

# Evaluation of Experimental Chlorine Technology Pre and Post Milking Teat Dips vs. a Commercial Hydrogen Peroxide Pre Dip and Iodine Barrier Post Milking Teat Dip on Teat End and Teat Skin Condition and Health

## A.S. Leaflet R2884

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### Summary and Implications

Objectives were to evaluate (using half udder design model) a novel chlorine predip and postdip combination (ECAlogix™ System) versus a control commercial hydrogen peroxide pre-milking teat dip and iodine barrier post milking teat dip on overall teat end and teat skin condition and health. There were 3 pens (10, 11, and 12) in the trial (7 weeks). Pen 12 (48 cows) had all teats dipped with current herd pre and post dips (herd sentry pen). Pen 11 (48 cows) and Pen 10 (24 cows) had left side teats dipped with commercial herd pre and post dips while right teats were dipped with 1000 ppm chlorine predip and 2000 ppm chlorine post dips (experimental prototypes). Teat skin (1=normal, 2=slightly dry; 3 = chapped) and teat end (1-1.5 = normal; 2-3= smooth ring; 3.5-4 = rough ring; 4.5-5 very rough ring) scoring was performed two times per week. Mixed procedure of SAS with repeated measured (mixed model with quarter within cow as a repeated measure) were used to analyze average teat skin score (TSS), average teat end scores (TES), and % rough teats, with  $p < .05$  considered significant. Prior to trial initiation, pens 12 (sentry) and 11 (experimental) had similar and higher TSS, TES, and % rough teats (1.08, 2.5, and 60%) compared to pen 10 (1.01, 2.1, 30-40%: used in a previous trial with experimental chlorine post dips that improved teat integrity). Pen 12 (sentry) showed no overall change in TSS, TES, and % rough teat ends during the trial. Chlorine dipped teats in pens 11 and 10 showed significantly better ( $p < .01$ ) TSS, TES, and % rough teats than control dipped teats within 10 days of trial initiation (1.01, 2.0, 30-40% vs 1.03, 2.6, and 60%, respectively) and maintained this improved teat integrity through the trial. Prototype chlorine teat dips were stable and provided significantly better teat skin and teat end health and integrity compared to commercial products.

### Introduction

Maintaining good teat end / skin health is recognized as an essential element in mastitis prevention and animal welfare. In addition to excellent germicidal activity, all teat dips should have both teat end and teat skin health data evaluation, and show excellent teat health prior to use and commercialization. The objectives of this trial was were to

evaluate (using half udder design model) a novel chlorine predip and postdip combination (ECAlogix™ System – ZurexPharmagra) versus a control commercial hydrogen peroxide pre-milking teat dip and iodine barrier post milking teat dip on overall teat end and teat skin condition and health.

### Materials and Methods

1. **Initial base germicidal product:** The initial base germicidal compound generated through ECAlogix™ System (Zurex PHARMAGRA) was designed to have 8000 ppm chlorine. All chlorine dips developed and evaluated in this trial used appropriate dilutions of this base germicidal solution in addition to designated additives for pre and post milking teat dips.
2. **Cows:** All protocols were approved by ISU Committee on Animal Care (IACUC # 10-06-6228-B). Pens 10 and 11 (previous chlorine development trials) were used where both experimental pre and post dips were used together in a half udder design (right side teats dipped with experimental pre and post dips, left teats with control commercial teat dips (Trial 3). A third pen of 48 animals (Pen 12) was scored across all 3 trial periods (herd sentry pen). This pen used commercial herd dips used throughout the trial periods and served as a base herd comparison (figures not shown in these reports).
3. **Trial design and farm practices:** Trial 3 evaluated experimental chlorine dips vs. commercial products.
  - **Pens 10 and 11 Trial 3:** Both pens 10 and 11 were dipped the same. Control teats received commercial herd dips (.5% hydrogen peroxide pre-dip and 1% iodine barrier postdip) while experimental or treated teats were pre-dipped with 1000 ppm chlorine solution with .36% PREP and post dipped with 2000 ppm chlorine solution with 7.27% POST ( 7.27% POST BLUE after 9/24).
  - Cows were milked 3X a day in a double 12 parallel parlor. Cows were forestripped (3 strips/teat) and pre-dipped (6 cow sequence), then dried with terry cloth towels prior to milker unit attachment. All cows were post dipped following unit removal. Automatic detachers were set at 2.0 lb. flow rate and 0 second delay. Commercial herd pre milking teat dip was a .5% hydrogen peroxide with 5% emollient (Active Oxy55, Boumatic, Inc). Commercial post milking teat dip was a 1% iodine, 10% emollient low drip barrier teat dip (Bovi-Kote, Boumatic). All

cows were housed in free stalls with stalls containing a Packmat (subsurface rubber filled mattress 4" below curb height; Promat, Inc.) and 4-6" of deep bedded recycled manure solids (fiber).

4. **Teat skin and teat end health evaluations:** Trial 3 was conducted from August 23 through October 17. Teat skin and teat end scoring were performed using a variation of the Goldberg and Timms methods, respectively, by trained graders (Tables 1 and 2). Scoring was performed two times per week. Data was entered into an Excel database. Results were compiled and analyzed using SAS.
5. **Statistical models:** SAS was used in all data analysis. Mixed procedure of SAS with repeated measured (mixed model with quarter within cow as a repeated measure) were used to analyze teat skin and teat end data, and % cracked / rough teats, with  $p < .05$  considered significant. The models were repeated measure analyses of variance models with treatment, date and their interaction as fixed effects, whereas pen, cow and quarter as random effects.

**Results and Discussion**

1. **Teat skin health and integrity:** Average teat skin scores for pen 11 and 10 for Trial 3 (ECAcept vs. commercial dips in half udder trials) are shown in Figures 1-2.
  - **Pen 11 (ECAcept pre / post dips):** There were no difference between control and treated teats (ECA pre and post). Average teat skin score range was 1.00 – 1.09 (0-9% teats scoring 2). ECA dips had numerically similar or lower ATSS at all evaluations compared to controls.
  - **Pen 10 (ECAcept pre / post dips):** There were no difference between control and treated teats (ECA pre and post-dips). Average teat skin score range was 1.00 – 1.01 (0-1% teats scoring 2) following trial initiation. Teat skin health was excellent in this pen

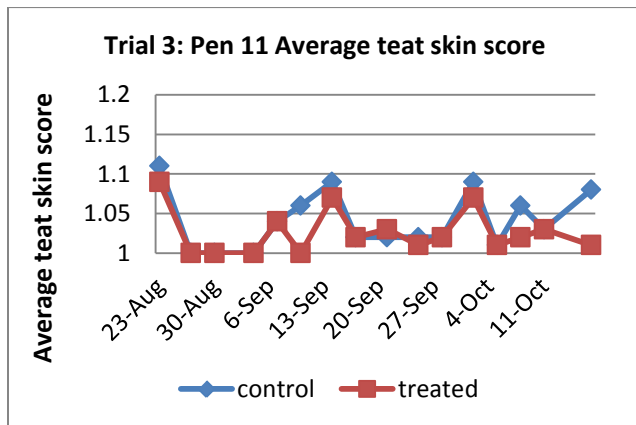


Figure 1. Average teat skin scores for Pen 11 in Trial 3 (commercial vs. ECAcept pre / post dips).

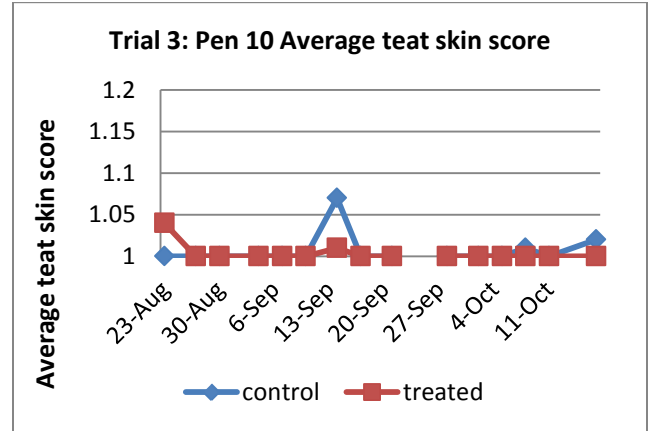


Figure 2. Average teat skin scores for Pen 10 in Trial 3 (commercial vs. ECAcept pre / post dips).

1. **Teat end health and integrity:** Average teat end scores and % rough cracked teats for Trial 3 (half udder ECAcept vs. commercial) for pen 11 and 10 are shown in Figures 3-6.
  - **Pen 11 (ECAcept pre / post vs. commercial post):** Teats dipped with ECA pre and post dips had significantly better teat end scores and % rough teats within the 1<sup>st</sup> 10 days of the trial and continued through trial end(  $p < .01$  for teat end scores;  $p < .05$  for % rough teats). At trial end, control teats had ATES and % rough teats of 2.6 and 60%, respectively whereas ECA pre/post dipped teats had 2.1 ATES and only 40% rough teat ends with a trend towards continued improvement (Figs. 3, 5).
  - **Pen 10 (ECAcept pre / post vs. commercial post):** Teats dipped with ECA pre and post dips had significantly better teat end scores and % rough teats within the 1<sup>st</sup> 10 days of the trial and continued through trial end(  $p < .01$  for teat end scores;  $p < .05$  for % rough teats). At trial end, control teats had ATES and % rough teats of 2.6 and 60%, respectively whereas ECA pre/post dipped teats had 2.1 ATES and only 40% rough teat ends (Figs.29-30). Although these results are similar to Pen 11, these occurred by ECA dipped teats remaining similar to previous trials in this pen (Pen 10) where ECA post dips were used and teats were significantly better than the sentinel pen. Significant differences in this pen resulted from poorer teat ends when commercial post dip was applied.
  - **Overall summary for teat ends: Trial 3:** Average teat skin scores and health were similar between control (commercial) and treated (ECAcept pre and post dips) in Pens 10 and 11 (trial pens). However, average teat end scores and % rough / cracked teats for ECAcept pre-post

dipped teats were significantly lower and better compared to commercial dipped controls within 10 days of trial initiation ( $p \leq .01$  for ATEs;  $p \leq .05$  for % rough ends) and remained that way throughout the trial. Results in pen 11 were due to improvement of teat ends when ECApost dips were applied. Results in Pen 10 (where ECAposts had already been on for Trials 1 and 2 and teat end were already significantly improved) were due to decreased teat end health when commercial dip was applied. Overall, pens 10 and 11 were dipped the same and after 10 days of the trial, ECAccept dipped teats had similar teat end scores and % rough across those pens (2.1 ATEs and 40% rough), while commercial dips had similar scores (2.6 ATEs and 60% rough).

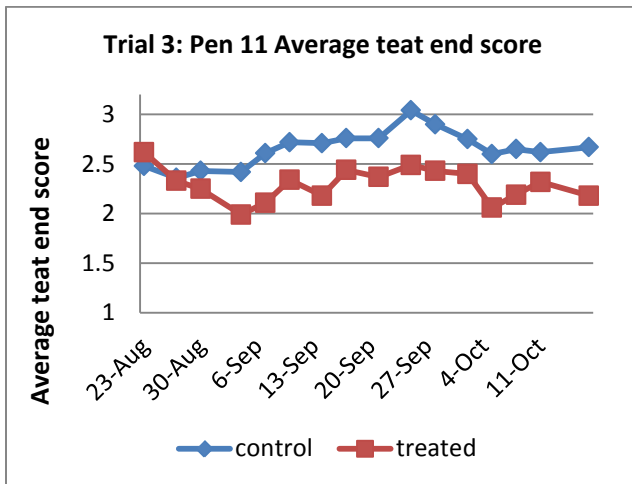


Figure 3. Average teat end scores for Pen 11 in Trial 3 (ECAcept pre/post vs commercial dips).

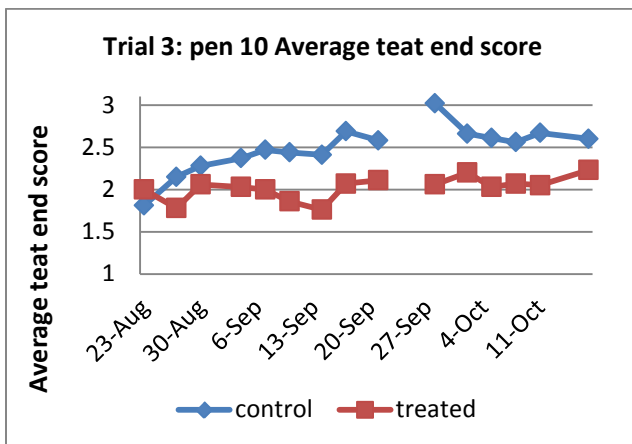


Figure 4. Average teat end scores for Pen 10 in Trial 3 (ECAcept pre/post vs commercial dips).

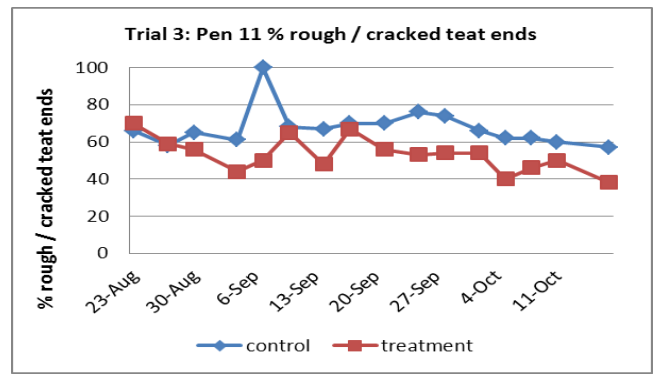


Figure 5. % rough/cracked teat ends for Pen 11, Trial 3 (ECAcept pre/post vs commercial dips).

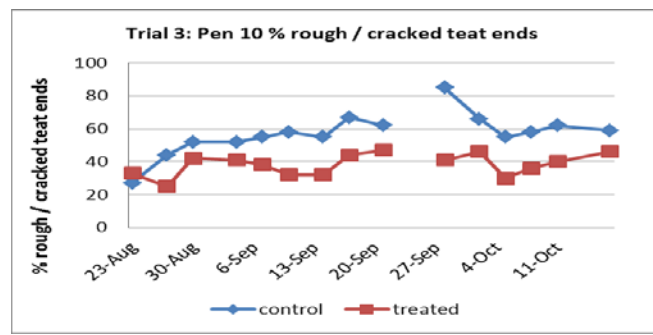


Figure 6. % rough/cracked teat ends for Pen 10, Trial 3 (ECAcept pre/post vs commercial dips).

➤ **Other summary points for trial 3:**

- *ECAccept dips (especially post dips) significantly improved teat end health even in the face of some milking machine issues.*
- All pens in these trials had higher than normal teat end scores compared to many previous trials at ISU. Higher average TES and % rough teats were due to a combined 3X milking interacting with some automatic take off teflon diaphragm issues. However, these problems were equal across all pens, and ECA post dip was able to overcome some of these effects and improve teat ends and skin in the face of these herd issues.

**Overall Summary**

1. **Dips and teat skin health and integrity:** All dips showed excellent teat skin health.
2. **Teat end health and integrity:** Teats dipped with ECAccept chlorine pre / post dips had significantly better teat ends (lower scores and % rough by 7 days into trial and remained that way throughout).

**OVERALL CONCLUSION:** Prototype chlorine teat dips were stable and provided significantly better teat skin and teat end health and integrity compared to commercial products.

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**Table 1. Teat Skin Scoring Scale**

<b>Score</b>	<b>Description</b>
<b>0</b>	Teat skin has been subjected to physical injury ( stepped on/ frost bite)
<b>1</b>	Teat skin is smooth, soft and free of any scales, cracks, or chapping.
<b>2</b>	Teat skin shows some evidence of scaling especially when feeling (areas of dryness by feeling drag when sliding a gloved hand along the teat barrel &/or seeing areas of lower reflective sheen to the surface of the skin).
<b>3</b>	Teat skin is chapped. Chapping is where visible bits of skin are visibly peeling.
<b>4</b>	Teat skin is chapped and cracked. Redness, indicating inflammation, is evident.
<b>5</b>	Teat skin is severely damaged / ulcerated / open lesions.

**Table 2. Teat End Scoring Scale (0\*- 5)**

<b>Teat End Scoring system</b>	<b>Degree of hyperkeratosis or callousing</b>				
<b>Cracking</b>	none	minor	mild	moderate	severe
No cracking	<b>1</b>	<b>1.5</b>	<b>2</b>	<b>2.5</b>	<b>3</b>
Cracked	<b>---</b>	<b>3.5</b>	<b>4</b>	<b>4.5</b>	<b>5</b>

0\* zero score – physical injury of teat not associated with trial