Automatic Milking Rotary AMR™ in practical use – First investigations and experiences during change-over period

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Introduction

The use of automatic milking systems now holds even in very large dairy herds with up to 1,000 cows sustainable catchment. Thus, the proportion of automatic milking systems, all by the year 2011, realized and planned milking project in the farms is around 50% (LASSEN und SCHIERHOLZ, 2011).

The world‘s first fully automated milking rotary AMR™ combines the advantages of fully automatic milking in the VMS™ single box and the conventional rotary milking. So the first modular AMR™ automates udder preparation, attaching the milk cups and the teat dipping / -spraying in a rotary milking system. Through three different robot modules – preparation and cupping module in double- the individual steps are carried out. With the current state of technology can be automatically milked per hour to 90 cows.

Milk quality

In two selected German farms the somatic cell count of the bulk tank was on a comparable level after the change to the automatic milking (SCC ~200.000 cells/ml). On farm two with increasing number of cows on the system it was obvious that the SCC was increasing. This problem could be solved by implementation of a chemical device in the cup-flush-module (PAA). After that the SCC went down to less 200.000 again and is staying there for long term now. In farm 3 after 60 days of milking with the automatic rotary a SCC on bulk tank level of ~ 200.000 cells/ml could be achieved on the same level like 90 days before change to AMR. The increase of SCC in the last 60 days before starting up of AMR was due to the fact that the cows have to be milked on an interims parlor during building up the new system.

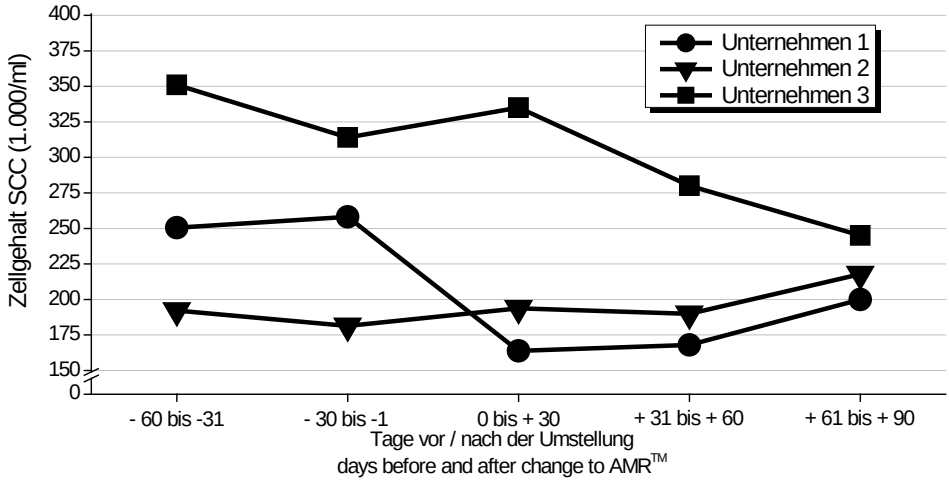

Figure 1: Bulk-tank-SCC on 3 farms during 60 days before and 90 days after change to AMR™

Teat conditions

In farm 1 the score of hyperkeratosis were recorded in the course of lactation in cows since the start of automatic milking. The classification was based on the scale of My et al., with score 1 „no keratin“ and score 4 „rough, fissured hyperkeratosis“ (MY et al., 2001). It was recorded that the two front teats with an average of 81% compared to the rear teats with an average of 88% had a slightly lower proportion of the score 1 + 2. However during the course of lactation no significant differences between the three recording periods have been observed (figure 2), which indicates a very good and gentle milking done by the system.

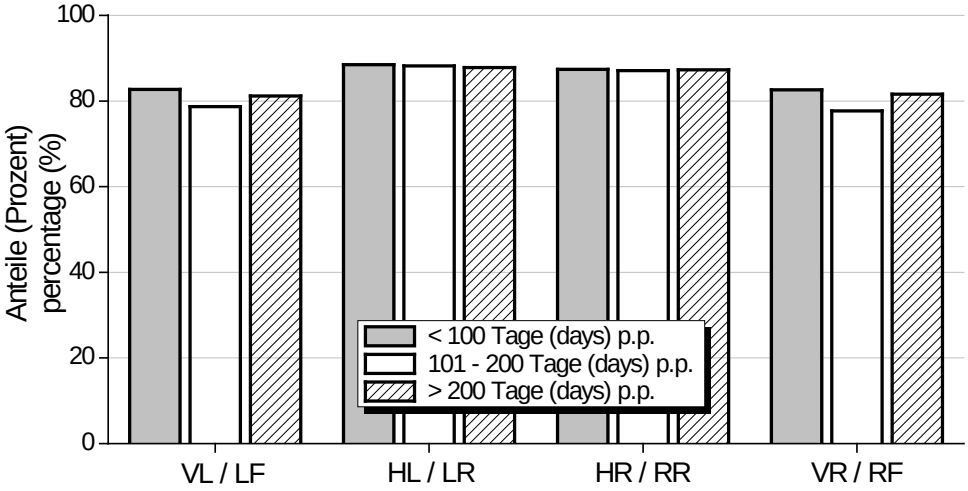

Figure 2: Percentage of hyperkeratosis with score 1+2 on teat level and days in lactation at farm 1 (n=1.401 observations at 341 cows)

Success rate

At farm 1 the success rate by the robot was evaluated at regular intervals starting up in August 2013. With the change of the visual-system to TOF-cameras (Time Of Flight) in October 2013 the success rate of attaching teats could be increased to more than 95% (figure 3). The remaining 5% of not attached teats could either be attached manually by the supervisor or those cows are sorted back to the rotary for an additional turn, but this may reduce the real throughput somewhat. A significant effect of the linear evaluation of the udder (DHV) scheme on the success rate could not be observed.

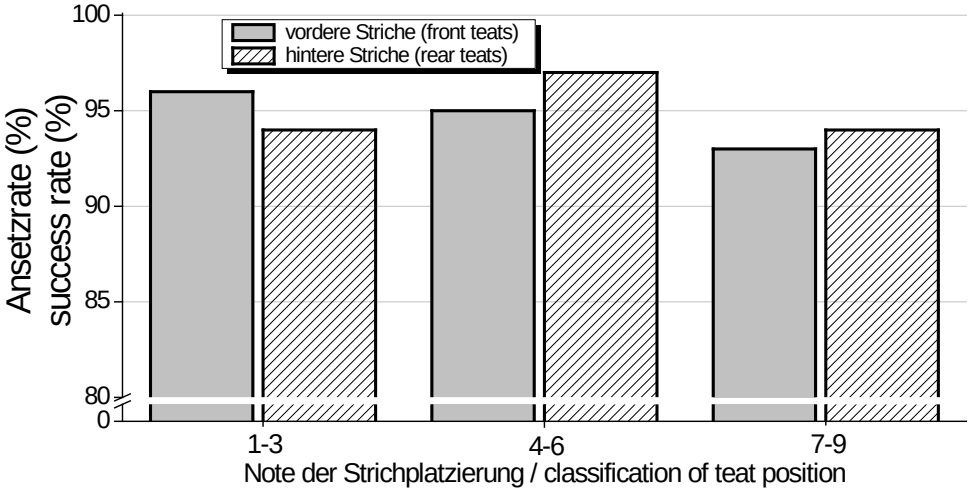

Figure 3: Success-rate of cup-attachment at different teat-positions

Behavior of the cows

In farm 1, the resting- and feeding- behavior of the cows was observed on monthly base during a 2 years period by using the time-sampling-method (5-minute-interval). It was found that the animals spent on average more than 11 hours per day with lying in cubicles, where here seasonal variations could be seen. Cows spent an average of 6 hours per day continue with the feed intake. Compared to other dairy-farms (conventional milking and AMS) significant differences in the behavior of cows have been observed. Overall, the central milking through the AMR™ has influenced the cow behavior positively or at least no negative effect due to the AMR compared to other milking systems could be observed. Especially compared to single boxes systems (AMS) cows have more time resting in the cubicles at the same time significantly lower time budget for standing including milking was observed (AMR: 460 ± 110 minutes per day; AMS: 526 ± 138 minutes per day). The prolonged period with cows standing around in the AMS single boxes systems primarily results in a prolonged period of queuing up in front of the milking unit (SCHNEIDER et al., 2013).