

# Chlorine Dioxide and Teat Conditioning—It Works!

It's been clear for years: the chlorine dioxide class of teat dips effectively prevent mastitis. Numerous studies following NMC protocols prove it.<sup>1</sup> Satisfied customers around the globe applaud it. And somewhere along the way, while these dips were working hard to protect cows from mastitis, a welcome upshot became apparent: bad teat ends improved with chlorine dioxide usage.

Though no formal study unveiled this discovery, positive field reports have poured in and continue to do so. Its effect on bad teats has been so predictable, even foremost milk quality consultants have taken note, recommending chlorine dioxide teat dips to help heal teats with hyperkeratosis, or rough teat ends.<sup>2,3</sup> Their observations indicate the chlorine dioxide class of teat dips are very effective in softening keratin, allowing keratin removal with aggressive action during udder prep.

## Softening is Key

The question has been posed that if chlorine dioxide (ClO<sub>2</sub>) “dissolves hyperkeratotic tissue, wouldn't it also dissolve skin?”

Chlorine dioxide does not “dissolve” hyperkeratotic tissue. It softens it for easier removal. Lactic acid, the activator in the system, (the same activator as in all ABS udder care products) is an alpha-hydroxy acid (AHA). The functional benefits provided by AHAs are skin softening and exfoliating.<sup>4</sup>

## What about the pH?

There are claims that low pH is bad while products with moderate pH (pH about 5 or 6) are more desirable for skin. These generalizations about pH are not accurate. It is recognized that a strong acid can be corrosive to skin; however, not all acidic products are bad for skin. Chlorine dioxide products, with pH levels ranging from 2.7 to 3.2, are proof. Lab testing of these products



Teat exfoliation as a result of ABS udder care products



End result of exfoliation, healthy teat condition


shows improved skin hydration. Field experience echoes the lab results. Furthermore, one can design a pH 5 iodine teat dip that can be very harsh to skin. Therefore, it is difficult to make broad cause-and-effect generalizations on pH.

“We have measured the skin surface pH of cows' teats and they are essentially neutral,” says Dr. Joseph Morelli, Ecolab Senior Scientist. “This has been examined by researchers in Germany. Prolonged application of a ClO<sub>2</sub> teat dip vs. a nil treatment control had no significant impact on the skin pH.<sup>5</sup> What does this tell us? There is no basis, physiological or otherwise, to say one pH is better than another. In addition, use of a low pH formula does not significantly alter the skin's inherent pH.”

## Summary

As you consider your teat dip selection, remember:

1. Chlorine dioxide softens hyperkeratotic tissue for easier removal.
2. Chlorine dioxide pH level does not alter the skin's inherent pH.

To learn more about ClO<sub>2</sub> please see the question and answer section below. 

<sup>1</sup> Summary of Peer-Reviewed Publications  
[www.nmconline.org/docs/Teatbibl.pdf](http://www.nmconline.org/docs/Teatbibl.pdf)

<sup>2</sup> Johnson, A. 2003. Hoard's Dairyman, May 10, p. 341.

<sup>3</sup> Reid, D.A. and A. P. Johnson. 2003. 42nd Annual National Mastitis Council Meeting Proceedings, pp. 124-127.

<sup>4</sup> FDA Draft Guidance.  
[www.cfsan.fda.gov/~dms/ahaguide.html](http://www.cfsan.fda.gov/~dms/ahaguide.html)

<sup>5</sup> Fox, L.K., L.Y. Oura, and C.R. Ames. 2003 J Dairy Sci. 86 (12):3951-2.

## What is Chlorine Dioxide?

Chlorine dioxide (ClO<sub>2</sub>), the primary germicide in ABS udder care products, is an incredibly effective broad-spectrum, anti-inflammatory, bactericidal, fungicidal and virucidal agent. Chlorine dioxide has been recognized for its disinfectant properties since the early 1900's. In 1967, the EPA first registered the liquid form of ClO<sub>2</sub> for use as a disinfectant and sanitizer.

## Where else has ClO<sub>2</sub> been used for disinfection?

Although ClO<sub>2</sub> has been used in udder disinfection for the past 20 years, it is no stranger to many other industries and has been used commercially for over 60 years. It is used for disinfection and odor control and is known for its broad-spectrum killing ability.

Some examples of industrial ClO<sub>2</sub> use include:

- washing fruit and vegetables
- disinfecting meat and poultry
- disinfecting food processing equipment
- controlling odors
- medical disinfection
- treating municipal water
- bleaching pulp and paper
- electronics - circuit board cleaning

In addition, in November 2001, the EPA began to use liquid ClO<sub>2</sub> in the cleanup of government buildings against Anthrax.

### **Is ClO<sub>2</sub> the same as bleach?**

No. While ClO<sub>2</sub> has chlorine in its name, chlorine dioxide's chemistry is radically different than that of chlorine. Bleach is a hypochlorite/hypochlorous acid, which is a more corrosive oxidizing system. Chlorine dioxide is gentler on hands and teat skin and has less tendency to become inactivated by organic matter (mud, manure, milk) than bleach.

### **Is ClO<sub>2</sub> non-toxic? What about residues?**

Chlorine dioxide is residue safe. The active ingredients break down to products naturally found in the environment - organic acids and sodium chloride (table salt). It is environmentally friendly and not harsh on teat skin. In fact, all of the ABS formulations are fast, safe and effective.

### **What are the advantages of a ClO<sub>2</sub> udder care product versus an iodine?**

Chlorine dioxide products are more effective under organic load. When milk, mud or manure are present on teats, these organic materials increase the pH on the

skin. Iodine is negatively affected by these pH increases and loses killing ability with the organic material present. Chlorine dioxide is not affected by this high pH level when organic materials are present and is able to maintain killing ability.

Also, ClO<sub>2</sub> products have proven to have a quick kill – a 15 second kill as proven in standardized tests developed by the Association of Analytical Chemists (AOAC). With these AOAC testing methods, germicides must achieve a 5-log reduction in 15 seconds to be considered effective. The ABS udder care products provide a 5-log kill in 15 seconds – with and without a 10% milk load. 