Milk flow patterns: interrelationship with somatic cell counts

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The present concept of machine milking is based on the acceptance that the cow is having the leading role in the interplay between her, the milker, the milking machine, and the environment. This acceptation of biological potentials and limitations of dairy cows allows us to milk them fast and complete and reduce or exclude any adverse effects on the cows. The development of new technologies gives us a new opportunity to understand and include biological responses of dairy cows into the milking process.

On the basis of the milk flow profiles analysed at the quarter and udder level the possible relationships between the duration of decline phase of milk flow and SCC (somatic cell count) were investigated. 40 Holstein cows, free of clinical mastitis and on their first to third lactation, were used. In total 1760 quarter and 440 udder milk flows were recorded during six consecutive days. At the last evening and morning milking of this period the milk samples from all quarters for SCC were collected. For the analysis all quarters and cows were classified in three different groups based on the duration of the decline phase – less than 40 s, between 40 and 80 s, and more than 80s for quarter analysis and less than 120 s, between 120 and 200 s and more than 200 s for udder analysis. The statistical analysis was carried out with the Genstat package (Genstat 5 Comittee, 1999).

At the udder level no effect of the duration of decline phase on SCC was found. With the increase of the decline phase the milk yield also significantly increased. The plateau phase increased only slightly when the decline phase increased.

At the quarter level there was a significant effect of the duration of decline phase on SCC (5.03±0.05 log SCC at < 40s as compared with 5.42±0.04 log SCC at >80s). With the increase of decline phase the peak flow rate increased but the time to reach the peak flow and the duration of plateau phase decreased. During decline phase the vacuum and its fluctuation appears in the teat sinus in each pulsation when the pulsation chamber is evacuated and it stops when teat sinus is restricted at the teat bases. It is not clear whether this fluctuation results in a higher SCC.

The duration of decline phase at the quarter level was not related to the duration of blind phase (overmilking) and milk production. Also, there was no correlation found between duration of blind phase and SCC. Probably overmilking of the single quarters within the udder is not harmful to secretory tissue but a negative effect on the teat ends and blood circulation in teats has to be considered.

At the udder level there was no effect of peak flow rate on SCC but at the quarter level the peak flow rate was higher in a group of quarters with longer duration of decline phase. Are cows with higher peak flow more susceptible for mastitis because of a high peak flow or longer decline phase?

The stage of lactation, time of milking, position of teat and peak flow rate did not influence the effect of the duration of decline phase on SCC at the quarter level.

In conclusion: the cows with longer duration (over 80s) of quarter decline phase had significantly higher SCC in their milk. Whether longer duration of decline phase from quarter is reason or consequence of higher SCC has to be investigated. To improve the interplay between cow requirements and machine parameters the quarter milk flow patterns have to be considered. The possible effect of quarter flow controlled milking on milk ejection and udder health has to be studied.