

# Influence of udder hygiene on the quality of milk

by Željko Pavicić, Department of Animal Hygiene, Environment and Ethology, Faculty of Veterinary Medicine, University of Zagreb, Croatia.

From an ethological perspective, the cow rests in a lying position, which inevitably leads to contact of the udder skin with dirt on the bedding surface. For example, as much as  $1 \times 10^{10}$  of total micro-organisms can be found in one gram of dirt from the udder surface.

With unsuitable udder hygiene, the micro-organisms present on the teat skin can contaminate the milk during milking or through the teat tip penetrate the teat canal increasing the possibility of mastitis.

Hence it is necessary to implement hygienic prophylactic measures in maintaining cleanliness and udder health before and after milking of dairy herds, with the aid of highly effective disinfectant udder care products that are :

1 Active in low concentrations and do not pose a threat regarding chemical residues in the milk.

2 Economically acceptable to farmers and easy to use with minimal time consumption.



**Udder Oxy Foam.**

There are many procedures for udder hygiene prior to milking. One pre-milking best practice is to immerse the teats in active foam disinfectant and wipe with disposable paper cloths after 1-2 minutes.

The implementation of udder hygiene after milking is a very rational method for maintaining acceptable udder health status, and is conducted by immersing teats in a disinfecting udder care product. This procedure removes the milk droplets that are left

behind which can serve as a breeding ground for surrounding pathogenic micro-organisms.

Subsequent drying of the disinfectant creates a thin layer over the teat orifice, mechanically preventing the incursion of micro-organisms through the teat canal.

The benefits are manifested through a decrease in postsecretory milk contamination, reduction of udder infections by so-called environmental microbes, and by a decrease in the number of sub clinical mastitis.

Nowadays, the priority in conducting udder hygiene is given to ecologically acceptable disinfecting agents that are not harmful to animals and the environment. In this manner, the standard disinfecting agents are being phased out and replaced by agents with a high degree of biodegradability and that are not aggressive to the skin.

Thereby, we investigated the applicability of such agents with the aim of establishing the degree of efficient udder sanitation on the quality of fresh raw milk in dairy herds on small farms.

## Materials and methods

The investigation was conducted on four small farms with differing milk quality regarding somatic cell and micro-organism counts, but with an identical udder hygiene method based on washing with water and wiping with disposable cloths.

Three farms (experimental groups) were selected for evaluating the effect of udder sanitation on the hygienic quality of fresh raw milk. This included disinfection prior to milking by immersing teats in a special cup containing Oxy Foam from the dairy hygiene expert company Ecolab. This is an active foam based on surface active compounds, organic acids and hydrogen peroxide.

Disinfection after milking was done by immersing teats in Blu-Gard, also from Ecolab, which is a film forming udder care product containing 1.94% linear dodecylbenzene sulphonic acid (LDBS) and skin care substances.

The remaining fourth farm (control group) continued to wash the udders with water and wipe with disposable cloths.



**Oxy Foam teat.**

The usual milking procedure was conducted twice a day on all farms with the use of milking machines.

Milk samples were collected on day 0 to determine the nominal condition and after the introduction of disinfection every 14 days throughout a period of almost three months. Individual milk samples from each cow were used in the investigation to determine somatic cell and micro-organism counts.

Each sample was an equal quantity of milk obtained from every quarter of the udders and was collected in a 40ml sterile bottle immediately after completing udder hygiene and squeezing out the first gushes of milk

*Continued on page 17*

## Blu-Gard Zitze Dip.



*Continued from page 15*

into a separate dish. The samples were delivered to the laboratory, where somatic cell numbers were determined by the fluorescent-optical method.

In addition, basic dilutions of milk samples were created, placed on growth medium, and incubated at 30°C for 72 hours from which the total number of colonies was recorded with the counter.

The number of colonies obtained represented the number of live micro-organisms in 1.0ml of milk. Basic statistical analysis of the collected data was performed using the Statistica 7.1 software.

The Student t-test was used to determine the significance of differences between the cows in the three experimental groups subject to daily disinfection of teats before and after milking and the fourth group.

During the investigation ANOVA Repeated Measures were used to establish variations in somatic cell and micro-organism count in individual groups.

## Results

The average somatic cell number in three experimental groups on day 0 of trial ranged from 5,621-5.656 log<sub>10</sub>/ml milk and was decreasing through the course of trial, reaching values from 5.584-5.613 log<sub>10</sub>/ml milk at day 84 from the start of disinfection.

Average somatic cell number in cow milk of the control group on day 0 was lower within boundaries established in three experimental groups and numbered 5.382 log<sub>10</sub>/ml milk.

However, during further measurements it continually increased to 5.486 log<sub>10</sub>/ml milk.

The average micro-organism number in three experimental groups on day 0 of monitoring was in the range from 5.549-5.659 log<sub>10</sub>/ml milk and was continually decreasing in the course of trial reaching values from 5.433-5.540 log<sub>10</sub>/ml milk on day 84 from the start of disinfection.

Average micro-organism number in cow milk of the control group on day 0 of monitoring was within boundaries established in



three experimental groups and numbered 5.558 log<sub>10</sub>/ml milk.

However, during further measurements it showed variations up to 5.565 log<sub>10</sub>/ml milk at most.

## Discussion

The effect of certain disinfection agents on hygienic milk quality and udder health status has been evaluated in many studies.

Thus it was established that LDDBS application (such as Blu-gard), as a teat disinfectant, reduces the numbers of mastitis-causing bacteria *S. agalactiae* and *S. aureus* by 71-80%, and decreases the number of new infections. Besides, the application of Oxy Foam and Blu-Gard, respectively before and after milking, used in this study, already demonstrated the prevention of newly merging infections, primarily ones caused by *S. aureus*.

However, it seems that the reduction of infection risk causes a drop in somatic cell and micro-organism count, which was also observed with the use of other disinfecting agents.

According to the data obtained, it is evident that the average somatic cell count in the experimental groups demonstrates a tendency to decrease in comparison to the starting values, but below the level of statistical significance.

In contrast, the average somatic cell count in the control group demonstrates a continuous increase in such a degree that from day 42 until the end of the trial this number was significantly larger ( $p<0.01$ ) in relation to the average somatic cell number at the beginning of the trial.

By observing the average micro-organism count in the cow's milk of the three experimental groups, it is evident that there is a decreasing trend during which there is a statistically significant reduction from day 42 of the trial continuing to the end of the investigation. In contrast, milk from the control group of cows whose udders were treated with water, showed no significant difference in the average micro-organism count during the trial duration, because of the slight oscillations in these values.

This method of milking hygiene is certainly not in accordance with proper udder hygiene, because it has been demonstrated that washing the udder with water decreases the micro-organism number on the teat skin by only 54.5-57.1%.

By an overall assessment of the trial results obtained from the control group, it is clear that they confirm current findings that without udder disinfection before and after milking the milk obtained can be of poor quality and unsuitable for processing.

Besides, the results obtained from the experimental groups are in agreement with current studies of sanitation in milking hygiene, where it has been established that implementation of disinfecting agents in udder hygiene prior to and after milking, such as Oxy Foam and Blu-Gard, can significantly reduce the average micro-organism count in fresh raw milk.

This effectively improves the microbiological quality of the milk in a relatively short time period, with the proviso that other sanitation procedures, including sanitation of milking equipment, are conducted in primary milk production. ■