Quarter Individual Milking in Conventional Milking Parlours

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In this study, a new quarter individual milking system called Multilactor® (MULTI) was compared with a conventional milking system (CON). The target of the developments in the field of milking technique is to obtain the whole milk from the teat of the animal in the shortest possible time without causing any detrimental effect on udder health. The most direct measure of the milking system effect on the cow is the vacuum in the claw of the milking unit (Reinemann et al. 2007). The quarter individual milking is still introduced by automatic milking systems (AMS). There are many studies about the effects of AMS milking on udder health conducted by different scientists. Rasmussen et al. (2003) detected an increase in bulk-milk somatic cell count (SCC) after using of AMS. This shows the necessity of having an additional method to detect clinically infected cows. So measuring of milk composition especially SCC per each udder quarter is important (Berglund et al. 2007). To satisfy these needs, a new milking system called "Multilactor®" was developed. Multilactor® uses the single tube system like AMS. But these systems include periodic air inlet in pulse chamber (like BioMilker®) and can be adapted for the use at milking parlour. It has a sequential pulsation and cluster is adapted by milking person (Oz et al. 2008). The objective of this study was to determine the effects of milk flow on average liner vacuum at the teat end during b- and d-phase in both, conventional and quarter individual milking systems by using wet-test method in practical conditions as defined in (ISO 6690, 2007).

Material and Method

Two different types of milking systems, a conventional (CON) and a quarter individual milking unit (MULTI) were tested during the experiments on two similar tandem milking parlours. Both milking parlours are equipped with milk meters and with low level vacuum line. The conventional milking cluster manufactured by GEA Bönen with a claw volume of 300 ccm (CON) was used as a reference cluster. Alternative pulsation at a rate of 60 cycles/min and the ratio of 60:40 was applied. The system working vacuum level was 40 kPa (11.81 inches of Mercury). As a second system, MultiLactor® (Siliconform GmbH Türkheim, Germany) (MULTI) was used. The length of the quarter individual long milk tubes and the inside diameter are 2100 mm (82.68 inches) and 10 mm (0.39 inches), respectively. The pulsation rate and the ratios were set to the same levels as in CON. The system working vacuum level was set to 38 kPa (11.22 inches of Mercury). The system works with sequential pulsation. Vacuum measurements were conducted by using wet test (ISO 6690, 2007). During the experiments ISO artificial teats were used (ISO 6690, 2007). Water was used to simulate the effects of milk flow ranged between 0-6 l/min (1.59 Gallons/min). The vacuum recording device named "Bovi Press", A & R Trading GmbH was used at the sampling rate higher than 300 Hz and with a measuring accuracy of ± 0,1 kPa. The vacuum was recorded for 21 pulse cycles. It was measured in the liner (ISO-teat end), in the pulse chamber and in the main vacuum line, simultaneously. From the data recorded, the mean vacuum in b-phase and in d-phase, and the percent share of the phases of the pulsation cycles were calculated.

Results and Discussion

It was found that at 4.8 l/min (1.27 Gallons/min) flow rate, the average liner vacuum during phase-b were calculated to be 35.0 kPa in CON and 31.1 kPa in MULTI systems that fits the desired average vacuum level in the liner mentioned in ISO 5707 (2007) as 32-42 kPa for cows. On the other hand, the average liner vacuums during phase-d were found to be different in the both systems. It was 34.2 kPa for CON and 12.3 kPa for MULTI. The reason for a big difference between two vacuum levels is considered to be normal since Multilactor® has BioMilker® system that allows periodic air inlet in pulse chamber. For both systems the teat end vacuum decreases with increasing flow. Both systems have to be compared in terms of the differences in b- and d-phases. As seen from the the reductions in b- and d-phase have a similar slope for the conventional system while big differences in Multilactor® in b- and d-phase are visible. The mean vacuum in d-phase dramatically goes down in MULTI as the flow rate increases. Worstorff et al. (1983) asserted that periodical air inlet led to substantial improvement in teat hardness, teat end lesions, milk production and cell count. Further, Hamann et al. (2001) showed that a positive pressure system caused significantly smaller teat end diameters and lower thickness values compared to the conventional system. Further the a- and c-phases were found to be shorter in MULTI than in CON. The sum of a- and c-phase at MULTI takes 9.6 % and at CON 29.0 % of a cycle duration. As a conclusion it can be stated that Multilactor® may provide an improvement in teat health and protect teat against mastitis since the system provides individual milking for each teat. The reduction of the mean vacuum level in d-phase as the flow rate increases can provide an effective massage on teat and this could be considered as an advantage of MULTI and BioMilker® system. Further research is needed to find out facts about the impact of long and short a- and c-phases to the udder condition.

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