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APPLICATION OF DISINFECTANT IN THE PREPARATION OF THE UDDER FOR MILKING

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Summary

Cleanliness of the udder before milking influences, to a great extent, the hygienic quality of milk as it decreases the possibility of the micro organisms from the skin of the udder to enter the raw during milking. The udder is most often cleaned with water and cloth, while a disinfectant is used only by a small number of breedrs. Thus, the purpose of this research was to establish to what extent disinfecting the udder before milking improves its cleanliness in comparison to the usual washing with water and to what extent it decreases the postsecretory pollution of raw milk by the skin of the udder. 10 dairy cows, from the same herd, were included in the research. The animals from the first group had a teats swab taken before preparing the udder for milking and the same was done after the usual washing with water and a cloth. In the second group the swab was taken from the udder be fore milking and after the usual washing with water and a cloth after the use of a disinfectant. The disinfectant used was on the basis of the surface active matter, organic acid and hydrogen peroxide (P3 - oxy Foam, Ecolab d.o.o., Croatia) and the teats were dried with a paper napkin for single use. Milk samples were taken from each group in order to establish the number of bacteria. According to the results obtained, in both groups, a significantly lower number of aerobic mesophyll bacteria was found after applying the udder disifectant where the application of the disinfectant decreased, more effectively, the number of bacteria on the teats in comparison to those washed with water and the cloth. Besides, the group of cows that had their udder disinfected before milking, had a lower number of bacteria in the milk sample, when compared to the group prepared for milking in the usual way with water and cloth. The conclusion can bee made that disinfection of the udder before milking decreases the number of bacteria on teats in more

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efficient way than the usual washing with water and thus it should be applied in order to prevent the pollution of milk by the micro organisms from the skin of the udder.

Key words: cow, milking, udder disinfection, milk quality

Introduction

Milk is food of animal origin, which, for as long as people can remember, has been of great importance in human nourishment. Owing to its composition, it represents ideal food for all age groups and has a protective role in human health. Milk, however, can be damaging for the human organism, in the first place when contaminated by various micro organisms (Pavičić and Hađina, 2001). Micro organisms, bacteria may, in the first place, reach milk in various ways, mostly from a diseased milk gland and from the skin of the udder during milking, as an environment contact infection (Habeš, 2002). This occurs, mostly, owing to inappropriate preparation animal for milking. It is still an ingrained rale that the best way to prepare the cow udder for milking is only by washing it with warm water and drying, thereafter, with a cloth. The fact is, that the udder is never really dry enough, so that the dirty liquid leaks from the skin of the udder into the milking machine, thus contaminating the milk (Bačić et al. 2000). As it happens, the same cloth may be used on several animals and, accordingly, there is a great possibility for spreading the milk gland inflammation agent, in the latent phase of the disease, to other animals in the same herd. Such incorrect way of preparing the udder for milking may, of course, increase the total number of bacteria in the fresh raw milk above the permissible level as ruled by the present dairy legislation. The legislation, rules the hygienic quality of raw milk by regulations and for the Member States of the European Union it is the EU Council Regulation 92/46/EEZ of June 16, 1992. The member States coordinate their own national rules (Kirin, 2001) according to this Regulation. Following the European legislation, the Republic of Croatia has recently brought. The "Regulation on the Raw Fresh Milk Quality" (NN 102/2000). It lays down among other things, the standard quality of raw milk - the rule is that there must not be more than 100.000 micro organisms in 1 ml of milk. Accordingly, it is in the interest of every milk producer to produce raw milk pursuant to the above Regulation for milk is classified in accordance with the number of micro organisms therein, into quality classes which, next to the physical and chemical characteristics of milk determine its market value. Thus, keeping the udder clean is considered one of the essential factors in the

prevention of the post - secretory pollution of milk and is of unquestionable importance in the hygienic milk quality improvement, to be carried out by implementing the hygienic measures as the most significant form of sanitation. Thus, the purpose of this research is to establish to what extent the inclusion of udder disinfection before milking may affect the decrease of the total number of bacteria on the teats when compared to the hitherto commonly used washing with warm water and drying teats with a cloth.

Materials and methods

The research was carried out on two groups of dairy cows of the East - Frisian breed, originating from the same breeding farm. Each group numbered 10 animals, put in a double row cowshed. The dung was removed manually. The fodder corridor was in the middle of the cowshed and above it was an open storeroom with hay. The animals were milked by a mobile milking machine, twice a day (6 o'clock in the morning and 8 o'clock in the evening), while every bedding place was manually cleaned, before milking. The usual preparation for milking consisted of washing the udder with warm water and drying it with a cloth; the first few spurts were milked into a separate dish for the organoleptic examination. For washing the udders clean water and a separate cloth were used for each cow, and the udders were disinfected before milking. With regard to this type of milking, the animals were divided into two groups. A swab of each cow in the first group was taken before the udder was prepared for milking and after the usual washing with warm water and drying with a cloth. In the other animal group the swabs were taken before preparing the udder for milking and after washing, disinfecting and drying the teats by single use napkins. The swabs were, in both groups, taken by pattern of 5 cm^2, put on the left teat. After washing the udder were the teats were submerged into a special glass containing an active foam for the udder disinfection before milking, made on the basis of the surface active matter, organic acids and hydrogen peroxide (P3 - Oxy Foam, Ecolab d.o.o., Croatia). The total number of aerobic mesophillic bacteria was determined in the standard way, by planting it on a nourishing agar and incubating at 34 °C during 24 hours. The result was expressed as a total number of aerobic mesophyllic bacteria cfu/cm^2 per teat. The data acquired were processed statistically by the variance analysis (ANOVA). The milk of the cows in the experiment was collected in two disinfected and dried dishes, while one dish was used to collect milk of the first and the second for the milk of the second group. After milking was completed, one milk sample was taken from every dish in order to establish the number of micro organisms. In the laboratory basic

solutions of the milk samples, were planted on a nourishing agar and incubated at 45°C during 72 hours when the total number of aerobic mesophyllic bacteria per cfu/ml of milk was established.

Results

Table 1 presents the results of one – way variance analysis (mean±SE) for the total number of the aerobic mesophyllic bacteria before and after the usual washing with water. In accordance with the results obtanied, the largest number of aerobic mesophyllic bacteria in the amount of 592/cm^2 was observed in the group before preparing the cows for milking (Control 1) and the least number of 140/cm^2 per teat was established in the group after the usual washing with water and drying (Experiment 1). Besides, according to the mean value indicators of the Control (290.3/cm^2) and the Experimental Group (132/cm^2), significant decrease ofthe total bacteria number could be observed after the udder was washed with water and dried with a cloth. This fact resulted in a significant statistical difference ($P<0.05$) between the Control and the Experimental Group, that is, it resulted in a decrease of the total aerobic mesophyllic bacteria number after washing with warm water, by 54.5 percent.

Table 1. -RESULTS OF THE TOTAL AEROBIC MESOPHYLLIC BACTERIA cfu/cm^2 OF THE UDDER TEAT BEFORE AND AFTER THE USUAL WASHING WITH WATER AND DRYING WITH A CLOTH

Indicator	Number of animals	Mean±SE cfu/cm^2	SD	CV	Max.	Min.
Control 1*	10	290.3^a±51.259	162.09	55.8	592	140
Experiment 1**	10	132.0^b±12.140	38.39	29.1	222	89

*animal groups where the swab was taken before preparing the udder for milking

**animal groups where the swab was taken after the usual washing with water and drying with cloth

$^{a'b}$= arithmetic mean not sharing the same letters in the superscript statistically differ on the $P< 0.05$ level

In Table 2 the results of the one – way variance analysis are shown (mean±SE) for the total number of the aerobic mesophyllic bacteria before preparing the udder for milking and after the udder and teats were disinfected. According to the results obtained, the largest number of aerobic mesophyllic bacteria of 456/cm^2 was observed in the group before preparing the udder for milking (Control 2) and the least, of 27/cm^2, in the group where the udder teats swabs were taken after disinfection (Experiment 2). Besides, according to the

mean value obtained for the Control (339/cm^2) and the Experimental Group (40.6/cm^2) a significant decrease of the total bacteria number occurred, on the P<0.05 level, after the udder teats were disinfected. Furthermore, the number of aerobic mesophyllic bacteria decreased, after the use of the disinfectant, by 88.1 percent.

Table 2. - RESULTS OF TOTAL AEROBIC MESOPHYLLIC BACTERIA CFU/CM^2 ON THE UDDER TEAT BEFORE AND AFTER THE DISINFECTION

Indicator	Number of animals	Mean±SE cfu/cm^2	SD	CV	Max.	Min.
Control 2*	10	339.0^a±28.261	89.37	26.4	456	192
Experiment 2**	10	40.6^b±3.622	11.45	28.2	64	27

*animal groups where the swab was taken before preparing the udder for milking
**animal groups where the swab was taken after the udder teats disinfection
$^{a'b}$= arithmetic mean not sharing the same letters in the superscript statisticaly differ on the P< 0.05 level

In Table 3 the results of the one – way variance analysis (mean±SE) for the total number of aerobic mesophyllic bacteria is shown, after the usual udder washing with water and drying it with a cloth, as well as after the disinfectant was applied. According to the results obtained it is obvious that the least values for the total number of bacteria (max. 64/cm^2; min. 27/cm^2) were observed on the teats of the animal udder after the disinfection (Experiment 2). Owing to this fact a significant statistical difference, on the P<0.05 level, occurred between both experimental groups with different treatment before milking. If we present these differences in percentages, the treatment of the teats by disinfectant before milking decreases the number of bacteria by 69.3 percent when compared to the usual washing with water and drying with a cloth.

Table 3. - RESULTS OF THE TOTAL AEROBIC MESOPHYLLIC BACTERIA CFU/CM^2 AFTER THE USUAL WASHING OF THE UDDER WITH WATER AND DRYING WITH CLOTH AND AFTER THE TEATS DISINFECTION

Indicator	Number of animals	Mean±SE cfu/cm^2	SD	CV	Max.	Min.
Control 2*	10	132.0^a±12.140	38.39	29.1	222	89
Experiment 2**	10	40.6^b±3.622	11.45	28.2	64	27

*animal groups where the swab was taken after washing with water and drying with a cloth preparing the udder for milking
**animal groups where the swab was taken after the udder teats'disinfection
$^{a'b}$= arithmetic mean not sharing the same letters in the superscript statistically differ on the P< 0.05 level

Milk, originating from the animal group where no disinfectant was used when preparing the udder for milking, had 3.7 x 104 bacteria per 1 mL of milk, while the milk, originating from the animal group where the disinfectant was applied had 1.25 x 104 bacteria per 1 mL.

Discussion

Milk, when extracted from the milk gland, is sterile, while the contamination by micro organisms occurs during and after milking (Saran, 1995). The high humidity level in the farm environment surely contributes to this, as it enables an excessive bacteria reproduction. The bacteria, arising from the cowshed environment, spread on the udder, thus enlarging the risk of their penetration, from the tip of the teat, into the teat canal (Suarez and Ferreiros, 1991). This situation represents a very favourable environment for the development of milk gland inflammation. Accordingly, the udder hygiene has a double significance as it, on the one hand, prevents milk contamination by micro organisms and, on the other, has a preventive effect on mastitis occurrence. The udder hygiene before milking meant, for most of the Member States with the International Dairy Association, for as long as the end of the last century, only washing the udder with water and drying it with a cloth (Saran, 1995). In the recent times, however, the situation has changed greatly as it is considered that such treatment does not decrease the teats contamination in a satisfactory way, it being a favourable factor for the contamination of milk by micro organisms during milking. Accordingly, one should, today, include in the udder hygiene before milking, the application of a disinfectiant, even more so as milk analysis proved that, without the disinfectant application before and after milking, the milk obtained may be hygienically incorrect and, accordingly, not appropriate for processing into cheese (Kalit and Lukač-Havranek, 2001). The disinfectants from the Ecolab programme were then also used only the research subject was not the effect of the disinfectant on the decrease of micro organisms on the udder. The research subject was to establish micro organisms in milk only. Thus we set the focus of this research on the effect of the disinfectant on the basis of the surface active matter, organic acids and hydrogen peroxide (P3 - Oxy Foam, Ecolab), the cleanliness of the udder before milking, with taking the samples of milk for establishing the total number of aerobic mesophyllic bacteria, as an additional measure in establishing the disinfectant efficiency. According to the results obtained, a significantly smaller ($P<0.05$) number of the total aerobic mesophyllic bacteria was established in both groups after preparing the udder

for milking, either by the usual washing with warm water and drying with cloth, or by applying teats disinfection.

The total number of aerobic mesophyllic bacteria decreased, in the first group, before and after the usual washing from 290.3/cm^2 to 132/cm^2, or by 54.5 percent, and in the second group, before and after the disinfection, from 339/cm^2 to 40.6/cm^2, or by 88.1 percent. Besides, when comparing both animal groups with regard to the way of the udder preparation, it was established that the additional udder disinfection before milking, decreases significantly, ($P<0.05$) the total number of aerobic mesophylic bacteria, by 69.3 percent, in comparison to the washing with warm water and drying with a cloth. Milk, prepared without the application of the disinfectant before milking had 3.7 x 10^4 micro organisms in 1, mL of milk, while the milk produced with the application of a disinfection contained 1.25 x 104 micro organisms in 1 mL of milk. In both cases the raw milk meets the requirements of the Regulation on the Quality of Fresh Raw Milk and is classified in class E. This may be explained by the fact that the disinfectant remains on the udder, constantly after milking. By this procedure the remaining drops of milk are removed, thus preventing the subsequent accumulation of pathogenic micro organisms, the milk being an excellent basis for this accumulation (Pavičić and Hađina, 2001). As the disinfectant is drying up, it leaves a thin film over the teats hole, thus preventing, mechanically, micro organisms to enter the udder, through the teat canal (Kalit and Lukač- Havranek, 2001).

Conclusion

The research proved that using a disinfectant preparing the udder for milking, may decrease significantly the total number of aerobic mesophyllic bacteria on the udder in comparison to the usual washing with water and drying with a cloth. This fact will surely affect the decrease of the total number of bacteria in the milked milk and, following the Regulation on the Quality of the Fresh Raw Milk, influence its microbiological classification.

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PRIMJENA DEZINFEKCIJE U PRIPREMI VIMENA ZA MUŽNJU

Sažetak

Čistoća vimena prije mužnje znatno utječe na higijensku kakvoću mlijeka, jer smanjuje mogućnost ulaska mikroorganizama tijekom mužnje iz kože vimena u sirovo mlijeko. Pritom se vime najčešće pere vodom i krpom, a dezinfekcija provodi kod manjeg broja uzgajivača. Stoga je cilj ovog istraživanja utvrditi u kojoj mjeri uključivanje dezinfekcije u higijenu vimena prije mužnje poboljšava čistoću sisa od uobičajenog pranja vodom i ujedno smanjuje postsekretorno onečišćenje sirovog mlijeka preko kože vimena. U istraživanju su sudjelovale dvije skupine po 10 mliječnih krava iz iste staje. Životinjama u prvoj skupini uzet je bris s površine sisa prije pripreme vimena za mužnju i nakon uobičajenog pranja vodom i sušenja krpom. Drugoj skupim životinja brisevi su uzeti s površine sisa prije pripreme vimena za mužnju te nakon pranja vodom, uporabe dezinfekcijskog sredstva na bazi površinski aktivnih tvari, organskih kiselina i vodikovog peroksida (P3-Oxy Foam, Ecolab d.o.o., Hrvatska) i brisanja sisa papirnatim ubrusom za jednokratnu uporabu. Od svake skupine uzeti su i uzorci mlijeka za utvrđivanje ukupnog broja bakterija. Prema dobivenim rezultatima u obje skupine je utvrđen značajno manji broj aerobnih mezofilnih bakterija nakon provedene higijene vimena, pri čemu primjena dezinfekcije učinkovitije smanjuje broj bakterija na sisi od uobičajenog pranja vodom i krpom. Osim toga, skupina krava kojima je dezinficirano vime prije mužnje, imala je manji broj bakterija u uzorcima mlijeka od skupine koja je pripremana za mužnju na uobičajeni način vodom i krpom. Prema tome može se zaključiti da uključivanje dezinfekcije u higijenu vimena prije mužnje efikasnije smanjuje broj bakterija na sisama od uobičajenog pranja vodom i treba se primjenjivati radi sprječavanja onečišćenja mlijeka mikroorganizmima preko kože vimena.

Ključne riječi: krava, mužnja, dezinfekcija vimena, kakvoća mlijeka

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