

TEAT DIP- POST DIP- PRE DIP- STRIPING



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Introduction

The prevention of bovine mastitis is the most important component of a mastitis control program, and both pre- and post-milking teat antiseptics are the most effective procedures for preventing new intramammary infections (IMI) in dairy cows. These procedures involve dipping teats of dairy cows before and after milking with an appropriate germicidal preparation to reduce teat skin colonization and contamination with mastitis-causing bacteria and minimize penetration into the teat canal.

Protocols for determining efficacy of teat dips have been developed and used to evaluate more than 300 experimental and commercial formulations. The protocols have been accepted by scientists, commercial companies, and regulatory agencies throughout the nation and world. Because of the attention given to efficacy of teat dip products and the availability of acceptable testing methods, manufacturers have developed highly efficacious germicidal products that reduce the incidence of mastitis by 50 to 95%. The accompanying reduction in level of mastitis in U.S. dairy herds alone represents a savings of millions of dollars annually.

In the last 25 years, teat dipping or spraying with a germicidal solution immediately after every milking has been an effective management tool to reduce the rate of new IMI in dairy cows, especially those caused by the contagious pathogens such as *Staphylococcus aureus*, *Streptococcus agalactiae*, *Mycoplasma bovis*, and *Corynebacterium bovis*. Post milking teat antiseptics is regarded as the single most effective practice for the prevention of mastitis. More recently, pre milking teat sanitization has been introduced and has been widely adopted to minimize the number of potential intramammary pathogens on teat ends prior to attachment of milking machines; these pathogens include the environmental

bacteria such as *Streptococcus uberis*, *Escherichia coli*, and *Klebsiella pneumoniae*.

Establishment of IMI requires penetration of mastitis-causing organisms through the teat canal, and researchers agree that the number and types of bacteria on teat skin have a direct relationship to the incidence and type of mastitis that develops. Teat dipping is a simple, effective, and economical means to reduce bacterial populations on teat skin both before and after milking, and an abundance of published evidence shows that this practice will reduce the rate of infection among dairy cows. However, the duration of existing infections is not affected, and it may take several months before the herd level of infection is reduced after teat dipping is initiated.

A variety of germicides are incorporated into teat dip products and include iodine, chlorhexidine, quaternary ammonium, sodium hypochlorite, dodecyl benzene sulfonic acid, chlorine, nisin, hydrogen peroxide, glycerol monolaurate, and fatty acids. These germicides destroy bacteria through chemical or biological action such as oxidation-reduction mechanisms, denaturation/precipitation of cytoplasmic proteins, inhibition of enzyme activity, and disruption of cell membranes. Teat sanitization procedures, germicide classes used, and efficacy testing are described below.

PRE DIPPING

The primary objective of pre milking udder preparation and teat sanitization is to achieve an acceptable level of decontamination of teat skin. This aids in reducing the spread of microorganisms and incidence of new IMI, and in minimizing the number of bacteria that find their way into the raw milk supply. In addition, 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.

With the decrease in mastitis caused by contagious mastitis organisms such as *Staph. Aureus* and *Strep. Agalactiae*, concern has increased regarding mastitis caused by environmental microorganisms, especially coliforms and environmental streptococci that contaminate teats and udders primarily between milking. This has led to widespread use of a pre milking sanitation procedure known as pre dipping.

This control method originated at the University of California, Davis, where researchers were attempting to prevent new cases of clinical coliform mastitis. It was theorized that pre dipping instead of udder washing before milking might help to minimize the amount of water on teat ends remaining from wash pens or prep stalls, and effectively reduce the number of bacteria on the teat surface, which serve as potential mastitis pathogens. To accomplish this, teats were dipped before milking in an iodine product instead of using an udder wash to reduce the coliform bacterial load on the teat skin, followed by drying with paper towels. This procedure was more effective than the udder wash in killing bacteria, and resulted in lowering the somatic cell count (SCC), but it was irritating to the teat skin. In addition, iodine residues were found in milk. However, switching to a lower iodine concentration for the pre dip prevented skin irritation, reduced residues in milk, and resulted in up to a 80% reduction in the new rate of infection.

The effectiveness of this pre milking udder preparation procedure was confirmed in subsequent efficacy studies at Cornell University, the University of Vermont, and the University of Tennessee. Iodine concentrations in the products evaluated

in these investigations ranged from 0.1 to 0.5%, and researchers stressed the need to thoroughly dry teats prior to machine attachment to avoid iodine residues in milk. In general, pre dipping was found to reduce the incidence of new IMI with environmental pathogens by greater than 50% compared with udder washing and drying with individual paper towels. In one study, pre dipping was also found to reduce the new infection rate against *Staph. aureus*; however, this practice was not effective against the coagulase-negative staphylococci.

The effectiveness of pre dipping is dependent upon the organic load to which teats are exposed during the inter milking period. Bacterial challenge studies as well as natural exposure trials suggest that exposure to a heavy load of environmental pathogens shortly after milking reduces the effectiveness of pre dipping. However, minimizing the bacterial load by keeping cows clean for 1 to 2 hours after milking maximizes the benefits of this practice.

The pre dip procedure involves

- 1) Pre cleaning of teats as necessary,
- 2) Forest ripping,
- 3) Dipping or spraying teats with a proven germicidal pre dip product,
- 4) Allowing the recommended contact time (15 to 30 seconds),
- 5) Drying each teat thoroughly with a single service paper towel or laundered cloth towel to remove surplus germicidal product, microorganisms, and organic material, and

6) Attaching teat cups to the dry udder. In some instances, the preferred method is to apply the pre dip, wait the recommended contact time, and fore strip followed by wiping; the additional benefit of massaging the teat during forest ripping may massage the dip into the teat skin and aid in the removal of surface microorganisms. Pre dipping is sometimes done without prior washing of teats, and germicide is often placed on top of manure and dirt present on teat skin. This practice is not likely to reduce the incidence of mastitis or lower the SCC, and will probably reduce milk quality. Manure and dirt must be removed to realize the full benefits of pre dipping.

Herds experiencing a problem with environmental mastitis should consider adopting this simple procedure. Only products proven effective should be used as pre dips and they should be used in strict accordance with manufacturer recommendations. It should be stressed that pre dipping does not replace good udder preparation, and after milking units are detached, post milking teat dipping should also be continued. When used in conjunction with all other procedures, pre dipping is an asset to the total mastitis control program.

Post milking Teat Dipping

The transfer of some organisms is inevitable at milking time, even under the best of hygienic conditions. To destroy mastitis organisms on teats at the end of milking, it is necessary to dip teats in a suitable disinfectant soon after milking machines are removed. Post milking teat dipping is the most effective milking hygiene practice for preventing new infections caused by the two most common contagious mastitis organisms, Staph. Aureus and Strep. Agalactiae.

The concept of teat disinfection after milking dates back to 1916, when dilute pine oil was used in an effort to reduce the spread of *Strep. Agalactiae*. However, the practice was not adopted widely for several decades because supporting research data were not available on existing teat dip products. The practice of post milking teat antisepsis was revived in Canada, where researchers at the University of Ontario, Guelf, showed that the practice of dipping teats in a disinfectant after milking led to reductions in mastitis-causing bacterial populations on teat cup liners. Subsequent studies at the National Institute for Research in Dairying in England confirmed Canadian observations in large field trials, and led to extensive investigations at Cornell University, where post milking was included as a component of a comprehensive mastitis control program.

It is now widely accepted that the vast majority of post milking teat dip products will reduce the new infection rate by at least 50% and some products as high as 95%. Only products shown by research to be safe and effective should be used. This involves using a product registered with the Food and Drug Administration (FDA). The label for such products will provide information on each active ingredient, instructions for use, the manufacturer, a production lot number, and an expiration date. Responsibility for generating conclusive evidence of effectiveness belongs to the manufacturer. Dairy farmers should require evidence that a product meets FDA regulations and is effective in preventing new udder infections.