THE INFLUENCE OF POST-MILKING TEAT ANTISEPTICS TO THE WELL-BEING OF UDDER

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Summary. The value of milk products is determined by udder health and quality of milk production. The aim of our studies was to investigate teats antiseptic after milking influence to udder wellness. Two udder antiseptics were applied: solution which main active ingredient – iodine (3 %) and gel with the main active component – biphenyl-2-ol (6 %). Each teat was soaked after morning and evening milking for 3 months in a row. Milk samples for bacteriological tests and somatic cell count were taken 3 times – before using antiseptics and after 1 and 2 months of treatment. Agents have been identified according to standard operating procedures SDP 5.4.4.B.6 guide "Fundamental mastitis-causing bacteria evaluation in milk" developed by "Laboratory and field handbook on bovine mastitis". The statistical analysis of the data was performed using descriptive statistics and independent-samples T test procedures in SPSS 13.0 for Windows. The use of udder antiseptics after Milking iodine (3%) reduced *Actinomyces bovi*, no effect was found on reducing *Streptococcus agalactiae*. Biphenyl-2-ol was effective to *Actinomyces bovi, Streptococcus agalactiae,* Somatic cell count decrease ($p<0.05$).

Keywords: cow, microorganisms, teat antiseptic, somatic cell count

Introduction. The value of milk products is determined by udder health and quality of milk production (Miseikiene et al., 2015). University of Florida researcher's group studies have shown that about 95 % identified mastitis cases were caused by these agents – *Streptococcus agalactiae, Staphylococcus aureus, Streptococcus dysgalactiae, Streptococcus uberis* and *Esherichia coli,* and only 5 % of udder inflammation cases were caused by other agents (Bray et al., 2012). Meanwhile, in Lithuania carried out studies have shown that 70 % to 80 % of enterobacterial infections become clinical and about 50 % of environmental streptococcal infections may cause prominently seen clinical symptoms (Japertienė et al., 2011). One of the most effective ways to reduce pathogenic microorganism in udder is teat soaking or spraying after each milking. Nelson et al., (2011) states that teat soaking is safe and effective way in order to reduce frequency of new pathogen initiated infections. They also states that teat dips reduces infection spreading by 50 % (Nelson et al., 2011).

Currently in Lithuania there are a variety of different registered teat disinfecting solutions with different active substances (iodine, chlorine, nisin, biphenyl-2-ol, etc.), but mostly used solutions are with different concentration of iodine. It is considered that microorganisms may become more resistant to iodine so because of that researchers are looking for new active substances. Teats antiseptic after milking is necessary because it reduces the spread of microorganisms and it softens a teat skin as damaged skin is less resistant to *S. aureus* colonization. *S. aureus, S. agalactiae* multiply in milk. Teats antiseptic reduces milk bacterial contamination and Somatic cell count. It also reduces hidden and clinical mastitis incidence frequency (Engere*t al*., 2016). Post milking teat disinfection helps in prevention of contagious bacteria such as *Staphylococcus aureus* transmission as well as it improves at condition (Kumar et al., 2012).

The aim of our studies was to determine teats antiseptic after milking influence to udder wellness.

Materials and methods

The work was done in the milk's farm following 1997 11 06 The Republic of Lithuania law for animal's care, housing, and usage Nr. 8-500 („Valstybės žinios", 1997 11 28, Nr. 108).

Investigations were carried out in the X farm situated in district of Lazdijai and in NFVRAI (National Food and Veterinary Risk Assessment Institute) in Kaunas territorial division of the Biological Research section. Twenty cows from 22 months to 38 months, which were free from clinical mastitis infection (no swelling, no heat, no pain, no redness of the udder; milk of normal color, without fibrin clots) were randomly chosen to apply the udder preparation after milking. The cows were divided into different groups. For the 1st group of cows (n=10) teats after milking were damped with solution which is using in farm, and main active ingredient – iodine (3 %) (FINK-Io Dip 30, FinkTeckGmbH, Germany). For the 2nd group of cows (n=10) teats were damped with gel with the main active component – biphenyl-2-ol (6 %, "Anti – GermTraydou", Germany). Each teat was soaked after morning and evening milking for 3 months in a row. Milk samples for bacteriological tests and milk somatic cell count were taken 3 times – before using antiseptics and after 1 and 2 months of treatment.

Agents have been identified according to standard operating procedures SDP 5.4.4.B.6 guide "Fundamental mastitis-causing bacteria evaluation in milk" developed by "Laboratory and field handbook on bovine mastitis". To identify microorganisms, samples were inoculated under uniform conditions on McConkey agar (Oxoid, England) for coliforms (*E. coli, Enterobacter aerogenes*, Columbia

blood agar medium (Oxoid, England) for staphylococci containing 5% sheep blood, Edwards agar (Oxoid, England) for streptococci, on Sabouraud medium (Oxoid, England) for yeast. The samples were incubated for 24– 48 h at 37ºC under aerobic conditions. Every 24 h the grown colony's size and colour were evaluated. Grown colonies were tested with 3% hydrogen peroxide solution. To identify *Staph. aureus* the latex kit, Staphytect Plus Test DR 850 (Oxoid, *England*) was used. Detailed identification of bacteria was peformed using API test (Oxoid, England) and Entero pluri Test (Liofilchem, Italy). "Sabouraud" medium (Oxoid, England) for yeast plates were incubated for 5 days at 25 ºC

The statistical analysis of the data was performed using descriptive statistics and independent-samples T test procedures in SPSS 13.0 for Windows. The difference was considered to be statistically significant when P<0.05.

Results and discussion

Based on our studies carried out in X farm we found that most prevailing microflora in both research groups were *Staphylococcus spp.* (n=6) and *Actinomyces bovi* (n=6) on Fig. 1. Bacteriological studies also have shown that in the beginning of the study in 1-st group 80 ± 0.01% of the analyzed samples had mixed microflora and in 2-nd group 70 % of lactic microflora were mixed (p<0.05).

The findings coincided with a number of authors; they also indicate that the most commonly milk microflora is mixed (Rudejeviene, 2007; Ollieret al., 2015; French *et al*., 2016).Kumar*et al*., (2012) also show that the use of some disinfectant products prior milking can have beneficial effects on reducing the levels of total bacterial, staphylococcal and streptococcal pathogens on teat skin.

However, study partially coincides with the Sliwinskiet al., (2015) as they say that udder inflammation is usually caused by *Enterococcus spp.* (Sliwinskiet al., 2015).

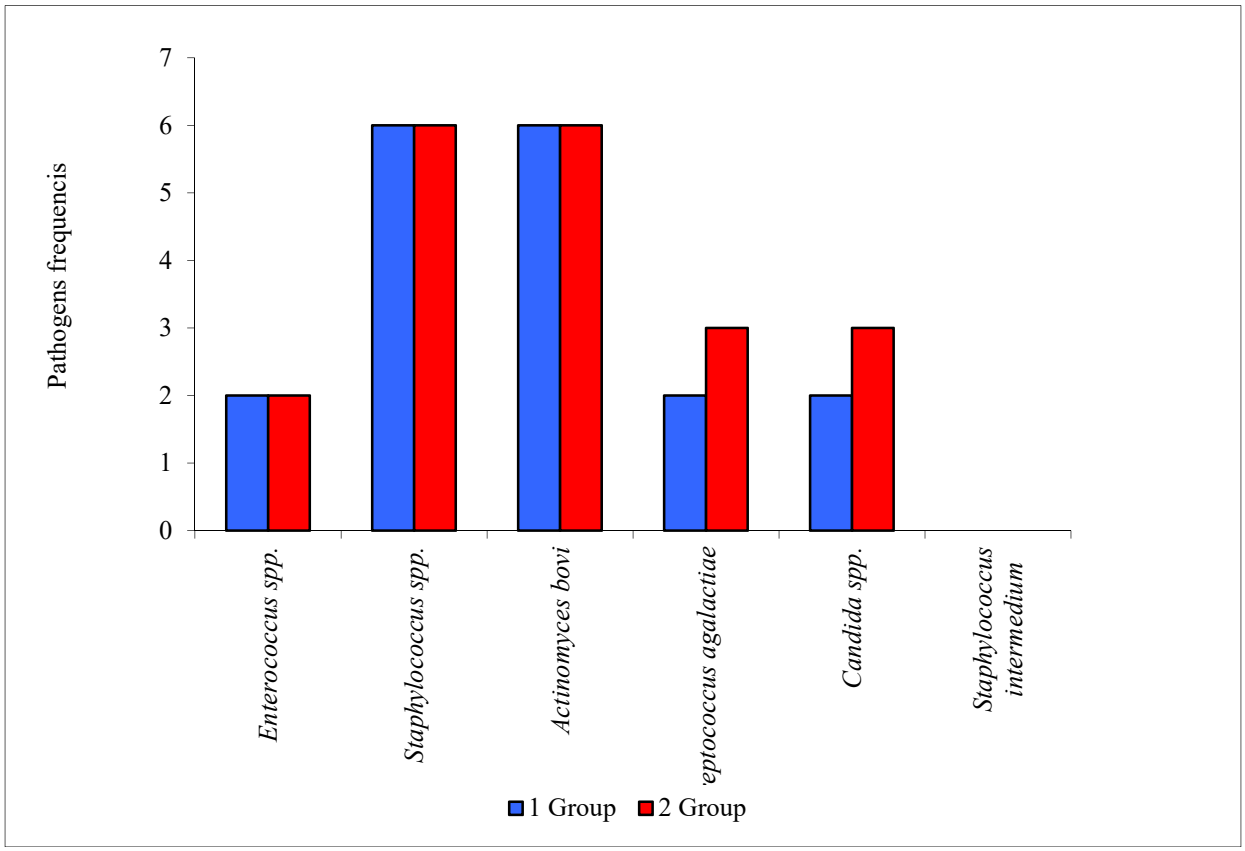

Fig. 1. **Udder-inflammatory agent's frequency at the beginning**

Observing disinfecting solutions effectiveness (Fig. 2.) we found out that in 1-st group *Staphylococcus spp.* were present in 60 ± 0.01% of this group analyzed samples, and within two months of the research the incidence decreased by 20 ± 0.01%. The number of *Actinomyces bovi* pathogen in 1-st group decreased by 2 times during the research. It should be noted that in 1-st group used disinfecting solution was effective against *Actinomyces bovi* but it didn't work on *Streptococcus agalactiae* as the incidence of this pathogen hasn't changed during the research. *Staphylococcus spp.* manifestation in 2-nd group during the research remained unchanged. *Actinomyces bovi* agent manifestation decreased 2 times. *Streptococcus agalactiae* frequency noticed that since the beginning of the test detected 30 ± 0.01% of the agent, the agent did not identify the end of the test (P<0.05).

The study showed that antiseptic solution used in 1-st group had not adequately protected the udder against *S. aureus* and in the 2-nd group this agent has not been established.

Also investigation showed that the incidence of *Enterococcus spp.* in both groups was maintained. The

results partially coincided with other scientist results (Williamson et al., 2010; Williamson et al., 2013, French et al., 2016).

According to them disinfection helps to reduce *Enterococcus spp*. manifestation. However, it coincided with scientist result which showed that *Streptococcus agalactiae* were not found during the research (Ruegg et al., 2006).

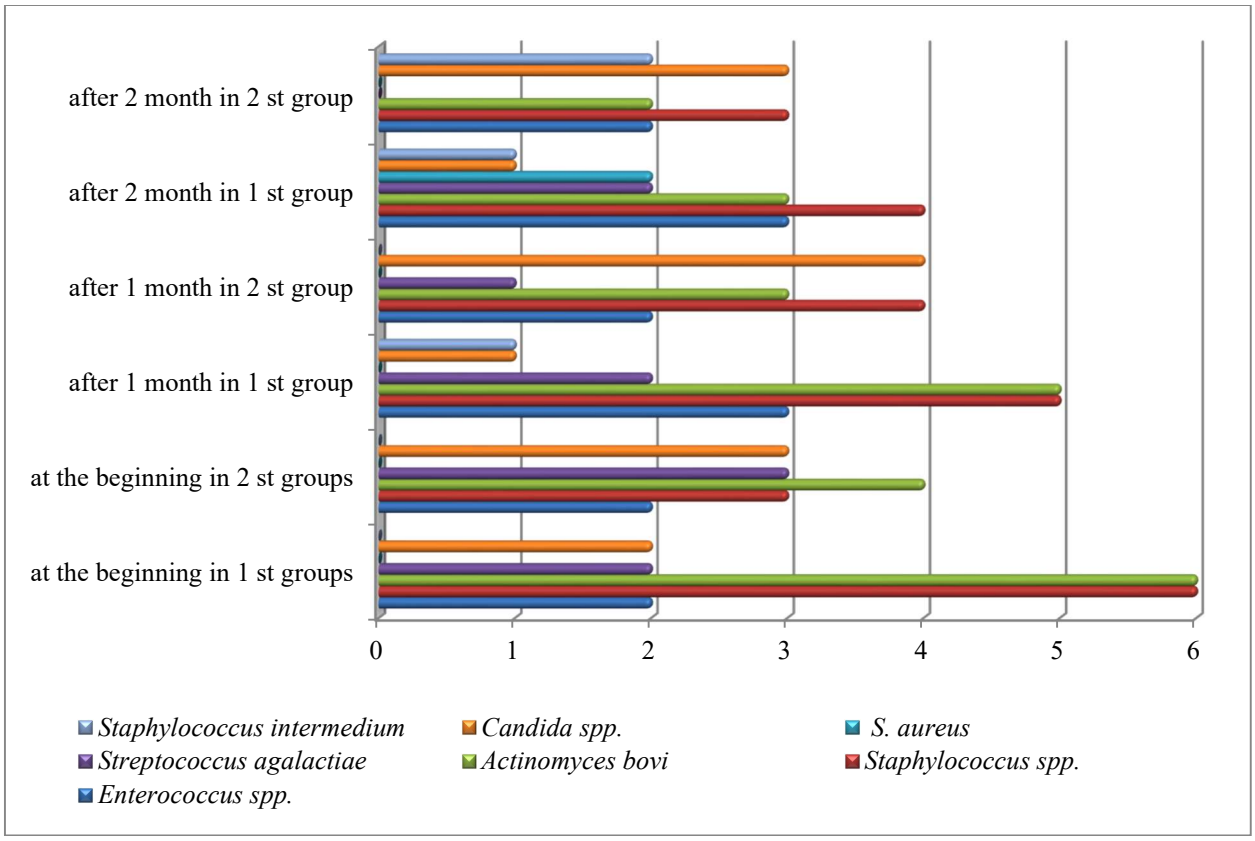

Fig. 2. **Identify pathogens a manifestation in testing groups**

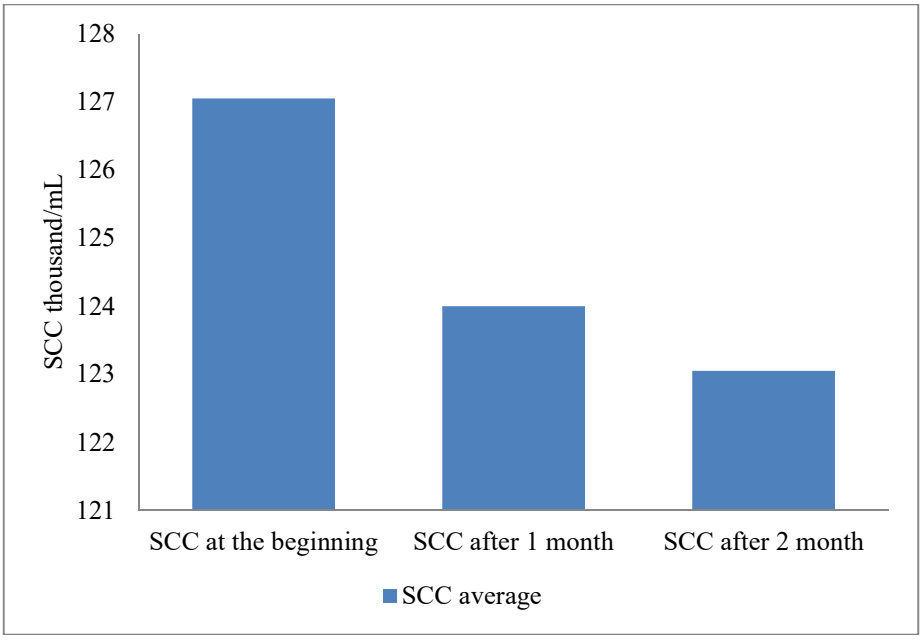

Fig.3. **General somatic cell count at investigations**

While evaluating somatic cell count we found out that in both groups in the beginning of the research this results average was 127.05 ± 9.79 thousand/mL (P <0.05) and during the research it dropped to 122.05 ± 9.79

thousand/mL (P<0.05) (Fig. 3). Scientists also claims that teat disinfection helps to reduce the somatic cell count (Ruegg, 2006; Ramanauskienė et al., 2008; Williamson et al., 2013).

When analyzing the evolution of somatic cell count by different research groups and research period we found that somatic cell count in 1-st group increased from 127.9 ± 8.34 thousand/mL to 146.5 ± 19.62 thousand/mL (P>0.05), but the data are considered unreliable because this result could be influenced by the fact that 2 cows in 1-st group were diagnosed with subclinical mastitis.

Somatic cell count in 2-nd group decreased evaluating by the baseline (Fig. 4). At the beginning of the study somatic cell count was determined 126.2 ± 7.61 thousand/mL, but after 2 months it was decreased to 100,2 ± 5.01 thousand/mL (P<0.05). This indicates that the disinfecting gel attempt was more effective than disinfectants used in a farm. As a result, it can be concluded that the solution with active component – biphenyl-2-ol was more effective than a solution whose main active component is iodine.

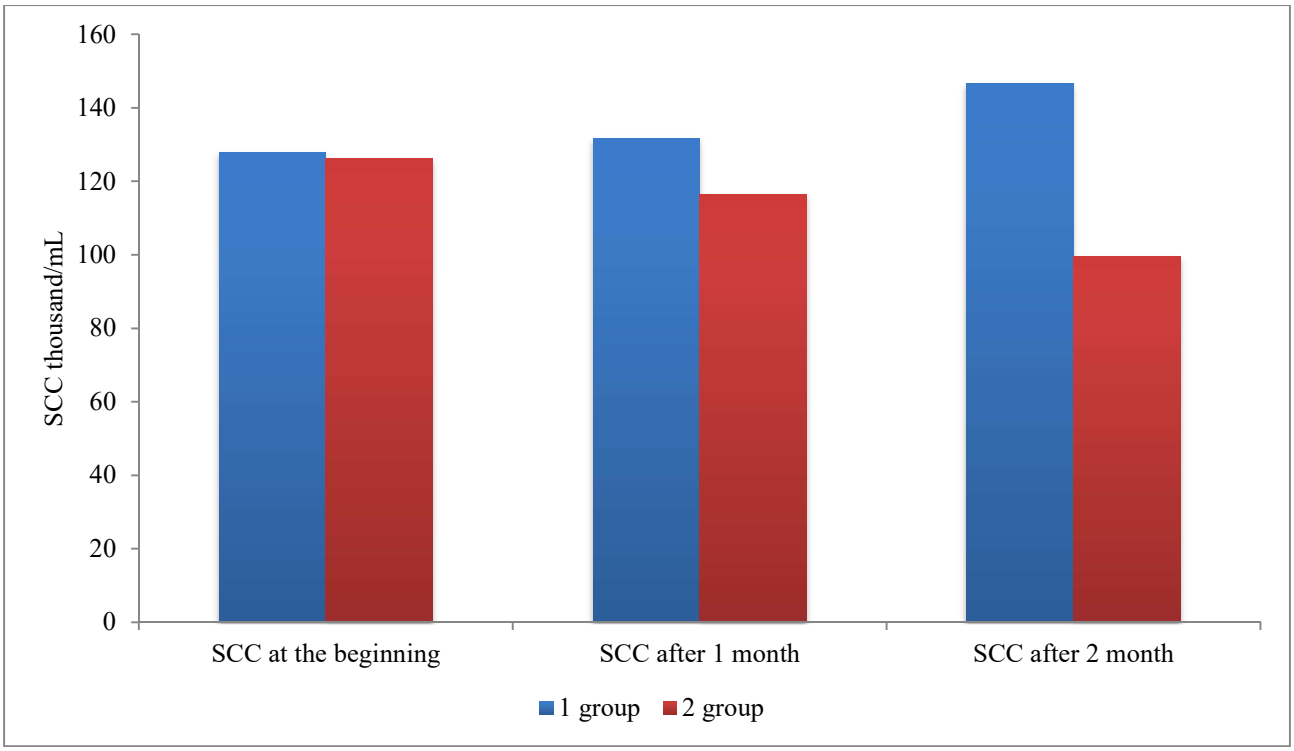

Fig.4. **Analyzes groups somatic cell count changes at investigation time**

Conclusion. Disincentive solution which was used for 1-st group cows didn‘t affect *Streptococcus agalactiae* pathogen. It also didn‘t provides enough protection from *S. aureus* but it effectively protected from *Actinomyces bovi.* Disinfection gel which was used for 2-nd group cows didn‘t provide enough protection from *Staphylococcus spp.* but it was effective from *Actinomyces bovi* and *Streptococcus agalactiae.* Somatic cell count in 1-st group increased from 127.9 ± 8.34 thousands/mL to 146.5 ± 19.62 thousands/mL (P>0,05), in the 2-nd group this result decreased from 126.2 ± 7.61 thousands/mL to 99.6 ± 8.2 thousands/mL. Milk production increased 1.04 ±0.14 L in 1-st group and 1.11 ± 0.12 L increase were seen in 2-nd group (P>0.05).

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