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## Development of microbiological colonisation in a newly installed milking system

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A field trial was conducted to characterize the development of microbiological colonization in a newly installed milking parlor regarding to seasonal influences and time that the liners were un use. The milking equipment was a 2x34 Side-by-Side milking parlor in a commercial dairy herd in Germany. We examined 2 charges of samples. The 1<sup>st</sup> charge of samples was taken before beginning of milking and in weekly intervals for a period of two months under climate conditions of winter (10<sup>th</sup> October – 18<sup>th</sup> December 02). The 2<sup>nd</sup> charge of samples was collected in summer 2003 (24<sup>th</sup> July – 11<sup>th</sup> September 03). Sterilized swabs were used to collect the samples. After sampling the diagnostic material was kept in Amies medium at 4°C until analysis.

Samples were analyzed from the mouthpiece of the liner, the shank of the liner, and the flushing adapter. The samples were collected immediately after disinfection of the milking equipment. They were analyzed qualitatively and quantitatively according to the official German guidelines (Amtliche Sammlung von Untersuchungsverfahren, §35, LMBG).

We considered mesophil aerobe total plate count, *S. aureus*, *E. coli*, *Coliforms*, *Streptococci*, *Yeast* and *Lactobacilli*. Results indicate a dependence of microbiological colonisation of the surface of the milking technique on season and position of sampling ( $p < 0,05$ ).

**Key words:** *Milking technique, hygiene, microbiological colonization, swabs, seasonal influence*

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### Summary

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## **Materials and methods**

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### **Experimental Design**

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A field observation trial was conducted to characterize the development of microbiological colonisation in a 2x34 Side-by-Side milking parlor of a commercial dairy herd in Germany housing 1400 lactating dairy cows. We examined 2 charges of samples. The 1<sup>st</sup> charge of samples was taken before beginning of milking and in weekly intervals for a period of two months under climate conditions of Winter (10<sup>th</sup> October – 18<sup>th</sup> December 02). The 2<sup>nd</sup> charge of samples was collected in summer 2003 (24<sup>th</sup> July – 11<sup>th</sup> September 03). After sampling the diagnostic material was kept in Amies medium at 4°C until analysis.

Samples were analysed from: mouthpiece of the liner, the shank of the liner, and the flushing adapter. On the left hand of the milking parlor (milking unit 1 and 17) the right front and the left hind liner were sampled, respectively. On the right side of the parlor (milking units 51 and 68) sampling was conducted at left front and right hind liner. From each milking unit one flushing adapter (unit 1: left front adapter, unit 17: right front adapter, unit 51: right hind adapter, unit 68: left hind adapter) was sampled immediately after disinfection of milking equipment.

Before Milking the teats were cleaned with udder paper wetted with a disinfecting dilution (Wofasteril®, Peressigsäure, 0,25%). Cleaning and disinfection of the milking technique was performed between the milkings with alkaline (two times) and acidic (one time) disinfectants.

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### **Bacteriological Analysis**

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The samples were analyzed qualitatively and quantitatively according to the official German guidelines (Amtliche Sammlung von Untersuchungsverfahren, §35, LMBG). Mesophile aerobe total plate count, *S. aureus*, *E. coli*, Coliforms, Streptococci, Yeast and Lactobacilli were considered.

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### **Statistical analysis**

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The effect of season, milking unit, position of sampling (mouth of the liner, shank, flushing adapter) cow (fixed factors) on mesophile aerobe total plate count (MTPC) was analysed using the UNIANOVA procedure of SPSS. The level of significance was set at  $\alpha = .05$ . (ln x)

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## **Results and discussion**

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Results indicate a proper hygienic status of the mouthpiece and shank of the liner and flushing adapter at the start of the milking process. Jasper (1976) described an increasing count of coliforme pathogens on the surface of milking technique as an indicator for an inadequate cleaning and disinfection of milking technique. We did not any coliforms in our study. Mastitis associated pathogens (*S. aureus* or Streptococci) were not detected and in only 20% of samples mesophile aerobe pathogens organisms could be cultured. This observation points out that milking technique was only a vector and not a resource of contagious mastitis pathogens. Various investigators describe teat skin as a source of contagious and environmental pathogens. For this reason the teat preparation before milking should result in a dry teat surface because of a reduction of detectable pathogens (Galton et al, 1982 and 1984, Mc Kinnon, 1990). In our investigation the teat skin was wet and therefore a

source for contamination of the milking technique with associated pathogens. Because of the absence of *E. coli*, coliforme pathogens, streptococci and Staphylococci in our swabs any time of examination we conclude that cleaning and disinfection of the milking machine is efficient.

Statistical analysis with a general linear model (GLM) regarding to mesophile aerobe total plate count (ln) showed season and position of sampling as important factors on concentration of pathogens of the sample ( $p < 0,05$ ). Number of sampling and the number of the milking unit did not influence the concentration of the pathogen in the swab ( $p > 0,05$ ). Less pathogens regarding to mesophile aerobe plate count and yeast colonize on the surface of the milking technique in winter compared to summer (figure 1 and 2). The number of detected pathogens did not cumulate over the two study periods (figure 3 and 4). The application of the GLM on the count of detectable yeast in the samples reflects season as an important factor ( $p < 0, 05$ ). Position of sampling, milking unit and number of sampling did not influence the number of detected pathogens. Yeasts were detected in summer in a higher percentage of swabs and the concentration of the pathogens was higher than in winter. This could be caused by the high temperature and thus the better growth condition of the organisms. Even though the concentration of yeast on the surface of milking technique was higher in summer the incidence of clinical mastitis in summer did not differ from winter.

In accordance to our results seasonal influences on bacterial colonization regarding to mesophil aerobe plate count are described in literature (Mc Kinnon, 1990). However, these investigators did not described this seasonal coherences for yeast.

In the international literature quality of liner material is discussed controversy. Some investigators describe quality of liner material as a risk factor for bacterial colonization (Jasper 76, Grindal 88, Wendt, 1994, Mc Donald and Packer, 1968, Noorlander and Heckmann, 1980). Others reported that there is no correlation between quality of rubber and bacterial colonisation (Zimmermann 2003). Our results indicated no accumulation of detected pathogens over the study period. Between the charges of samples the liners were about 130 hours in use. That's why no accumulation of pathogens is estimated as an advice for no influence of time that the liner is in use.

Further research is required on the importance of detected pathogens on mastitis in cows.

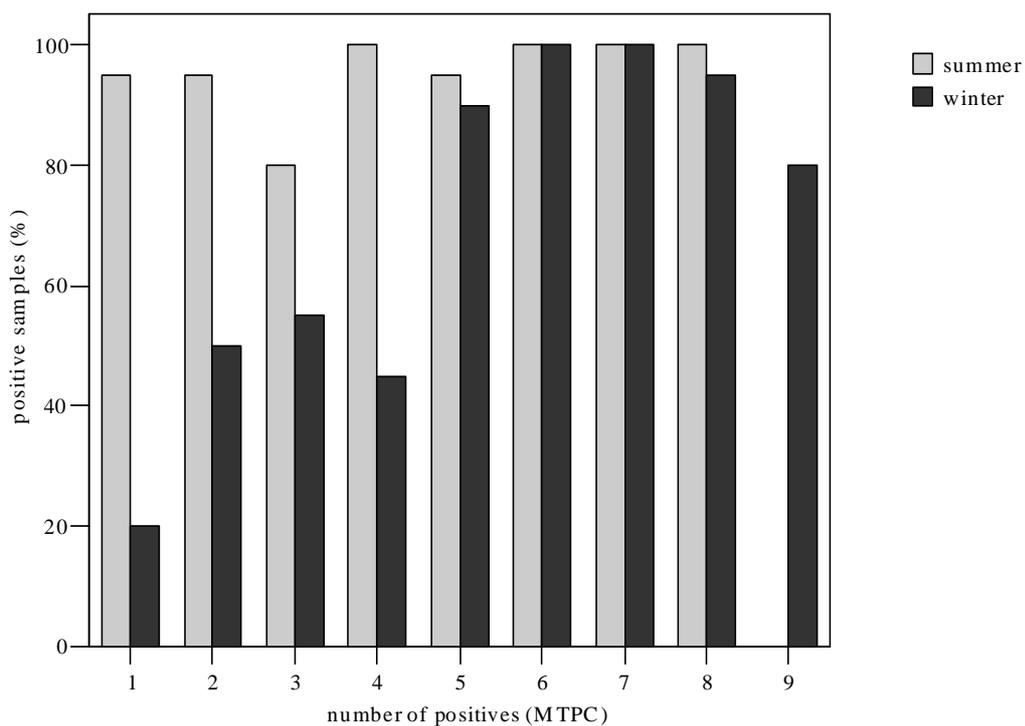


Figure 1. Number of positive samples regarding to mesophilic aerobic total plate count.

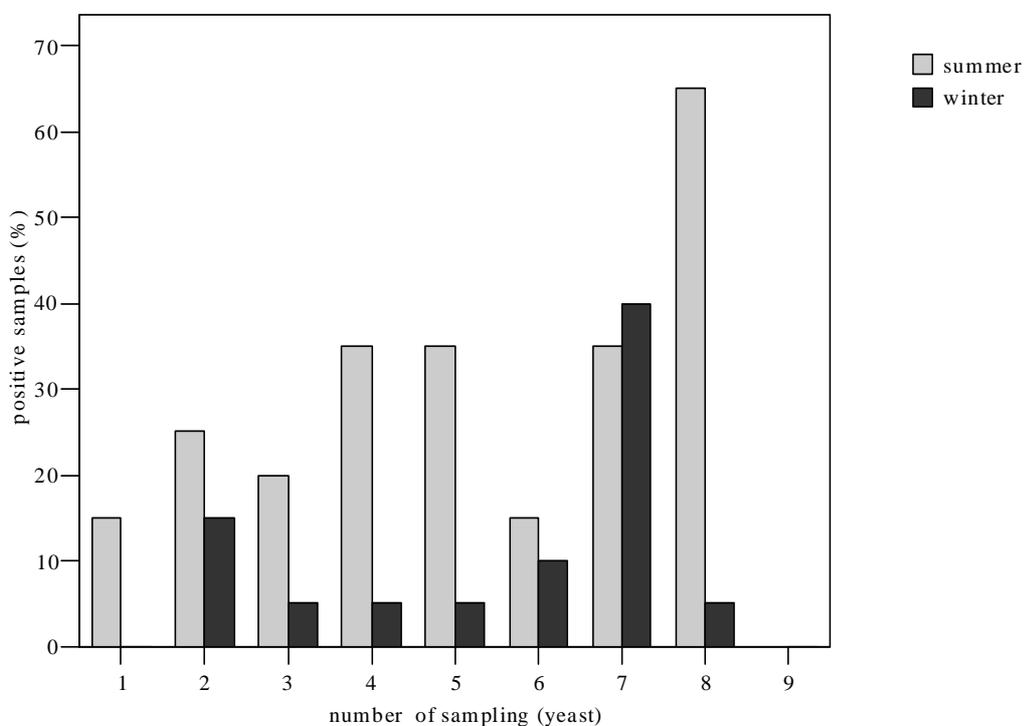


Figure 2. Number of positive samples regarding to yeast.

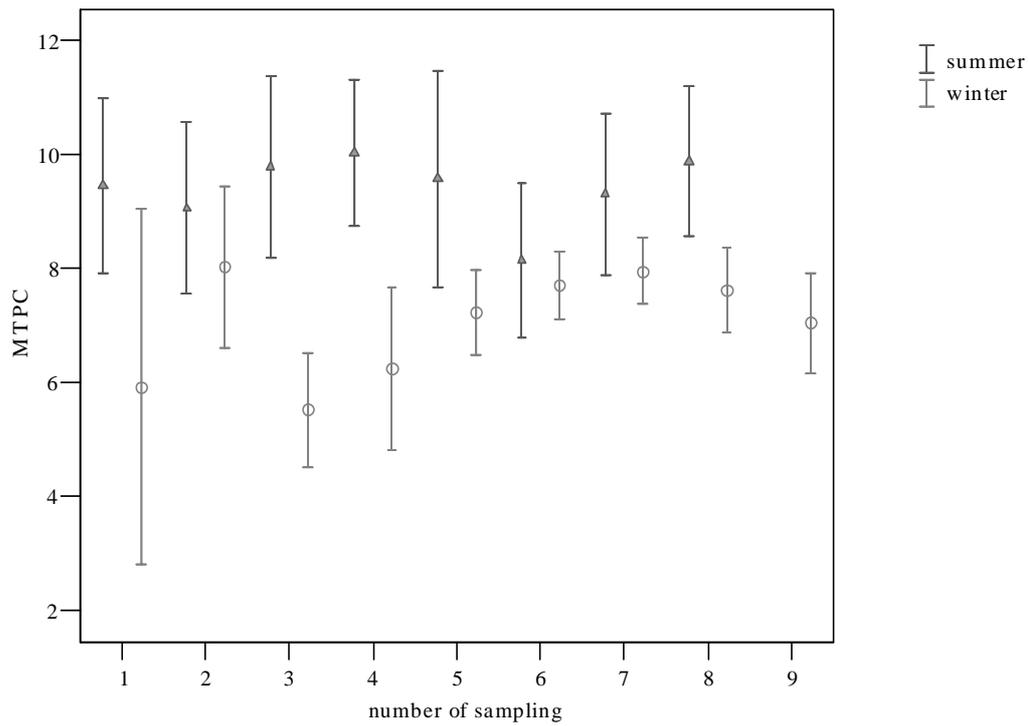


Figure 3. Mean and standard deviation of positive samples (mesophil aerobic total plate count).

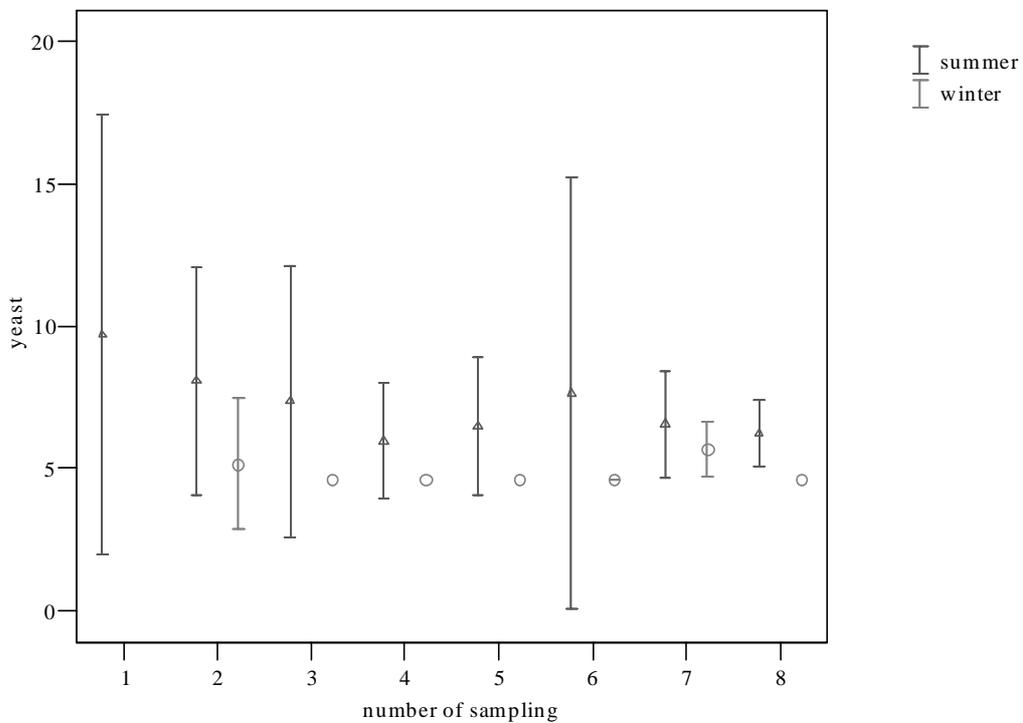


Figure 4. Mean and standard deviation of positive samples (yeast).

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