 sec). Cows with pointed teat-end shape had the longest unit on time compared to cows with flat or round teat-end shape, respectively.

Stage of lactation, parity, and teat-end shape were significantly associated with time in low flow. A second lactation cow with flat teat-end shape at the end of lactation (240-300 days in milk) spent the least time in low flow rate (11 sec). The largest decrease in time in low flow

Figure 1: Milk flow curve showing a bimodal milk let-down. The blue area under the curve illustrates the amount of milk harvested within the first two minutes (two minute milk; lb). The red lines indicate time in low flow (seconds below 2.2 lb/min flow rate).



Please turn to page 38

Influence of cow characteristics and premilking udder preparation on milk flow and teat condition

continued from page 37

could be observed in cows with round teat-end shape when stripping time and lag time were increased, respectively.

Primiparous cows had the lowest risk of bimodal milk let-down while cows towards the end of lactation were more likely to show a bimodal milk flow pattern. Increasing stripping time resulted in decreased risk of bimodal milk let-down.

The risk of short-term changes in teat condition was lower in cows in later stage of lactation. Second lactation cows were least likely to demonstrate short-term changes after milking. While cows with flat teat-end shape had lower risk to develop short-term changes in teat condition, increasing two minute milk or lag time could decrease likelihood of short-term changes in teat condition in all cows.

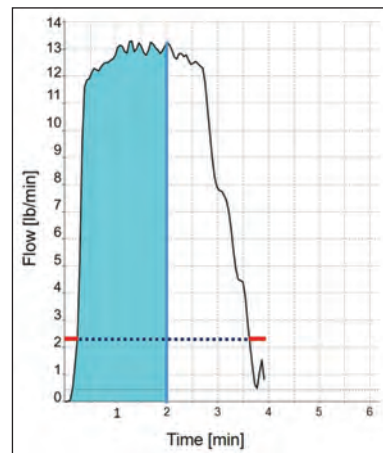
We were able to identify associations between cow characteristics, milking routine, milk flow parameters, and short-term changes in teat condition. Our data suggests that premilking udder preparation matters and is in accordance with previous research indicating that excellent milk flow rates can be achieved with a stripping time of 8 to 12 seconds and a lag time of 90 seconds. Increasing stripping time resulted in higher two minute milk, less time in low flow, and less bimodal milk let-down (Fig. 2). Expanding lag time could increase two minute milk, decrease time in low flow, and diminish the risk of short-term changes in teat condition postmilking. Moreover, our results indicate that consideration of the interactions

Lactococcus: an emerging mastitis pathogen

continued from page 36

lution found in 2014. Difference between the bacteriological cure rate for *L. lactis* (59% cures, n=66) was significantly different than *S. dysgalactiae* (92% cures, n=49) and *S. uberis* (89% cures, n=18). There may also be a difference in risk of a repeat mastitis event - at least a second clinical mastitis event was recorded for 26% of cows with *S. dysgalactiae* (n=67), 31% of *L. lactis* (n=118) and 14% of *S. uberis* (n=28). The difference between *S. uberis* and *L. lactis* indicated a potential trend for an increased risk of recurrent mastitis for cows with *L. lactis* infections. Finally, there was a trend towards a difference in number of cows leaving the herd after a *Streptococcus dysgalactiae* infection (19%), compared to those with *Streptococcus*

Figure 2: Milk flow curve showing a unimodal milk let-down. The blue area under the curve illustrates the amount of milk harvested within the first two minutes (two minute milk; lb). The red lines indicate time in low flow (seconds below 2.2 lb/min flow rate). Note the difference in two minute milk, time in low flow and unit on time compared to the milk flow curve in Figure 1.



between different cow characteristics and premilking udder preparation has the potential to substantially improve parlor efficiency and udder health.

Matthias Wieland (mjw248@cornell.edu) is a Veterinarian and Clinical Fellow in the College of Veterinary Medicine. **Jaclyn Melvin** (jmm745@cornell.edu) is an Undergraduate Research Honors Candidate in the Department of Animal Science at Cornell. **Paul Virkler** (pdv3@cornell.edu) is an Extension Veterinarian at QMPS Animal Health Diagnostic Center. **Daryl Nydam** (dvn2@cornell.edu) is the Director of QMPS Animal Health Diagnostic Center.

uberis (36%) or *Lactococcus lactis* (31%).

Identifying differences in intramammary infections due to different bacteria shows why this information on clinical mastitis cases in cows is important. Even within a group of bugs that previously haven't been differentiated, different infection characteristics are observed, which may impact management decisions. *Lactococcus lactis* appears to be more common than originally thought and warrants further investigation so it can be managed to the best of our abilities within the dairy industry. □

Jessica Scillieri Smith is the veterinarian for the Northern NY QMPS lab in Canton. **Paolo Moroni** is the Director of the Central NY QMPS lab in Ithaca. **Daryl Nydam** is the Director of the QMPS Program.