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EVALUATION OF USING SOME DISINFECTANTS IN UDDER PREPARATION FOR MILKING AND MEASUREMENT THEIR RESIDUES IN MILK

By

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ABSTRACT

This study aimed to evaluate the effect of pre-milking teat preparations (Iodine and Hydrogen peroxide) on incidences of mastitis, SCC, the prevalence of (Staphylococcal, Streptococcal and Coliform) infections and total bacterial count of milk in addition to measurement of iodine residues in milk and assessment the status of teats after using hydrogen peroxide.

This study was performed on 75 cows, divided into 3 groups. The first group (25 cows) iodine 0.5% was used as pre-dipping disinfectant; the second group (25 cows) hydrogen peroxide (Hydroxil 0.5%) was used as pre-dipping disinfectant while the third group (20 cows) was control group. Results showed that, pre-dipping had an effective role in decreasing the incidence of subclinical mastitis either iodine was used or hydrogen peroxide as pre-dipping disinfectants and also SCC was decreased**.** The incidences of microorganisms (*Staphylococcus* spp., *Streptococcus* spp. and Coliform) isolated from examined milk samples were decreased after pre-dipping procedure of the teats. Iodine residues after pre-dipping were in normal range and not exceed the permissible limits. When hydrogen peroxide was used as pre-dipping disinfectants it may lead to cracks on the teats and that considered as predisposing factors to occurrence of mastitis. Generally pre-dipping preparation of the udder should be recommended to be followed in dairy farms.

Keywords:

Pre-dipping - mastitis - iodine - hydrogen peroxide.

INTRODUCTION

Mastitis represents a major economic cost to dairy farmers depending on severity. The losses associated with mastitis include discarded milk, increased number of culled cows, cost of antibiotic treatment and reduced milk quality and price **(Kagkli *et al*. 2007 and O'Brien,**

2008). Also raw milk can be contaminated with pathogens originated from dairy cows or farm environment. Bacteria can be transferred into milk during milking or at any stage of milk handling, through dirty udders, improperly sanitized milking equipment, and cows with subclinical mastitis **(Amagliani *et al.*, 2012).**

It has been shown that some factors such as poor milking hygiene has been associated with increased incidence of mastitis,somatic cellcount (SCC)whichusedasasystemfor measurement of milk quality internationally and total bacterial count also reduced milk production and inferior milk quality **(Jadhav *et al*. 2016 and Martins *et al.* 2017).**

Machine milking may be considered as a major cause of bacterial cross contamination from cow to cow so a good pre-milking hygiene routine can decrease mastitis and cow infection ratio by not only reducing udder bacterial contamination from the environment, but also reducing bacterial contamination from other infected cows **(Hutchison *et al.* 2005).**

The process of preparing teats for milking has several other advantages, which include promoting milk letdown, speeding up the milking process, and helping to ensure that, the maximum amount of available milk is harvested without causing damage to the sensitive teat tissues. The aim of any teat cleaning routine and pre-milking procedure is not only to reduce mastitis infection risk, but also to enhance milk quality. Many methods of pre-milking udder preparation are practiced by producers and over all; one of the most important aspects of pre-milking udder hygiene is udder dryness at the time of machine attachment. **(Gleeson, *et al.* 2009)** reported that pre-dipping reduced the rate of intrammamary infection with major mastitis pathogens such as *Staphylococcus aureus*, *Streptococcus agalactiae* and Coliforms. Pre-milking preparation procedures resulted in lowering bacterial counts as reducing the microbial count on teats and is an important step in the prevention of mastitis and enhance milk quality. Pre- dipping technique was an effective for controlling cow mastitis and the type of disinfectant product used as a pre-dip may have varying degrees of success in reducing the microbial count on teats **(Gibson *et al.* 2008).** Many products can be used in teats pre-milking with various disinfectant products such as iodophor solution, iodine-based gel, hydrogen peroxide, chlorine, chlorhexidine, phenolics, and alcohol **(Gibson *et al.* 2008).**

Furthermore, iodine products when used as a pre-dip significantly decreased SCC and were an effective pre-milking treatment for controlling cow mastitis**. (Zucali *et al*. 2011).**

Hydrogen peroxide, as a sanitizing agent, has the inherent benefit of breaking down into water and oxygen leaving no residues or side products. It has been used as a teat dip additive and

has shown to possess good antimicrobial properties over a broad spectrum of pathogens **(Jessica, 2012).** Recently, high levels of iodine found in milk have been a human health concern. Excess exposure to iodine-based teat dips can potentially affect the milk, as iodine can permeate skin. Children under the age of 8 have a daily iodine requirement of approximately 90 µg with a maximum iodine limit of 300µg, and adults have a daily iodine requirement of approximately 150 µg per day, with a maximum iodine limit of 1100 µg. It is important that humans are not ingesting excess iodine from dietary sources. Pre-milking disinfection can pose a substantial risk of iodine transfer to milk, as it is dependent on the degree of removal from the teats prior to cluster attachment; if not sufficiently removed the iodine may enter the milk directly during milk removal or may be absorbed through the teat skin **(Borucki, *et al*., 2012)**.

So the objective of this study was to investigate the effectiveness of pre-milking teat preparations (Iodine and Hydrogen peroxide) on incidences of mastitis, SCC, the prevalence of (staphylococcal, streptococcal and coliform) infections and total bacterial count of milk in addition to measurement of iodine residues in milk and assessment the status of teats after using hydrogen peroxide.

MATERIAL AND METHODS

Collection of milk samples:

A total No. of seventy Holstein cows were enrolled in this study. Cows were collected randomly and divided into 3 groups; in the first group (25 cows) iodine 0.5% was used as pre-dipping disinfectant, the second group (25 cows) hydrogen peroxide (Hydroxil 0.5%) was used as pre-dipping disinfectant while the third group (20 cows) was used as control group.

In this study milk samples were collected twice from the three groups. First, according to the farm system, this has no pre-dipping preparation system only washing of the udder and teats. Several investigations as California mastitis test, somatic cell counts, isolation of bacterial pathogens, total bacterial counts and measurement of iodine residues were applied.

Then 3 weeks later and after applying pre-dipping preparation for the udder and teats using iodine and hydrogen peroxide as disinfectants, milk samples were collected from cows of the three groups for the same previous investigations.

Somatic cell count:

SCC was measured by using cartilage of (Nucleo counter SCC-100) chemometec.

Bacteriological examination:

Milk samples were cultured on blood agar media, Mannitol salt agar, Edward's medium, MacConkey's agar plates and brain heart infusion agar media then incubated at 37°C for 24-48 hrs. Suspect colonies were examined for colony morphology, Gram stain characteristics and motility. Gram negative bacilli and Gram-positive cocci were further subjected to IMVIC tests, TSI, urease hydrolysis, catalase, oxidase and coagulase tests as well as other standard biochemical tests acc. to **Koneman *et al*., (2005) and Quinne *et al*., (2011).**

Total bacterial counts:

Examined milk samples were freshly cultured using pouring technique on standard plate agar media before and after 3 weeks of pre-dipping udder preparations for investigation of total bacterial counts acc. to **Koneman *et al*., (2005 and Quinne *et al*., (2011).**

Pre-dipping technique: (National Mastitis Council, 2004)

Udder and teats of cows were washed then teats in first group were disinfected with iodine 0.5% then dried with individual disposable paper towels approximately 30 seconds prior to milk. In the second group teats were disinfected with hydrogen peroxide (Hydroxil 0.5%) as pre-dipping preparation then wait to dry. While the third group was considered a control one as the udder and teats were washed only then dried with paper towels.

Measurement of iodine residues by using Gas chromatographic method (Bakker, 1977):

A Hewlett packard 5830A gas chromatograph, equipped with automatic injection, a 15 mCi Ni ^{63} electron capture detector, and a 2 mm id x 3.05 glass column packed with 10% SE 30 on 100\120 Gas chrom Q was used. Samples and standards were tested isothermally. The time to do one sample was approximately 4 min. Column temperature was 120ºC, inlet temperature 150 ºC, detector temperature 220º C with 95% argon / 5% methane carrier gas at 56 ml/ml. Total inorganic iodine content of milk was determined by forming a volatile iodobutanone derivative. Sample iodine content was determined using regression analysis (average r^2 =.99) from standard curves of iodobutanone derivatives produced from known weights of potassium iodide. For each standard curve, six different concentrations of standard were done in duplicate. Standard curves were prepared daily. The method by **Bakker (1977)** was modified as following: 50 ml glass stoppered centrifuge tubes were substituted for separatory funnels and the quantities of sample and reagents were scaled down by factor of 4 **(Dellavalle and Barbano1984).** Detection limit of this method was approximately 25 µg/L of milk.

Statistical analysis:

The obtained results were subjected to analysis of variance according to Sendecor and **Cochran (1982).** Values were expressed as mean ± SE. Statistical comparisons between the means of different experimental groups were made with completely randomized one-way ANOVA ″Student _ Newman _ Keuls test ″by COSTAT program version one. A probability ″P″ value of <0.05 was assumed for statistical significance.

RESULTS

Table (1) revealed that there was high incidence of subclinical mastitis in examined animals of the three groups before pre-dipping udder preparation procedure as in the first and second groups percentages of subclinical mastitis decreased from 76% to 40% and 80% to 44% respectively while in control group the percentage of subclinical mastitis increased from 80 % to 95 %.

Table (1): Incidences of subclinical mastitis before and after using pre-dipping preparation.

	Subclinical mastitis			
	Before		After	
	No	%	No	%
Iodine (25 cows)	19	76	10	40
H2O2(25 cows)	20	80	11	44
Control (20 cows)	16	80	19	95

*** Percentages were calculated acc to total No. of examined animals in each group.**

Somatic cell count was investigated in this study as shown in (Table 2) which explained the effect of pre-dipping technique in milking procedure on SCC. Mean SCC was decreased from 480,000 cells/ml to 270,000 cells/ml and decreased 560.000 cells/ml to 350.000 cells/ml in the first and second group respectively. While in control group SCC increased from 530.000 cells/ml to 680.000 cells/ml along the period of study.

Table (2): Somatic Cell Counts (SSC) before and after using pre-dipping preparation.

	* Mean Somatic cell counts X 1000 /ml	
	Before	After
Iodine	480±20	270±33***
H2O2	560±44	350±25***
Control	530±30	680±70**

***Mean SCC ±S.E (Stander Error),**

˝P˝ value of <0.05 was assumed for statistical significance.

Table (3) showed the prevalence of isolated microorganisms from examined milk samples before and after using pre-dipping disinfectants. In first group incidence of *Staphylococcus* spp.,*Streptococcus* spp. and *E.coli* infections were 92%, 72% and 96% respectively then these percentages were decreased to 72%, 36% and 44% respectively after using iodine in pre-dipping procedure. While in second group,*Staphylococcus* spp.,*Streptococcus* spp. and *E.coli* infections were decreased from 84%, 80% and 88% to 76%, 48% and 40% respectively after using H2O2 in pre-dipping procedure.

In control group, the prevalence of isolated microorganisms was increased from (90% to 100%), (85% to 95%) and (90% to 100%) in *Staphylococcus* spp.,*Streptococcus* spp. and *E. coli* infections respectively.

Table (3): Prevalence of isolated microorganisms from examined milk samples before and after using pre-dipping disinfectant.

	***Staphylococcus* spp.**				***Streptococcus* spp.**				***E.coli***			
	Before		**After**		**Before**		**After**		**Before**		**After**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Iodine (25 cows)	**23**	**92**	**18**	**72**	**18**	**72**	**9**	**36**	**24**	**96**	**11**	**44**
H2o2 (25 cows)	**21**	**84**	**19**	**76**	**20**	**80**	**12**	**48**	**22**	**88**	**10**	**40**
Control (20 cows)	**18**	**90**	**20**	**100**	**17**	**85**	**19**	**95**	**18**	**90**	**20**	**100**

*** Percentages were calculated acc to total No. of examined animals in each group.**

The effect of pre-dipping disinfectants on total bacterial counts were explained in (Table 4) which showed that both iodine and hydrogen peroxide had an effect in reducing total bacterial count from 550,000/ml to 150,000/ml when iodine was used in pre-dipping and decreased from 480,000/ml to 200,000/ml when H2O2 was used. In contrast, total bacterial count was increased from 570,000 /ml to 655,000/ml in control group.

Table (4): The effect of pre-dipping disinfectants on total bacterial counts of examined milk samples**.**

	Total bacterial count/ml	
	Before	**After**
Iodine	**550,000±40,000**	**150,000±20,000*** **
H2o2	**480,000±46,000**	**200,000±23,000*** **
Control	**570,000±60,000**	**655,000±65,000*** **

″P″ value of <0.05 was assumed for statistical significance.

Table (5) revealed that an iodine residue in examined milk samples was 195.76±17.27 ug/l in control group and 210.55±22.34 ug/l when iodine used as pre-dipping disinfectants.

Table (5): Iodine residues in examined milk samples after pre-dipping.

	Pre- dipping with Iodine	**Control**
Mean Iodine residues ug/l	**210.55±22.34 ug/l**	**195.76±17.27 ug/l**

Results of teat cracking were explained in (Table 6) ich revealed that 52% of teats had no cracking, 36% showed minor cracking, 12% showed mild cracking while no teats (0%) showed sever cracking after using of H2O2 in pre-dipping.

Table (6): Teat cracking after using hydrogen peroxide as pre-dipping disinfectants.

	***NO**	**%**
No cracking	**13**	**52**
Minor cracks	**9**	**36**
Mild cracks	**3**	**12**
Sever cracks	**0**	**0**

***Numbers and percentages were calculated acc to total No. of the group (25 cows).**

DISCUSSION

Pre-dipping preparation of the udder and teat sanitization is to achieve an acceptable level of decontamination of teat skin thus aids in reducing the spread of microorganisms and incidence of mastitis. In this study we tried to clarify the importance of pre-dipping udder preparation and its effect on occurrence of subclinical mastitis, SCC, bacterial invasion and total bacterial counts. Also, evaluation of both iodine residues in milk and cracking of the teats after using of hydrogen peroxide as pre-dipping disinfectant.

Results of this study approved the value of pre-dipping preparation of the udder as it was clear that there were significant differences in incidence of subclinical mastitis due to minimizing the number of bacteria that find their way into the raw milk supply as in the first and second groups percentages of subclinical mastitis decreased from 76% to 40% and 80% to 44% respectively unlike to control group we found the percentage of subclinical mastitis increased from 80% to 95% and this is may be due to new intramammary infections.

Many studies agreed with ours and revealed that pre-milking udder preparation and teats disinfection has been shown to reduce bacterial numbers on teat skin prior to attachment of milking clusters therefore decrease new intramammary infections and incidences of mastitis **(Gleeson, *et al*.,2009; Dufour, *et al*.,2011 and Baumberger, *et al.,* 2016).** Moreover **Gibson *et al.* (2008)** showed similar results and stated that pre-dipping preparation followed by a dry wipe was a most effective treatment for controlling cow mastitis and reducing milk contaminants.

Also **Morton *et al.* (2014)** assured the benefits of pre-milking teat disinfection especially heavily soiled teats when presented for milking. On the contrary **Rowe *et al.* (2018)** found that pre-dipping had no benefits in reducing of clinical mastitis.

One of the key ways that a dairy can quantitatively determine milk quality is by measuring milk somatic cell count (SCC).Somatic cell count acts as an indicator of a cow's susceptibility to mastitis, and when the entire herd is monitored, it quantifies the effectiveness of the dairy's hygiene practices.When SCC levels increase it is considered a chance for developing of mastitis.

The correlation between pre-dipping of teats and SCC in the examined milk samples was studied. The results showed an increase in SCC in control group and decrease in SCC after pre-dipping that may decrease intramammary infection. These results agree with **Gibson *et al.* (2008)** who said that, commercially available disinfectant products may appear to use similar ingredients, the levels and strength of ingredients with additional emollients may influence

the success of a product in reducing SCC and improving teat condition over a longer period. At the same time **Pavičić *et al* (2008)** reported that without using disinfectants in udder preparation, the average SCC demonstrates a continuous increase.

Likewise, **Zucali *et al.* (2011)** stated that pre-dipping and post-dipping had lower teat contamination and lowered milk SCC than farms that did not carry out pre dipping operation.

On the other hand our results disagree with **Gleeson *et al*. (2018),** who reported that SCC was similar in both non-disinfected and disinfected (pre-milking) teats but as the same time they added that, the low initial herd SCC and the small difference in new intramammary infections observed may account for no significant differences in SCC levels observed over the lactation for milk from disinfected teats compared to milk from teats that did not receive pre-milking disinfectant.

In this study the incidences of *Staphylococcus*, *Streptococcus* and coliform bacterial infections were lower in disinfected and dried teats with paper towels when compared to that with no preparation prior to cluster attachment. The present results showed that, the use of both iodine and H2O2 as disinfectant products for pre-milking teat preparation had beneficial effects on reducing the levels of *staphylococcal* and *streptococcal* pathogens compared to no preparation of the udder and teats in the control group.

These results agreed with many previous studies that showed that teat disinfection reduced bacterial levels and prevent new intramammary infections as **Pavičić *et al* (2008)** revealed that teat disinfectant, reduced the numbers of mastitis causing bacteria *S agalactiae* and *S. aureus* by 71-80 % and decreased the number of new infections in relation to udders treated with iodine.

Previosly, Myllys and Rautala (1995) stated that when teat preparation was omitted, increased teat colonization could be expected and this may result in new intramammary infection that was concured with the findings of **Nickerson, (2001)** who reported that pre-dipping can reduce the rate of intramammary infection with major mastitis pathogens. Also the use of a 0.25% Iodine solution pre-milking has also been shown by **Oliver *et al.* (1993)** to reduce major pathogen intramammary infections resulting from *S. uberis* and *S. dysgalactiae* by as much as 49%.

Gleeson, *et al.* (2009) found that when 'Iodine' was used as a pre-milking disinfectant, while it significantly reduced bacterial numbers, it was 2.3 times more likely to reduce *staphylococcal* and 1.24 times more likely to reduce streptococcal counts on teats compared to 'Washing and drying' or no preparation treatments. They added that, the reduction in the coliform count with any of the teat preparation treatments used was low. This may be influenced by a low initial level of coliform pathogens present prior to treatment. Teat washing combined with drying with individual paper towels reduced *staphylococcal, streptococcal* and coliform pathogens compared to 'No preparation' and was particularly effective in reducing *streptococcal* counts when used on cows indoors compared to outdoors. Pre-dipping with disinfectant has been found to be most effective against environmental bacteria such as *E. coli* and *S. uberis* **(Edmondson, 2002).** In general, when cows were housed indoors the procedure was found to reduce the incidence of new intramammary infection (IMI) caused by environmental pathogens by greater than 50%.

Jessica (2012) stated that, Hydrogen peroxide is a relative newcomer to the marketplace. Although there were only a few National Mastitis Council protocol studies on hydrogen peroxide, the anecdotal data is quite good and there are some challenge tests that indicate it was effective against the major mastitis-causing pathogens.

Total microbial count of collected milk samples was examined before and after pre-milking of teat preparation and the results revealed that total bacterial counts decreased after using both iodine and H2O2 in udder preparation from 550,000 cfu /ml to 150,000 cfu/ml and from 480,000 cfu/ml to 200,000 cfu/ml respectively. In control group total bacterial counts increased from 570,000 cfu/ml to 655,000 cfu/ml. Therefore, using products as iodine and H2O2 in pre-dipping of the teats in this study significantly influenced the microbial count of milk as it decreased to nearly acceptable bacterial count and that encouraging dairy farms to apply pre-dipping hygienic measures.

The current results came in parallel with many works, recently **Gleeson *et al.* (2018)** stated that, the teat disinfectant products used for pre and post milking on the different farms may partially account for differences in bacterial counts observed on teat skin.

However, differences in environmental conditions and milking management were more likely to have accounted for these differences as bacterial levels. Previosly, **Ingawa *et al.* (1992)** showed that both iodine-based gel and 0.5% iodophor solution significantly reduced milk bacterial count and clinical mastitis occurrence compared to teat washing and drying with

paper towels. Furthermore,**Gibson *et al.* (2008)** concluded that most pre-milking teat cleaning treatments reduce the teat total bacterial count, but that cleaning effectiveness was influenced by the type of disinfectant and the application methods.

The results obtained from the current study also were in agreement with other studies of sanitation in milking hygiene, where it has been established that implementation of disinfecting agents in udder hygiene prior to and after milking can signicantly reduce the average microorganism count in fresh raw milk **(Pavičić *et al.,* 2003; Petrovic *et al.,* 2006 and Pavičić, *et al*., 2008).** This effectively improved the microbiologic quality of the milk in a relatively short time period, with the proviso that other sanitation procedures, including sanitation of milking equipment, were conducted in primary milk production **(Petrovic *et al.,* 2006).**

Milk and dairy products contribute highest proportion of iodine to the human diet and pre-milking disinfection can pose a substantial risk of iodine transfer to milk **O'Brien *et al.* (2013).** Iodine found in milk comes from the diet and teat disinfection products used during milking process. One of the objectives of this study was to evaluate iodine residues in milk after pre-dipping udder preparation with iodine. Iodine residue was in normal range in 2 groups (iodine group and control group) as it was 210.55 ug/l and 195.76 ug/l respectively so it was suggested that it can be used safely in pre-dipping preparations with recommended concentrations.

It was suggested that an appropriate iodine level in bulk tank milk should remain below 500 µg/kg. This can be done by: proper use of teat dips; proper cleaning and drying of the teats; assuring that dietary iodine levels be limited to requirements only **(Elizabeth, *et al*. 2016).**

Borucki, *et al*., (2012) supported our results and revealed that, Pre dipping teats with an iodine-based sanitizer is an acceptable practice, but must be performed with the appropriate product and completely wiped off before milking and they added, iodine concentration in disinfectants greatly affects iodine residue in milk as 0.5% iodophor teat dip contributes to less iodine in milk than a 1% iodophor teat dip **O'Brien *et al.* (2013)** recommended monitoring of iodine residues in milk monthly to avoid increasing the level of iodine in milk.

Rasmussen *et al.* (1991) concluded that pre-dipping with 0.5% iodine solutions followed by complete drying of the teat did not significantly increase milk iodine concentrations. However, pre-dipping with 1% iodine solution increased the milk iodine content and added that when

pre- and post-milking iodine teat disinfectants varying in concentration of iodine from 0.25% to 0.5% were discontinued, milk iodide levels immediately decreased.

However, including'Iodine' as a pre-milking teat preparation treatment may have implications for milk residues as pre or post dipping with an iodine product can increase iodine levels in milk **(Galton *et al.* 1984).** Therefore, correct disinfectant concentration and drying after application with paper towels must be advised to reduce milk residues. Also, **Lacasse *et al.* (2012)** added that, pre dipping teats with an iodine-based sanitizer is an acceptable practice, however, it must be performed with the appropriate product and the sanitizer must be completely wiped off before milking.

Maintaining good teat end / skin health is recognized as an essential element in mastitis prevention and animal welfare. Teat dips should have both teat end and teat skin health data evaluation, and show excellent teat health prior to use and commercialization.

In this study evaluation of teat cracking was done to evaluate the effect of H2O2 as a new pre-dipping disinfectants on the skin of teats and the results revealed that 52% of teats showed no cracking followed by 36% of teats showed minor cracking and 12% of teats showed milk cracking while no sever teat cracking were observed. These cracks were undesirable as it considered predisposing factor to occurrence of mastitis. These results disagree with **(Jesse and Leo 2011)** who reported that, teats dipped with hydrogen peroxide-based product had significantly higher teat skin scores (poorer skin condition) within one week of initiating dipping and remained that way throughout the experimental dipping period. They also added that, histological evaluation showed premature skin peeling of normal skin (perakertatosis) on all hydrogen peroxide tissue samples.

On the other hand, **Leslie *et al.* (2006)** showed that, the experimental hydrogen peroxide-based teat disinfectant provided efficacy similar to that of the positive control teat disinfectant, with significant improvement in teat skin condition and no adverse effects on teat end condition. Also, **Nickerson (2001)** indicated that H2O2 as disinfectant provided a wide spectrumofcontrolagainstmostmastitis-causing bacteria throughitsoxidizing action.

Hydrogen peroxide may be combined with lactic acid, which results in the formation of alpha hydroxy acids. This combination aids in the desquamation of dead teat skin and improves teat skin condition, thereby minimizing bacterial colonization on the teat skin surface. So, we recommended that, changes to the hydrogen peroxide-based dip need to be made into to improve teat skin performance before it can be made commercially available as adding some

emollients or moisturizers to provide a soothing effect on the teats, and in some cases include glycerol or propylene glycol to provide soft and healthy teat skin, free of lesions, sores scabs and calluses.

CONCLUSION

In conclusion this study revealed the effectiveness of pre-milking dipping to control mastitis and improve milk quality,we therefore recommend the wholesale use of this practice in Egypt farms. Bacterial incidences, specifically staphylococcal and streptococcal and coliform were significantly reduced when pre-dipping udder preparation was applied to the udder and teats. The practice of washing and drying did reduce bacterial numbers compared to pre - dipping technique and pre-milking teat disinfection must be followed by teat drying using individual paper towels to minimize the possibility of chemical residues in milk. Generally, it would be an advantage for the dairy industry to have a teat dip composition that could both remove pathogens that cause mastitis with minimal irritation of the teat skin to help preserve the health of the teat skin.

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