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mastitis control and milk quality

## Post-milking Teat Disinfection Fact Sheet

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### Introduction

The rate of new intramammary infections is related to a number of variables, not least of which is exposure of the teat end to mastitis-causing pathogens. These potential pathogens can be found in the cow's environment, inside milking unit liners, colonizing or contaminating normal teat skin (especially near the orifice), or in colonized or infected teat skin lesions, e.g. abrasions, wounds, or fly bites. Disinfecting teats immediately after milking cluster removal at every milking kills a significant proportion of the potential pathogens on the teats, aids in healing of teat skin lesions, and helps optimize skin condition. This in turn reduces the chance of pathogens entering the mammary gland.

Post-milking teat disinfection is especially effective at reducing the number of pathogens associated with contagious mastitis, e.g. *Staphylococcus aureus* and *Streptococcus agalactiae*. While milking procedures can facilitate the spread of any type of mastitis pathogen, *Staphylococcus aureus* and *Streptococcus agalactiae* primarily spread from cow-to-cow during the milking process. *Staphylococcus aureus*, *Streptococcus dysgalactiae* and *Trueperella pyogenes* readily colonize teat skin lesions. Effectiveness of controlling infection with different mastitis-causing pathogens will vary according to the product being used. It has long been considered that post-milking teat disinfection may be less effective in reducing the new infection rate with "environmental" pathogens, such as coliforms and *Streptococcus* spp. other than *Streptococcus agalactiae*, e.g. *Streptococcus dysgalactiae*. Various products have approved claims to control some of these environmental pathogens. Hence, one should always consult the product label when selecting products to control a particular pathogen type. Notably, control of environmental pathogens should also be focused on other management practices, such as maintaining cows in a clean, dry environment, good pre-milking hygiene, and using milking machines designed, installed and operating to specification and appropriate standards. Even in well-managed herds where somatic cell counts are low, milking technicians should continue post-milking teat disinfection as a routine part of milking procedures.

Post-milking teat disinfectants can also be formulated to address specific environmental or weather conditions.

This Fact Sheet will address various types of post-milking teat disinfectants. Always thoroughly review manufacturer label claims and directions for mixing, use, and storage prior to deciding if a product is right for your farm.

### Expectations

The rate of new intramammary infections can be reduced by 70% or more by disinfecting all teats of all cows with an effective product immediately after every milking, compared with no disinfection. Teat disinfection does not affect existing mammary gland infections, but may reduce colonization of the teat end by mastitis pathogens and thus reduce the chance of new intramammary infections. Existing subclinical intramammary infections are best eliminated by antimicrobial therapy during the dry period or by culling chronically infected cows. Post-milking teat disinfection is an important step in preventing new intramammary infections and thus reducing the prevalence of mastitis in a dairy herd over the long term. Consistent application of post-milking teat disinfectants along with other milking time hygiene procedures and housing cows in a clean environment will lead to improvements in udder health, including fewer cases of clinical mastitis and/or lower herd somatic cell counts.

### Application

Acceptable methods for applying post-milking teat disinfectants include dipping or spraying. Either method should be done in a manner that thoroughly covers the entirety of all four teats. The disinfectant should be applied immediately after milking cluster removal at every milking.

### Proper Handling

Refer to NMC's "Proper Storage and Handling of Teat Disinfectants" for additional information.

### *Storage*

- Store teat disinfectants in cool, dry areas.
- Do not allow disinfectants to freeze.
- Keep containers closed to prevent contamination.
- Do not assume that all teat disinfectants will kill all pathogens. Some mastitis pathogens can survive in some disinfectants under certain conditions.

### *Instructions for use*

- Follow manufacturer material safety data sheet (MSDS) and label instructions.
- Use teat disinfectants at the manufacturer recommended concentration.
- Do not dilute unless indicated on the label. If dilution is necessary, use the recommended type of water (e.g. pathogen-free, correct pH and hardness).
- Use a clean container for diluting and mixing the final product.
- Do not use expired product.

### *Dip cups*

- Empty and clean disinfectant dip cups after every milking or if they become contaminated during milking.
- Ensure the supply of disinfectant is sufficient for the whole milking.
- Never pour used disinfectant back into the original container.
- Discard and replace damaged disinfectant dip cups.

### *Sprays*

- Only products that are formulated for spray application should be used in teat spray systems.

- Ensure the supply of disinfectant is sufficient for the whole milking.
- When manually applying the spray, use a lance or wand to extend the sprayer under the teats.
- Platform, fixed, or robotic sprayers should target the teats and provide complete coverage of all teats of all cows.
- The teat spray nozzle should provide spray droplets no less than 10 µm to limit inhalation and absorption by the operator.

#### *Automated milking systems*

- Only use products that are formulated to provide complete teat coverage when applied via AMS, noting that product application varies depending on type of AMS.
- Calibrate the system to achieve adequate coverage of all four teats.
- If any mixing or dilution of teat disinfectants is required, take the necessary steps to ensure that the products are mixed to the correct concentrations per manufacturer guidelines.
- Verify that the teat disinfectant is compatible with the materials of construction used in the delivery system.

#### Products to Use

Good teat disinfectants have efficacy against the major mastitis pathogens, are economical, easy to apply, and help maintain or promote good skin condition. Use only products that are registered or licensed with the appropriate regulatory authority in your jurisdiction. For example, the Food and Drug Administration (FDA) for the United States, the Veterinary Drugs Directorate (VDD) of Health Canada for Canada, or the European Medicines Evaluation Agency (EMA) for Europe. In the United States, FDA regulates teat disinfectants as over-the-counter drugs and does not require proof of effectiveness. In contrast, in Canada, teat disinfection products must complete a full submission and approval process for veterinary drugs. This process includes evaluation of efficacy, safety, residue and manufacturing data. Products approved by the aforementioned agencies will generally claim to aid in the control of mastitis. Be aware of products that are attempting to mimic those that are registered, as well as unregistered or unlicensed products that may claim to be a disinfectant but have no label claim for mastitis control; avoid such products.

Dairy producers should request information from the manufacturer or supplier on the registration or licensing and results of controlled research studies showing efficacy

#### Testing Teat Disinfectants

Refer to NMC's "Testing of Teat Disinfectants for Efficacy in Preventing Intramammary Infections" for additional information.

NMC recommends two methods for testing teat disinfectant efficacy or effectiveness. Efficacy is generally measured in controlled trials, whereas effectiveness usually refers to the product's performance during its "real-world" application on the farm. Protocols for experimental challenge and natural exposure are described briefly below. NMC does not advocate for any efficacy trials using unapproved protocols.

Regulatory authorities in different jurisdictions will have specific requirements for registration or licensing. Approved products will have a license number, registration number, drug identification number or similar regulatory body approval designation that is shown on the container label.

### Teat Disinfecting in Different Seasons

#### *Barrier Teat Disinfectants*

Barrier teat disinfectants are designed for use when environmental challenges pose a higher risk of intramammary infection to cows.

While NMC recognizes that there is no industry-wide definition for barrier teat disinfectants, in general, barrier disinfectants are designed to leave a protective barrier or film on teat ends and/or leave a plug in the teat canal. This film or barrier should remain intact over a period of time. The time period can range from approximately one hour to ensure the teat sphincter muscles have relaxed and closed post milking to the length of time between milkings. In addition, there are special barrier disinfectants that are used at dry off that last for several days.

Due to their film-forming properties, barrier disinfectants should not be applied to cows' teats as a pre-milking disinfectant, as they are not easily removed with either paper or cloth towels and could leave a residue that would enter the milk stream. Most barrier disinfectants are unsuitable for spraying as they are too viscous and block spray nozzles.

Barrier disinfectants should be tested for efficacy against common environmental pathogens, such as *Escherichia coli*, *Klebsiella* spp., and *Streptococcus uberis*. Barrier disinfectants should also be tested for efficacy against common contagious mastitis pathogens, such as *Staphylococcus aureus* and *Streptococcus agalactiae*. Several barrier disinfectant products have proven effective in trials using NMC guidelines for testing efficacy of teat disinfectants.

#### *Winter Teat Disinfectants*

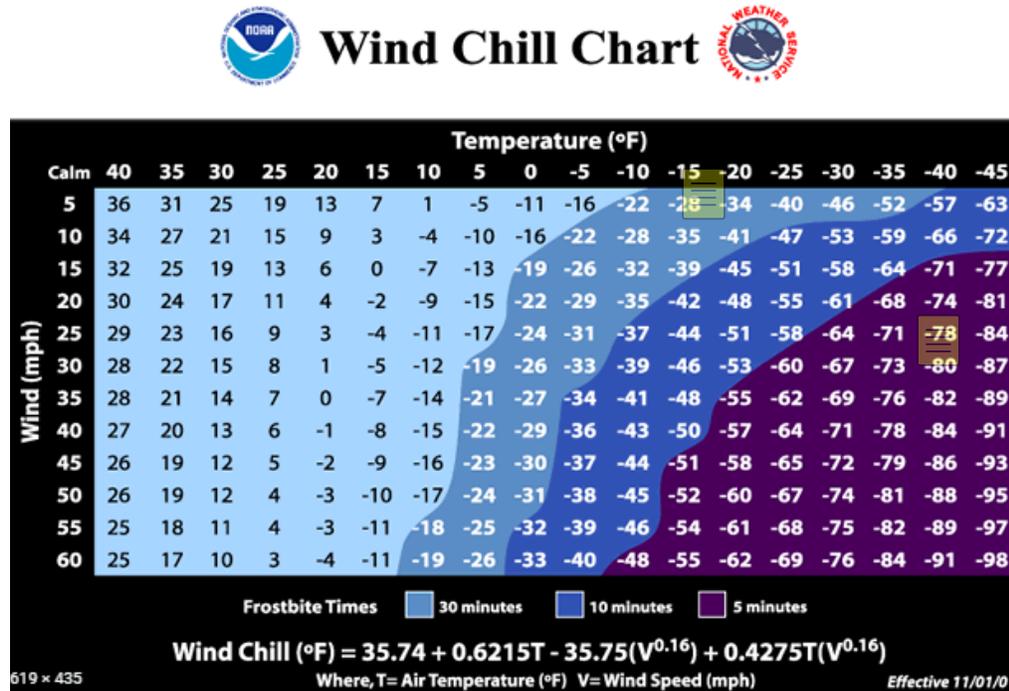
Winter disinfectants are designed for use in extreme winter weather conditions. Broadly, this relates to the changes in teat health caused by exposure to sub-freezing air temperatures, extreme wind chill, and changes in humidity. Cow housing system can be an important factor, as wind exposure can be greater in open-lot systems, whereas humidity levels may be higher in some confinement settings.

Cold temperatures cause the cow to use more of her energy to protect her body. Much like other animals (humans included), the energy is used to protect vital organs first. Further, blood flow to peripheral tissues is diminished to maintain body temperature. Cold temperatures also cause the skin to lose some of its natural oils and fatty acids, resulting in drying and chapping of skin.

Some winter teat disinfectants are formulated to improve skin condition by incorporating a minimum of 50% emollients. While these ingredients lower the freezing point of the teat disinfectant, they are not specifically included as a freeze point depressant. Even though the teat dips will not freeze at temperatures below the freezing point of water, this physical feature does not provide a protective barrier against cold temperatures. Hence, it is important to follow the

manufacturer guidelines regarding use of teat disinfectant products during sub-freezing temperatures.

The wind chill chart below shows the relationship between ambient temperature, wind speed, and the risk of frostbite to human skin dependent on exposure time. Cows’ body temperature is slightly higher than humans, but the results are very similar.



There are two physical forms of winter teat disinfectants on the market today – liquids and powders, with liquid disinfectants being more common.

It is extremely important for the dairy producer to monitor weather conditions, as well as the animal’s housing environment during adverse cold conditions. This will be key to determining the type of post-milking disinfectant to use. As with any post-milking disinfectant, winter products should be tested for efficacy against common mastitis-causing organisms and should only be used according to manufacturer recommendations.

*Recommendations for Avoiding Chapped or Frozen Teats in Cold Weather*

- Disinfect all teats after every milking using a high emollient concentration product. Winter teat disinfectants with greater than 50% emollients may be useful in extreme conditions.
- Warm teat disinfectants during cold conditions to reduce drying time.
- Provide windbreaks for cows in outside areas.
- Closely monitor animals that have just calved; they are more susceptible to chapped and frozen teats.
- Monitor skin condition for chapping; refer to “NMC Teat Condition Portfolio.”

### *Other Considerations*

In warmer and dry conditions, such as summer, a lower emollient concentration may be used. In pasture systems at high latitudes, teats may be exposed to an excessive level of UV light during extended daylight lengths. A UV barrier teat disinfectant may be useful to minimize the risk of sunburn.

### Summary

- Teat disinfection is an important part of the NMC mastitis control plan.
- Many new udder infections can be prevented with proper post-milking teat disinfection.
- Choose an appropriate teat disinfectant for the prevailing environmental and climatic conditions.
- Only use a product with proven efficacy or effectiveness.
- Handle teat disinfectants properly, as prescribed in the manufacturer's MSDS.
- Use teat disinfectants at the manufacturer's recommended concentration.
- Apply teat disinfectant to all teats of all cows immediately after every milking.
- Ensure that the disinfectant thoroughly covers the entirety of all four teats.

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