

Characterization of internal teat sealant behavior throughout the dry and post-fresh periods

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Introduction

The primary objective of this study was to characterize the behavior of internal teat sealants during the dry period as well as sealant shedding patterns during the post-fresh period in dairy cattle. Two commercially available teat sealants were utilized for this study ShutOut™ (Merck Animal Health, Madison, NJ) versus Orbeseal® (Zoetis, Parsippany, NJ). Digital radiography was used to monitor location and percentage of teat fill with sealant at dry off during the dry period. Other parameters evaluated included weight of sealant shed at first milking, duration of sealant shedding after freshening, and amount of sealant shed at each milking. Incidence of clinical mastitis, teat-level infection status at dry off, and teat-level infection status during the dry and post-fresh periods were also assessed.

Materials and methods

This study was conducted at the Iowa State University dairy farm between May and September 2021. Cows were treated with the 2 sealants in a cross-udder design using 1 fore- and 1 hind teat on opposite sides of the udder. Eligibility criteria included: expected dry period of 30-90 days, at least 3 functional quarters, body condition score > 2.0 out of 5, and a lameness score < 4. Cows designated to be culled early in the subsequent lactation were also ineligible. Cows were excluded from enrollment if they had received any antimicrobial treatment within 14 days of dry off or if they had clinical mastitis at dry off. Teat pattern for each cow was randomly assigned the week before expected dry off.

Sealant placement was visualized immediately after sealant infusion using a TR9030 Generator and Next II Digital Radiograph machine (Sound Technologies, Carlsbad, CA) and imaging was repeated at one time on all enrolled cows when they were between 35 and 69 days dry. Following image capture, cows were managed per farm protocol. Milk leakage was monitored every 8 hours for 15 minutes in the 3 days immediately following dry off. After freshening, the first 50 mL of milk from each quarter was collected separately for evaluation of initial sealant shedding. At each subsequent milking, individual quarters were hand-stripped 10 times into a strip cup used for mastitis detection (Ambic Equipment Limited, Witney, UK) lined with a brown, paper flat-bottomed coffee filter to evaluate sealant residue shedding in the post-fresh period. Shedding was scored on a 1-5 scale with 5 describing large chunks of sealant while 1 indicated no sealant present. Cows were maintained on this protocol until they achieved unenrollment criteria or were moved

to the hospital pen. Clinical mastitis events were recorded on a quarter-level for the first 120 days in milk. Quarter-level milk samples were also collected using aseptic technique at dry off and within 14 days after freshening.

Results

There was no difference in incidence of mastitis in the first 120 days between treatment groups. When evaluating relationships between sealant location at pre-fresh radiographs and incidence of mastitis in the first 120 days, there was no correlation between sealant present in the streak canal ($P = 0.8111$), teat cistern ($P = 0.5620$) or gland and mastitis incidence ($P = 0.9911$), nor were these parameters affected by treatment group. Percent of teat cistern containing sealant was also evaluated with respect to incidence of mastitis within the first 120 DIM with no correlation identified between treatment groups (SO 95% CI [0.00848, 0.220]; ORB 95% CI [0.01158, 0.241]). Incidence of mastitis in the first 120 DIM was also evaluated in regards to sealant weight at freshening, however no correlation was identified ($P = 0.352$). There was also no difference in pre-fresh cistern fill between treatments ($P = 0.4088$). A relationship was identified between pre-fresh cistern fill and weight of sealant obtained at freshening ($P = 5.158 \times 10^{-9}$).

Significance

Currently, there is minimal published data characterizing internal teat sealant movement within the udder during the dry period or shedding patterns during the post-fresh period. Prolonged sealant shedding is a primary reason that producers cite for not utilizing these products. Further research is required to determine the optimal amount of sealant required to provide protection during the dry period with minimal post-fresh shedding.

