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## Automatic milking systems: Udder health and milk flow profiles

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Automatic milking systems (AMS) enable voluntary milking up to more than three times a day. This fact should not only increase the milk yield but also improve the status of udder health in automatically milked herds. The aim of the present study was the investigation of udder health and milk flow profiles and possible relations between these parameters. Data were collected on two practical farms using single-box-systems. One herd had 70 dairy cows which have been milked by one AMS, the other herd had a stock of 110 dairy cows and used two AMS. Over a period of six months both herds were examined three times. This investigations include antiseptical foremilk-samples for bacteriological analyses and the recording of milk flow profiles. Environment-associated pathogens had been the main cause for subclinical mastitis. In one herd the incidence increased during the period of investigation. But also udderassociated (contagious) pathogens can spread out in an automatically milked herd. Subclinical infected quarters in average have a higher maximum milk flow and longer overmilking times.

**Key words:** *Automatic milking systems, udder health, somatic cell count, milk flow profiles, management.*

One of the most important technological innovations in dairying during the last years is automatic milking. Worldwide more than 1000 dairy farms are using this new technique. Most of the systems used in Europe are installed in family farms with 50-150 dairy cows. Beside the reduction of physical labour and the free organisation of working processes an improvement of the udder health status is suggested, because automatic milking systems enable voluntary milking and some systems are allowing a quarter milk flow controlled milking process.

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### Summary

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### Introduction

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Aim of the study is the investigation of quarter milk flow profiles, somatic cell count, bacteriological status and possible relations between these parameters. The examination is taking place in two dairy farms, one with 70 dairy cows and one AMS (herd 1), the other with 110 dairy cows and two AMS (herd 2). Both farms are using single-box-systems.

## Material and methods

During the milking process single quarter milk flow profiles were recorded with the Lacto Corder<sup>R</sup> (by Foss), which measures total amount of milk, rate of maximum milk flow, overmilking time and total time of milk flow. At the same time single quarter foremilk-samples were taken antiseptically from all lactating cows directly before the milking process started. The somatic cell count of each sample was determined by fluorescence-optical method (Fossomatic<sup>R</sup> 360). According to the somatic cell count the quarter foremilk samples were subdivided into two groups. Samples with a somatic cell count up to 100 000 cells/ml were classified as samples from healthy quarters. Samples with more than 100 000 cells/ml were suspected to come from quarters with subclinical mastitis (1). These samples were cultured for bacteriological examination according to IDF standard (2). Each herd was at least investigated three times in intervals of three months.

## Results

The herds were free of *Streptococcus agalactiae*, and only a few quarters were found to be infected with *Staphylococcus aureus* (<5%). Environment-associated pathogens (environmental streptococci and Coagulase-negative staphylococci) were diagnosed as the main cause for subclinical and clinical mastitis under robotic milking in these two herds. The rate of subclinical, by environmental pathogens, infected quarters in herd 2 rose from 7.5% to 17.7%, whereas in herd 1 it decreased in the second investigation and after six months it reached a level of about 30% of infected quarters that was comparable to the situation at the beginning of the investigation (Figure 1). In herd 1 the udder-associated (contagious) pathogen *Staphylococcus aureus* was the reason for a certain number of subclinical infections (Figure 2).

A maximum quarter milk flow in the range of 0.78 up to 1.24 kg/min was found. Hind quarters in comparison with front quarters had a higher average maximum milk flow. Over the period of six month robotic milking, the average maximum milk flow decreased in herd 1. The overmilking times of single quarters were in average between 7.2 and 32.8 seconds. They decreased in both herds in the period of six month. The average maximum milk flow and the overmilking time of quarters with cell counts over 100 000 cells per ml were higher than those with cell counts below this threshold value.

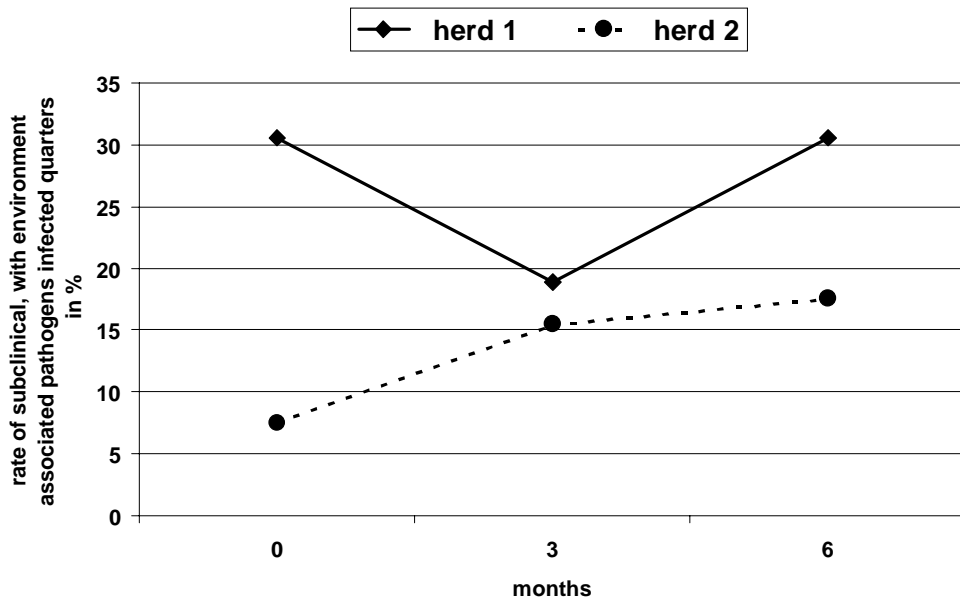


Figure 1. Prevalence of subclinical, with environment-associated pathogens infected quarters (n=1 088).

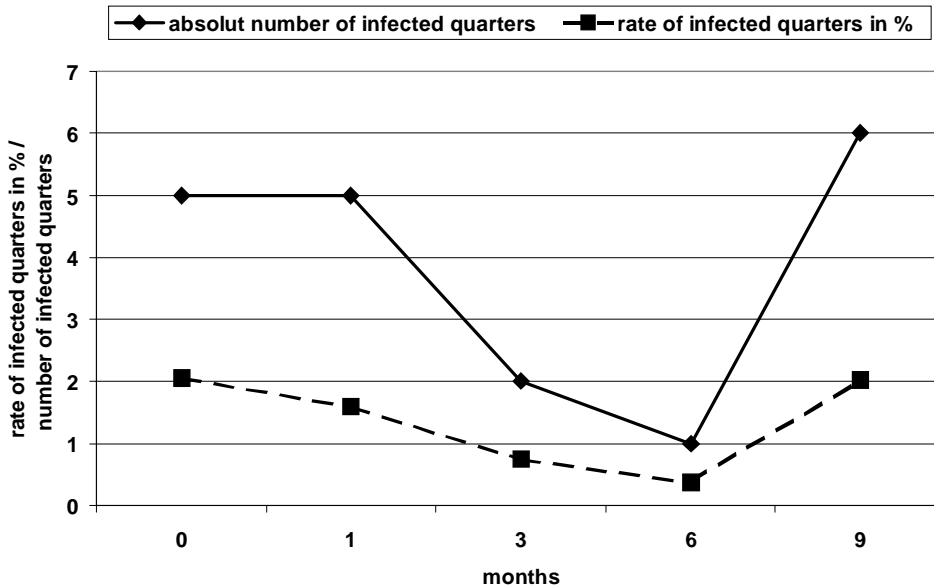


Figure 2. Rate and total number of quarters infected with *Staphylococcus aureus* (n=1 376).

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## **Discussion and conclusions**

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The rate of subclinical mastitis caused by environment associated pathogens increased in one herd. Cause for this may be on the one hand the frequency and intensity of cubicle cleaning, on the other hand the disability of the AMS to distinguish between clean and dirty udders and as a result of this a non sufficient cleaning of the teats.

New-infections caused by udderassociated (contagious) pathogens are favoured by long intervals of cluster disinfection and a non sufficient teat dipping.

The decrease of the maximum quarter milk flow may be the result of a higher milking frequency with lower milk yield per single milking.

The remarkable decrease of the overmilking time is the result of the increased threshold value for the automatic teatcup take-off up to 150 gram per minute.

An increase of the maximum milk flow and overmilking time of single quarters is associated with an increasing risk for subclinical mastitis.

Our results once more show, that the relations between every kind of milking technique and udder health are very complex. In farms using AMS the direct contact between dairy cow and farmer is reduced to a minimum, so that technique and management are getting more important. The use of an automatic milking system did not improve udder health automatically.

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## **References**

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