

# The Importance of Teat Canal Closure and Other Risk Factors On Dry Period Intramammary Infections

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## Introduction

For the first few weeks after drying-off, and then again immediately prior to calving, cows are at increased risk for developing new intramammary infections (IMI). Research supports that this susceptibility is related to variations in the teat streak canal as well as inherent biochemical and cellular changes occurring in the udder. The time in which the udder is most resistant to dry-period infections is when it has become fully involuted, and when each quarter has formed a natural teat streak canal keratin plug which acts as a physical barrier to close the teat canal. Recent research has been published demonstrating that not all quarters become closed by the teat canal keratin plug, and that dry period clinical mastitis is more likely to occur in quarters that do not close. In addition, products administered at drying-off which act as an inert physical barrier to ensure teat canal closure during the dry period (OrbeSeal<sup>®</sup>) have been shown to be efficacious in preventing new IMI. Hence, risk factors associated with teat canal closure would be important to identify.

## Materials and Methods

Two research herds associated with the University of Guelph, and one herd each at Kansas State University, Iowa State University, and the State University of New York at Cobleskill, participated in this study. At two weeks prior to scheduled drying-off, quarter milk samples were taken aseptically from all cows enrolled for bacteriological culture, and teat-ends were scored with a uniform scoring system. Daily milk weights were recorded until the day of drying-off. On the day of drying-off, all cows received dry cow antibiotic therapy, teat-ends were scored, and quarter milk samples were obtained. Once a week, for the first six weeks of the dry period, every quarter of each enrolled cow was assigned a teat-end score, and every quarter was assessed for formation of the teat canal keratin plug. Dry period examinations ended when all four quarters of a cow were defined to be closed for two consecutive weeks, or at the end of six weeks, whichever came first. Upon calving, final quarter milk samples were taken for bacteriology.

## Results and Conclusion

In total, 300 individual cow records and 1178 quarter results were analyzed. The average dry period length among the five herds was  $65 \pm 13$  days. There were significant differences in the level of daily milk production among each herd prior to drying-off, with an average production of  $28.4 \pm 19.1$  lb ( $12.9 \pm 8.7$  kg) on the day before dry-off. The proportion of quarters developing a new IMI during the dry period was 11.1%, with the majority caused by major mastitis organisms (environmental streptococci 34.4%, coliforms 28.8%, *Staphylococcus aureus* 10.7%, other major pathogens 10.0%). Overall, 24.5% of quarters were defined to have a cracked teat-end, with most quarters scored as having a crack on the day of drying-off (20.9%). There was a general improvement of teat-end scores as the dry period progressed. Over 50% of quarters were defined to have closed in the first week of the dry period. However, at the end of six weeks, 23.4% of quarters were still classified as open. The level of milk production recorded from two milkings on the day before drying-off significantly influenced the time until quarter closure ( $P < 0.01$ ). Quarters from cows producing greater than or equal to 46.2 lb (21 kg) of milk were significantly more likely to be open during the dry period, compared to quarters from cows producing less milk. In the final logistic regression models, quarters that remained open longer than three weeks ( $P < 0.05$ ) and that had cracked teat-ends ( $P < 0.05$ ) were both 1.7 times more likely to develop new IMI compared to quarters that closed and that were not cracked. Similarly, cows that had at least one quarter cracked and at least one quarter remaining open were more than twice as likely to develop new IMI, compared to cows with neither cracked teat-ends nor open quarters ( $P < 0.05$ ). The results of this study demonstrate the importance of teat-end integrity and teat canal closure in the dry period. Management strategies aimed at improving teat-end integrity and enhancing teat canal closure would be of considerable benefit to the dairy industry.