

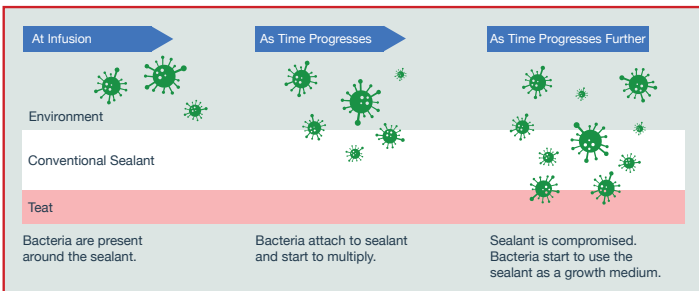


Next Generation Teat Sealant

Background to Bismuth Subnitrate Teat Sealants

For the past twenty years, Bismuth Subnitrate teat sealants have been the dairy industry's tool of choice in reducing the incidence of mastitis in the dry period. However, these conventional Bismuth Subnitrate teat sealants, while effective, have a significant vulnerability - they have been formulated to “possess no antimicrobial activity” [1].

This deficiency exposes them to the risk of microbial exploitation by the type of microorganisms found on farm. This is a recognised issue [2] and represents a very serious weakness. The omission of antimicrobial activity increases the risk of the sealant being compromised by the ingress of microorganisms around or through the sealant in the dry period – See illustration below.



In our research, conventional teat sealants have been shown to **FAIL** basic microbial challenge tests such as the EP test for Efficacy of Antimicrobial Preservation [3].

| CONVENTIONAL TEAT SEAL | | Colony Forming Units / g | | | | | | |
|------------------------|------------------------|--|---------------|-----------------------------------|---------------|---|---|--|
| Time | Log reduction required | <i>Ps. aeruginosa</i> Gram-Negative | | <i>S. aureus</i> Gram-Positive | | <i>Bmix</i> A Mixture of Gram-Positive and Gram-Negative | <i>C. albicans</i> Gram-Positive Yeast | <i>A. brasiliensis</i> ATCC 15097 ATCC 16404 |
| 0 Control | N/A | 620,000 | Log reduction | 640,000 | Log reduction | 8,100,000 | 570,000 | 260,000 |
| 48 hours | 2 | 12400 | 1.70 | 9200 | 1.84 | >100000 | N/A | N/A |
| 7 days | 3 | 17900 | 1.54 | <10 | 4.80 | >300000 | N/A | N/A |

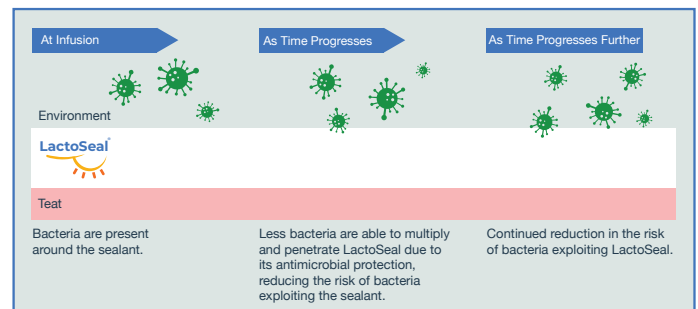
Red = Failure

The LactoSeal Advantage

LactoSeal is formulated just like other bismuth subnitrate teat sealants but, additionally, **contains Phenoxyethanol, a powerful, GRAS listed, antimicrobial.** LactoSeal **PASSES** the EP test for Efficacy of Antimicrobial Preservation.

| LactoSeal | | Colony Forming Units / g | | | | |
|-----------|--|-----------------------------------|---|-------------------------------------|---|--|
| Time | <i>Ps. aeruginosa</i> Gram-Negative | <i>S. aureus</i> Gram-Positive | <i>A. brasiliensis</i> Gram-Negative | <i>C. albicans</i> Gram-Positive | <i>Bmix</i> A Mixture of Gram-Positive and Gram-Negative | |
| 0 Control | 2.2x10 ⁵ | 3.6x10 ⁶ | 3.7x10 ⁵ | 3.6x10 ² | 4.7x10 ⁶ | |
| 48 hours | <10 | <10 | - | - | <10 | |
| 7 days | <10 | <10 | - | - | <10 | |
| 14 days | - | - | <10 | <10 | - | |
| 28 days | <10 | <10 | <10 | <10 | <10 | |

This secondary antimicrobial action of LactoSeal provides the sealant with broad range protection against *gram-negative* and *gram-positive* bacteria and many other opportunistic microorganisms – See illustration below.



LactoSeal Inhibits Microbial Growth On and Within the Sealant

Gram-negative bacteria are estimated to be responsible for >40% of mastitis cases in the dry period, yet the majority of antibiotic dry cow therapy infusions in North America are targeted against *gram-positive* types only.

LactoSeal's unique antimicrobial properties offer a significant advantage over conventional products, providing secondary protection against new cases of mastitis during the dry period—without requiring any changes to existing protocols.

References

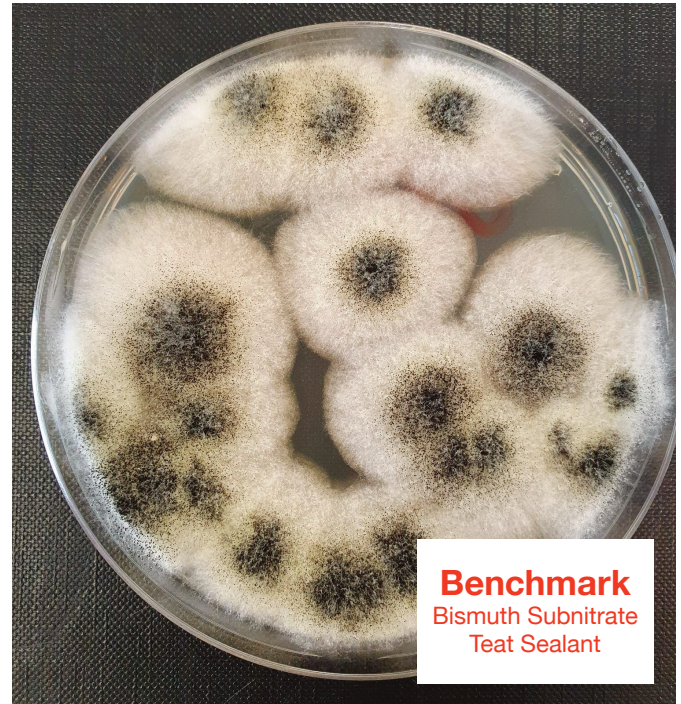
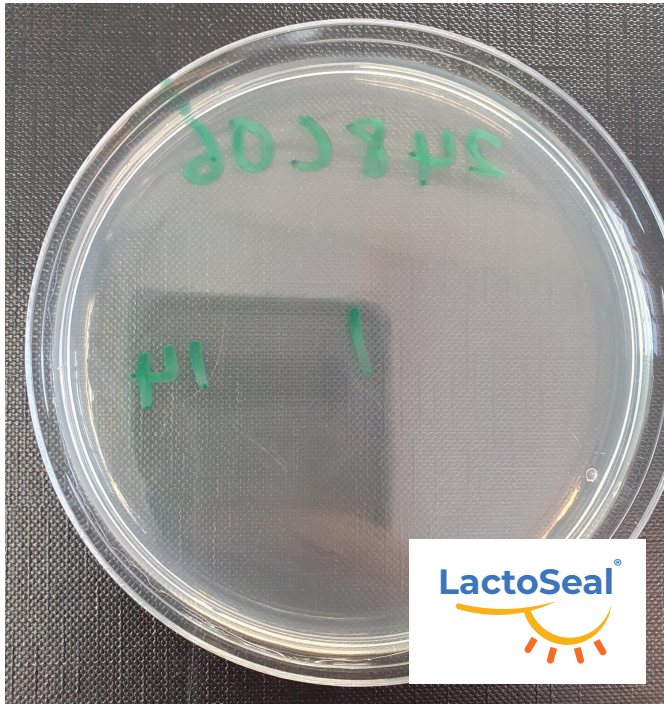
- https://www.zoetis.co.uk/livestock-farming/life-on-farm/easset_upload_file50953_252886_e.pdf
- <https://patents.google.com/patent/AU2009322372B2/en>
- The Test for the Efficacy of Antimicrobial Preservatives - EP 10th Edition



**Next Generation
Teat Sealant**

THE ADDED ANTIMICROBIAL MATTERS

LactoSeal vs. a Benchmark Bismuth Subnitrate Teat Sealant



Plates showing recovery of *A. brasiliensis* at Day 14

We have collected a volume of in-vitro microbiological data on teat sealants in conjunction with a UKAS accredited, contract laboratory.

In that microbiological work, the benchmark product failed the required criteria for *E. coli* (*gram-negative*) and *C. albicans* when assessed against the European Pharmacopoeia (EP) criteria for parenteral products (“The Test for the Efficacy of Antimicrobial Preservatives - EP 10th Edition”). It should be remembered that the EP test only covers a limited range of microorganisms, but the test is a valid indicator of microbial vulnerability.

LactoSeal passed the EP test in full.

The range of microbial challenge experienced by a teat sealant during its application and the dry period is extreme.

Addressing the known microbiological vulnerability of bismuth subnitrate teat sealants is fundamental when looking to achieve optimal performance, hence the need for the addition of an antimicrobial.

The two slides above illustrate the recovery of *A. brasiliensis* on Day 14 of a microbiological challenge study. These images were captured by a UKAS accredited laboratory. The study compared LactoSeal, which contains an added antimicrobial agent, with a benchmark competitor product that does not.

These images clearly demonstrate the impact of the added antimicrobial in LactoSeal. By Day 14, there was no recovery of *A. brasiliensis* on the LactoSeal-treated sample. In contrast, the benchmark product showed significant microbial recovery, visibly highlighting LactoSeal's superior antimicrobial performance.