Importance of the new silicone liner “Stimulor® Stressless” for optimal milking performance and welfare of the lactating animals-technical report

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Abstract The mechanical forces during mechanical milking lead to changes in teat tissue. This effect is related to the degree of adaptation of the milking machines to the physiological requirements of the lactating animals. If the milking machine settings and liners are not suitable for all lactating animals on the farm, the teat condition will deteriorate and some animals may suffer from mastitis. For this reason, the company Siliconform, Germany, sets itself the task of developing better suited milking machines for lactating animals, as the company has been in milking technology for 50 years and has a great amount of experience with all lactating animals such as cows, sheep, goats, and camels. First, milking machines for cows “MultiLactor” and Camels “StimuLactor” were developed. After the great success of using both milking machines, the focus was on the further development of the teat liners. The name of the new liner is “Stimulor Stressless”. These new liners have unique properties that are excellent for maintaining teat health during machine milking in all lactating animals. One of its distinguishing features is the presence of a wave-shaped design of its mouthpiece, which allows it to adapt well to the different teat sizes in a herd, thus ensuring consistent milking of the entire herd. In this way, the aim of our milking technology was achieved, which is to imitate the rhythmic process of calf suckling during machine milking as much as possible.

Keywords: lactating animals, liner, MultiLactor, silicone, StimuLactor, Stimulor Stressless, teat cup

1. Introduction

The requirements for environmentally friendly and animal welfare or resource-conserving livestock farming have increased in recent years. An increase in milk yield through increased milk synthesis and milk secretion and, in the long run-time term, a slower drop in yield over the course of lactation (Persistence) is possible if the udder is emptied frequently and completely. Studies have shown that a correct milking machine for cows, such as “MultiLactor” (ML), results in complete udder emptying at every milking. As a result, the milk secretin rate remained high, and the milk yield continued at a high level until the end of lactation (Kaskous 2018a). In addition, the new milking technology “StimuLactor” for camels (SL) has been adapted to the physiological, morphological, and anatomical requirements of lactating camels. After the practical application of SL, the udder was completely emptied at each milking, and the camels were milked for a long time (Kaskous 2021). For this reason, increases in performance can be expected if lactating animals are milked daily with suitable milking equipment. Studies have shown that a quarter individual milking machine ML, which has a specific liner design and settings adapted to the physiological needs of dairy farms, leads to better results in terms of improved milk yield, fat content, protein content and lower milk somatic cell count (Kaskous 2018c; 2020). Milk removal as a neuroendocrine reflex is a prerequisite for the availability of alveolar milk for the milking machine. Before the milk is ejected, only a relatively small amount of milk (cistern milk) (especially from cows, camels, and buffaloes) can be milked immediately (Bruckmaier 2007; Bruckmaier and Blum 1998; Kaskous and Bruckmaier 2011). The timely onset of milk ejection is particularly important in animals and species with low levels of cistern milk. In the case of dairy cows, camels, and buffaloes, sufficient udder preparation must be ensured to trigger milk ejection at the right time. Most milk in sheep and goats can be obtained before ejection because the proportion of cistern milk is significantly high. Cistern milk (depending on the breed) can account for up to 70% of stored milk (Bruckmaier 2007). In lactating animals, milk ejection is triggered by mechanical stimulation of the udder (manual or mechanical) primarily in the teat area in the form of a neuroendocrine reflex (milk ejection reflex). The principle of the milking machine was developed similar to the sucking behaviour of the calf. This means an alternation of pressure and vacuum generation. However, due to technical problems, this goal could not be fully realized. Thus, milk removal by the milking machine has been further developed based on a periodically pulsating vacuum on the teat. In other words, milking machines extract milk from the mammary glands of lactating animals by vacuum suction. However, the vacuum is not applied continuously, as this can damage the teat.
2. Background for the development of the new silicone teat cup liners

When the lactating animals are milked, the teat liner is the immediate interface between the technical aggregate of the milking machine and the highly sensitive organ, the udder. Therefore, the liner has a significant influence on the duration of milk removal, the degree of udder emptying, the maintenance of udder health and the quality of raw milk (Mein et al 2003; Sagkob et al 2010; Bobic et al 2018; Odorcic et al 2019; Miekley 2022). Our milking philosophy is to increase milk yield and quality, improve animal welfare and reduce production costs. The development of silicone liners began in the early 1980s. The new material (silicone liner) was able to meet the extraordinarily high requirements for mechanical, chemical, thermal and hygienic properties with the longest possible service life. The breakthrough in using silicone as a material for teat liners and introducing it into milking technology came at the beginning of the 1990s with the qualities developed by Siliconform GmbH Germany (Model and Rudovsky 1999). Advances in milking technology development have reduced the labour time required per animal, but udder health and udder tissue stress have not improved (Ströbel et al 2015). The reason for this was the incorrect use of the liner, vacuum level, and pulsation. Field studies have shown that cows on the farm remained healthy with a MultiLactor quarter-individual milking system throughout the study period. The reason for this lies in using the right milking machine. That is, suitable teat cups with air inlet valve (biomilker), suitable silicone liner, low vacuum level, correct pulsation rate and pulsation ratio. (Kaskous 2018a, 2020). It is well known that the mechanical forces in mechanical milking lead to changes in the teat tissue (Stauffer et al 2021) and allow penetration of bacteria into the udder (Neijenhuis, 2004), particularly in the skin of the teat end, which could increase the risk of new mastitis infections and increase SCC (Hamann and Osteras 1994; Mein et al 2003; Bobic et al 2018). Under these conditions, Siliconform, Germany, set itself the task of developing milking machines for lactating animals, as the company has been in milking technology for 50 years and has a great amount of experience with all lactating animals, such as cows (Kaskous and Fadlelmoula 2015; Kaskous 2018a; Kaskous 2020), sheep, goats (Kaskous 2022b) and camels (Kaskous 2021; 2022a). The suckling of new-borns from lactating animals was taken as a reference for our milking machine development. To further improve the performance of our developed milking machines and to optimize the health of the udders, especially in camels, Siliconform has further developed exceptional liners for lactating animals. Our observations in practice have shown that teat shape and teat size vary greatly from animal to animal, including within the herd in the same farm, especially in camels (Kaskous and Fadlelmoula 2014; Kaskous 2018b,d; Kaskous 2021). Our goal was therefore to develop a teat liner that adapts to all teat sizes and dimensions without noticing any problems during milking. This achieves the goal of our milking technology, which is to imitate the rhythmic process of calf suckling in machine milking as much as possible.

3. Characteristics of the new silicone teat cup liner (Stimulor® Stressless)

The teats of the lactating animals in a herd are usually of different sizes. The observed liners often seal too tightly for large teats, while the air inlet can get in for small teats. The wavy construction of the new liner (Stimulor Stressless; Figure 1) has an adaptive lip. This means that with the integrated adaptive lip, different teat sizes can be milked with the same liner. The new wave designed of the lip reacts to the pressure difference in the liner and, if necessary, allows the outside air inlet to flow in to compensate. This prevents excessive head vacuum and reduces tissue stress. Likewise, the wave-shaped structure closes again at the right time and stabilizes the head vacuum at an ideal level to keep the teat cup on the udder. This prevents unwanted air from entering or the teat cups from falling. Since the wave head shape adapts well to the different teat sizes in a herd, even milking of all lactating animals is guaranteed. Furthermore, these new teat liners not only improve milking performance but also positively support the welfare of lactating animals. With this new liner, the head vacuum is kept in the physiological range, and the teats adhere particularly well and do not cause any slurry noise during milking. For lactating animals, this means protection of the sensitive teat tissue and more comfort when milking. It should be mentioned that the new liner prevents injuries and thus contributes significantly to more animal welfare and improved animal health.

Figure 1 New teat cup liners (Stimulor® Stressless) for lactating animals.
Due to these excellent properties, this new liner was patented and awarded a gold medal by the German Agricultural Society (DLG). This gold medal will be awarded at the EuroTier in November 2022 in Hanover, Germany. An independent expert jury appointed by the DLG using stringent criteria has selected the winner of the Innovation Award EuroTier. The Innovation prize EuroTier 2022 in gold has been awarded to Siliconform-Germany for the subject area: Milking and cooling technology.

4. Conclusion

Successful milking of lactating animals is guaranteed with the new “Stimulor Stressless” teat liners. Because it is optimal, gentle, safe and efficient.

Ethical Considerations

It is not necessary in this technical report.

Conflict of Interest

The author has no conflict of interest in this technical report.

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References

Kaskous S, Bruckmaier RM (2011) Best combination of prestimulation and latency period duration before cluster attachment for efficient oxytocin release and milk ejection in cows with low to high udder-filling levels. Journal of Dairy Research 78:97-104