

Evaluation of Teat Coverage Persistency and Teat Health for 4 Dry Period Persistent Barrier Teat Sealant Dips (Hydromer)

A.S. Leaflet R3084

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Summary and Implications

Mastitis research has shown that 40-50% of intramammary infections (IMI) are contracted during the dry or non-lactating period with the greatest percentages of these occurring during the first and last two weeks of the dry period. The ability to develop and apply external persistent barrier teat dip products (like a liquid bandage) that can persist for these 1 week periods could decrease IMI, thus improving animal health and performance, and product quality and safety. The objective of this study was to evaluate and compare 4 persistent barrier dry cow teat sealant dips with particular interest and comparisons of dip persistency in providing teat end protection, and overall teat end and skin health.

Cows dipped with all dips had significantly greater persistency and protection compared to previous 4 trials (last 2 years). All dips were easy to apply and showed excellent teat health. Films were very consistent and very flexible over time (limited ripping, shredding or flaking). Overall, Dip E showed greatest persistency in the first 4-5 days post dipping which is a very critical time period.

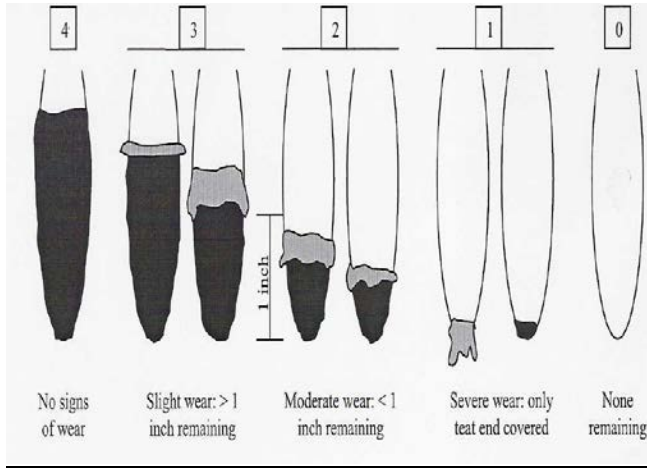
Introduction

Mastitis research has shown that 40-50% of intramammary infections (IMI) are contracted during the dry or non-lactating period with the greatest percentages of these occurring during the first and last two weeks of the dry period. At these times, the mammary gland is in a transitional state. Immunological factors are preoccupied or suppressed, milk is not being flushed from the gland, and increased mammary pressure distends the teat, thus allowing for easier bacterial penetration through the streak canal. Both external persistent sealant (2-5 day adherence) dips and internal teat sealants have been developed and shown to decrease IMI rates, especially environmental mastitis, in dry cows/ springing heifers during the early dry and late parturition periods when used properly. The ability to develop and apply external persistent barrier teat dip products (like a liquid bandage) that can persist for these 1 week periods could decrease IMI, thus improving animal health and performance, and product quality and safety. The objective of this study was to evaluate and compare 4 persistent barrier dry cow teat sealant dips with particular interest and comparisons of dip persistency in providing teat end protection, and overall teat end and skin health.

Materials and Methods

1. **Dips used:** 4 dips were used in this trial. The four dips were named T-Hexx Dry C (Dip C), T-Hexx Dry – E (Dip E), T-Hexx Dry F (Dip F), and T-Hexx Dry H (Dip H). Prior to this study, 2 other trials were conducted (Trial 1: T-Hexx A, B, C, D compared; Trial 2: T-Hexx E,F,G, H compared) and the 4 best performing dips were chosen for this subsequent study.
2. **Cows:** All protocols were approved by the ISU Committee on Animal Care. 24 dry cows and pregnant heifers (~ 2-4 weeks pre-calving) were used for the study. Cows were housed in a free stall barn with sand bedding and headlocks on the south side of the ISU dry cow barn. Cows were fed and locked up at 6:30 am Tuesday, April 14, 2015.
3. **Animal ID and teat health evaluation** (initial and final): 24 animals in lockups were visually identified by eartag. All teats of all animals were cleaned and dried with terry cloth towels. If teats were visibly dirty, teats were pre-dipped first with a 350 ppm chlorine predip and then dried with the towel. Individual teat ends and teat skin for every animal were evaluated by one scorer using the system below at this time (initiation of trial) and again once the dip had completely been removed from the teat following dipping (final evaluation). Comparisons between dips as well as between evaluation periods were conducted.
4. **Teat dipping and dripping / drying evaluations:** Dip was dispensed into dixie cups for dipping and refilled as needed. 24 total cows were dipped in an individual quarter design (4 different dips/cow). **Dips were applied to teats in randomized fashion in order to make equal amounts of dip comparison combinations on both front and rear teats.** This is extremely important since there are dip persistency differences between front and rear teats within cow but not right to left side teat differences. Observations of film or dip thickness, color, dip dripping and/or stringing of dip, and dip wastage via animal leg movement, etc. were noted. Some cows were photographed on day 0 (dip day) and day 3 post dipping (see end of report).
5. **Teat dip persistency evaluation:** Teat dip persistency or coverage of teats (especially teat ends) was conducted every 24 hours. Teat dip coverage was scored using a 0-4 scale: (4= complete teat adherence similar to originally dipped; 3 = dip starting to peel but on $\frac{3}{4}$ of teat; 2 = 50% of teat covered; 1 = teat end only covered; and 0 = dip completely off. Observations on dip shearing, flaking, or tearing were also recorded.

Each teat was given a score (day when dip was last seen) and means and medians for each dip are in the database spreadsheet (T-Hexx Dry Study April 2015). Each of the 6 dip combinations or comparisons (C v E, C v F, C v H, E v F, E v H, and F v H) ended up with 8 observation with 4 on front teats and 4 on rear teats.



Results and Discussion

1. Teat end and teat skin health

- There were no differences among dips with regards to teat skin and teat end health. All teats had excellent teat skin and teat end health before dipping and after dip removal.

2. Teat dip film coverage:

- Dip films on Day 0: Dips C, E, F, and H went on very fluently with some dripping but all gave very uniform films.
- Dip films on Days 2 and later: All dips were reasonably flexible with good films. There was limited or no ripping, shearing, or flaking.
- Dip thickness, stickiness, and reasonable drying times are very important. We dip not dip any different than we have in previous experiments and all cows had dip dried before being released to lie down. All dips looked and did very well from a film standpoint!

3. Teat dip persistency and coverage: Figure 1 represents % of teat ends of quarters and cows (since 4 dips / cow or 1 quarter/ cow) protected relative to dips used and days post dipping for each dip across all combinations.

- a) **Average/ median minimum retention times:** Average/ median minimum retention times (days) for Dips C, E, F, and H were: 4.5, 4; 4.7, 5; 4.2, 4; 4.4, 5;
- b) **Dips C vs. E:** (n = 8): C > E 4; C = E 1; C < E 3
- c) **Dips C vs. F:** (n = 8): C > F 3; C = F 3; C < F 2
- d) **Dips C vs. H:** (n = 8): C > H 4; C = H 1; C < H 3
- e) **Dips E vs. F:** (n = 8): E > F 3; E = F 3; E < F 2
- f) **Dips E vs. H:** (n = 8): E > H 1; E = H 5; E < H 2
- g) **Dips F vs. H:** (n = 8): F > H 1; F = H 3; F < H 4

h) Overall comparison of dips having higher, same, or lower persistency (24 observations/ dip):

DIP	TEAT PERSISTENCY		
	HIGHER	SAME	LOWER
C	11	5	8
E	7	9	8
F	5	9	10
H	9	9	6

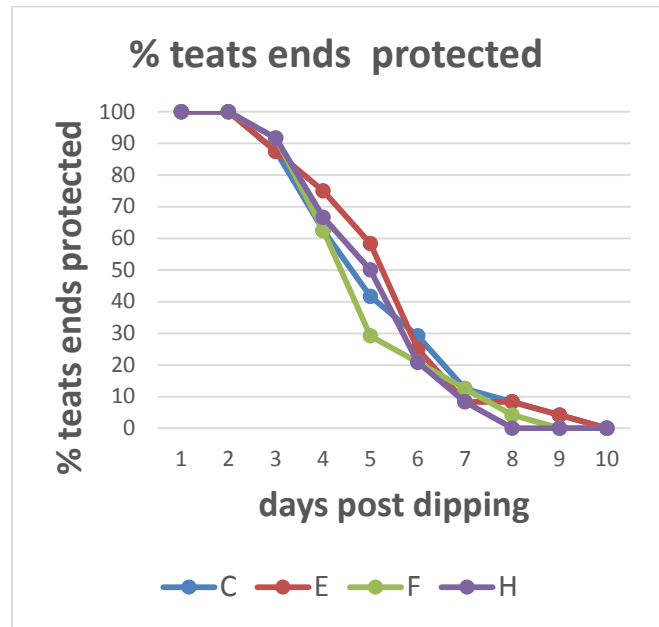


Figure 1. % of teat ends / cows protected by days post dipping and different dips (C, E, F, and H). Remember, this data represents cumulative data of dip (24 cows and 24 quarters).

- **On certain days, each dip can perform slightly better than the other so 1 dip not always 100%.**
- **We are looking for small differences (1-2 days) so looking at graphs and trends are key.**
- On days 1 and 2 post dipping, all dips protected all teats very well (100%).
- On day 3, all dips had similar persistency (88-92%) which are all excellent persistency.
- On days 4 and 5, Dip E > H > C > F
- On day 6 Dip C and E with slight advantage.
- On day 7, all dips equivocal.
- All dips off by day 10!!
- **Overall: Dip E had greatest persistency at days 4-5, followed by Dip H, C, and F.**

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Overall Summary

- **Ranking the Dips on adherence at days 4-5: E > H > C > F.** Although each dip (highest or lowest) can show variability among cows (even the lowest adherent dip can stay longer on an individual cow), Dip F certainly has the lowest average and median retention times and lowest persistency at day 5 ; and Dips C and H had more 2 teat comparisons within_cow where they scored greater retention than Dip E.
- All dips were easy to apply and showed excellent teat health. Films were very consistent and very flexible over time (limited ripping, shredding or flaking).
- Overall adherence of dips in this study were excellent and better compared to most previous studies, including the 2014 studies
- Differences in top 3 dips very slight; ranking of dips may vary compared to parameter used!

Table 1. Teat Skin Scoring Scale

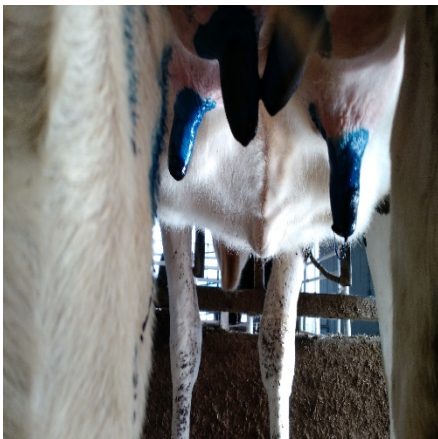
Score	Description
0	Teat skin has been subjected to physical injury (stepped on/ frost bite)
1	Teat skin is smooth, soft and free of any scales, cracks, or chapping.
2	Teat skin shows some evidence of scaling especially when feeling (areas of dryness by feeling drag when sliding a gloved hand along the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

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

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

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

Cow pictures: 4/14/2015 Day 0 (10 minutes post dipping)



Cow pictures: 4/17/2015 Day 3

