



Evaluation and comparison of protective efficacy and teat coverage persistence between two long-lasting teat sealant dips: a field trial and an *in vitro* model

Objective

Two complementary studies to evaluate and compare the efficacy of two external teat sealants: Dip A: T Hexx Dry® (Huvepharma US product) with 0.1% triclosan, and Dip B: Blue V Seal®, a new antibiotic-free formulation.

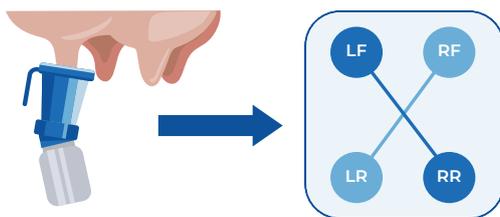
Study 1 A randomized controlled field trial to assess dip persistence in providing teat end protection.

Study 2 An *in vitro* simulation model using rubber calf-feeding nipples to evaluate the barrier properties of each formulation in preventing bacterial penetration.

Study design

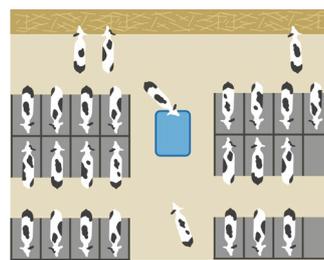
| Study 1 | Cows at enrollment | Mature cows | Nulliparous cows |
|---------|-------------------------------|----------------------------|------------------|
| | Days in milk | 324 ± 31 | 643 ± 28 |
| | Days carried calf | 225 ± 1 | 249 ± 5 |
| | Milk production | 69 ± 17 lbs/d | - |
| | Somatic cell count at dry off | 202 ± 531 x 1,000 cells/mL | - |

Teat dip application



- Dip A (T Hexx Dry®)
- Dip B (new Blue V Seal®)

LF = Left front teat
 RF = Right front teat
 LR = Left rear teat
 RR = Right rear teat



Mature (≥ 1 lactation) pregnant Holstein cows (n=27)



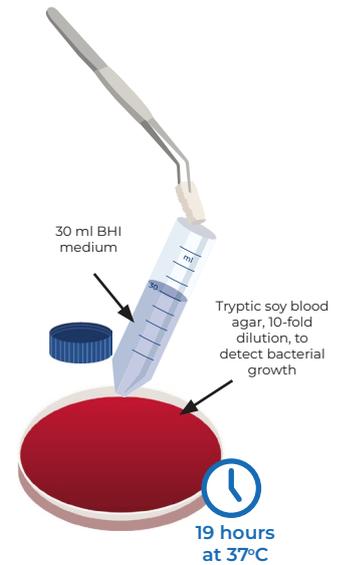
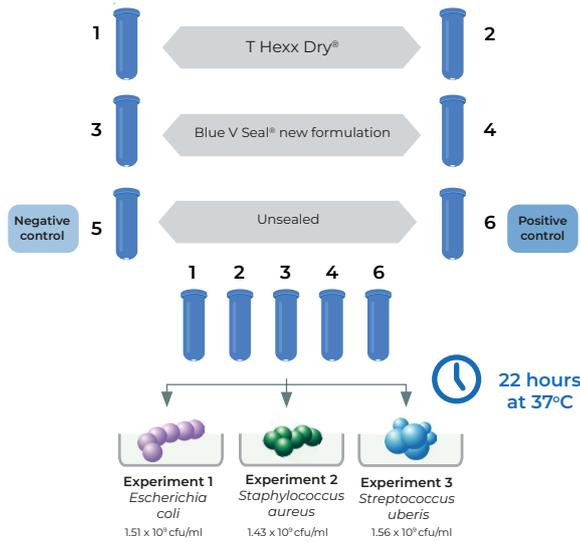
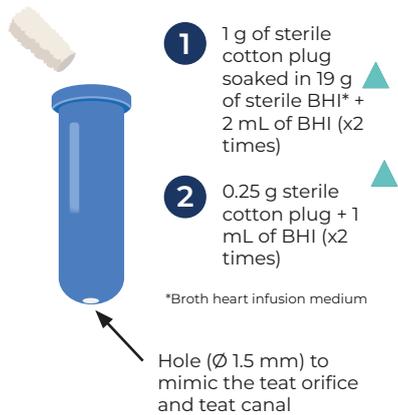
Nulliparous pregnant Holstein cows (n=27)

Teat dip coverage



Individual teat end (1-5 scale) and skin (0-5 scale) evaluated at enrollment and in the final evaluation.

Study 2

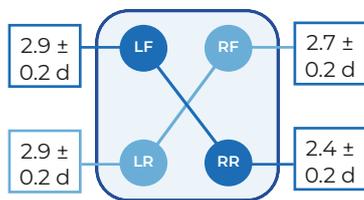


Results

Study 1

Teat dip persistence

Quarter



Teat dip persisted for longer in front quarters than in rear quarters.

Parity



Nulliparous
2.1 ± 0.2 d



Multiparous
2.1 ± 0.2 d

Teat dip persisted for approximately one day longer in nulliparous cows compared to mature cows.

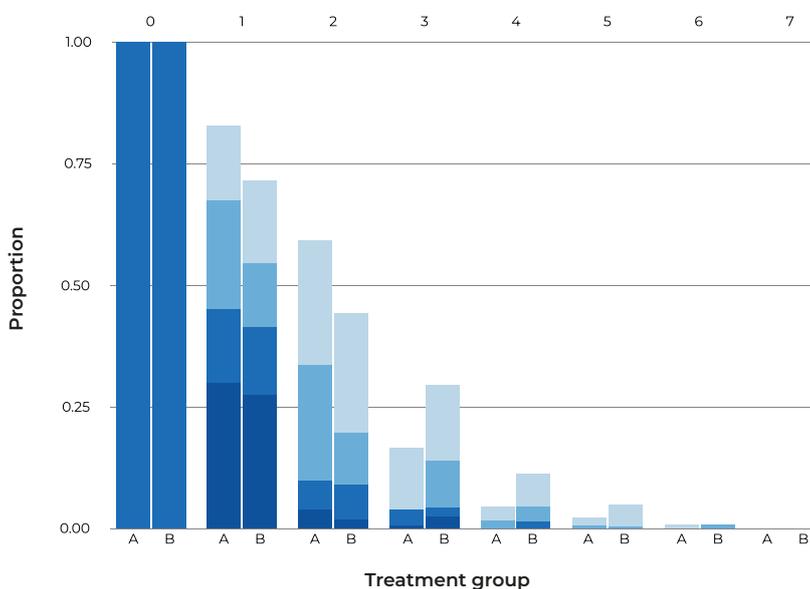
Relationship between treatment group and the number of days before quarters became unprotected:

| Treatment group | Estimate (95% CI) | Adj. mean (SE) | p-value |
|-----------------|---------------------|----------------|---------|
| Dip A | Ref. | 2.60 (0.17) | 0.68 |
| Dip B | -0.10 (-0.55, 0.36) | 2.50 (0.16) | |

Teat coverage score > 0; parity and quarter position = fixed effects; Farm-ID = random effect

The mean days until becoming unprotected for cows with Dip A and Dip B applied were 2.6 and 2.5, respectively.

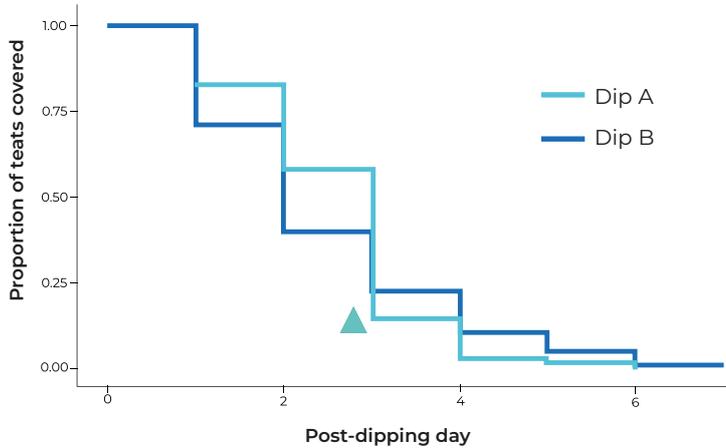
Proportion of quarters protected over time:



The proportion of protected quarters decreased over time, starting at 82.7% for Dip A and 71.4% for Dip B on day 1, and dropping below 10% for both groups after day 4—except for Dip B on day 4, which retained 11.6% protection.

Time to become unprotected:

Association between treatment group and days with teats covered with dipping products



During the first 7 days post application of the dipping products, all the enrolled quarters (n=216) became unprotected. The likelihood of quarters becoming unprotected were 1.13, 0.75 and 1.76 times greater in Dip B compared to Dip A on days 1-2, 3-4 and 5-7, respectively.

No differences were observed in regards to teat skin health between groups.

Study 2

Summary of bacteriological culture results from the rubber teats after 19 h of incubation at 37°C for Dip A and Dip B.

| Sample | Teat number | Cotton plug titers (cfu/mL) | | |
|------------------|-------------|-------------------------------|---------------------------------|---------------------------------|
| | | Treatment 1 <i>E. coli</i> | Treatment 2 <i>S. aureus</i> | Treatment 3 <i>S. uberis</i> |
| T Hexx Dry® | 1 | Negative | 1.17 × 10 ¹⁰ | Negative |
| T Hexx Dry® | 2 | Negative | Negative | Negative |
| Blue V Seal® | 3 | Negative | Negative | Negative |
| Blue V Seal® | 4 | Negative | Negative | Negative |
| Negative control | 5 | Negative | Negative | Negative |
| Positive control | 6 | 2.07 × 10 ⁹ | 4.17 × 10 ⁸ | 1.10 × 10 ⁶ |

All treatment samples aside from the positive controls were negative for bacterial growth, except *S. aureus* for T Hexx Dry®.

Conclusions

Study 1 – Field study

- ▶ Both the current and the new formulations of Blue V Seal® persisted for approximately 2 to 3 days with no observable difference between the groups.
- ▶ Teat dip persisted for longer in nulliparous cows and in the front quarters.
- ▶ There was no evidence of a difference in the proportion of quarters unprotected over time when comparing both groups.

Study 2 – *In vitro* study

- ▶ Both the current and the new formulations of Blue V Seal® prevented the penetration of the three most common mastitis pathogens in the *in vitro* model using rubber calf-feeding nipples.

References

Dorella, M., Peña-Mosca, F., Pereira, F.N., Abreu, A.C., Netto Praxedes, J., De, U., Godden, S. and Caixeta, L. Evaluation of teat coverage persistence and teat health for two dry period persistent barrier teat sealant dips (2023). Veterinary Population Medicine Department, University of Minnesota.

Becky Moore, Daniel Coleman, Ryan Vander Veen. Evaluation of barrier characteristics of current and new T-Hexx Dry external teat sealants to prevent bacterial penetration under *in vitro* conditions using rubber calf-feeding nipples (2023). Data on file.