

POSTER

Technical Session 2

Validation related to the Use and Usability of Data

Preliminary Evaluation of Phytogetic Dry-Off Tablet on Dairy Cow Transition Health and Performance with pH Plus Bolus from smaXtec

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The dry-off period (DO) represents a pivotal transition in the lactation cycle of dairy cows, significantly impacting health and productivity. During this phase, cows undergo substantial physiological adjustments, including metabolic, hormonal, and immune changes, which prepare them for the subsequent lactation. Mismanagement during this critical stage can result in metabolic disorders, compromised immune function, reduced milk yield, and reduced longevity. To improve animal welfare and health outcomes, effective dry-off strategies are essential. Recent advancements in dry-off strategies emphasize the use of dietary interventions and targeted treatments to support metabolic adaptation and minimize negative energy balance. This study evaluates the impact of a novel dry-off tablet (StopLac®, AHV; containing an Allium-derived compound as the active substance) on the key patterns affected by the intervention.

A longitudinal, randomized, double-blinded pilot trial was conducted on a commercial Holstein dairy herd to evaluate behavioral and rumen physiological responses to alternative dry-off strategies using pH Plus Bolus, smaXtec animal care GmbH, Graz, Austria. Forty-five cows from a single farm were randomly allocated to three groups (n=15 per group): (1) a treatment group receiving a novel dry-off (DO) tablet, (2) a negative control group managed with standard gradual dry-off procedures, and (3) a positive control group receiving an oral acidogenic bolus containing calcium chloride, calcium sulfate, and ammonium chloride, as previously described in dry-off studies using acidogenic boluses. Behavioral activity, rumen temperature, and rumen pH were monitored around dry-off and around calving using automated sensor technologies to capture high-resolution temporal patterns. Data were analyzed in JASP, and temporal boxplots were generated to visualize within- and between-group trends over time. Nonparametric Kruskal–Wallis tests were applied at each time point to quantify the magnitude and duration of differences between treatment groups in behavioral and rumen parameters. This pilot study design aligns with previous work on acidogenic boluses and milk cessation methods at dry-off, which have demonstrated effects on cow activity, lying behavior, and udder comfort, and extends these approaches by integrating continuous rumen sensor data in a randomized, double-blind framework. The outcomes of this study will inform the potential of the DO tablet as a data-driven dry-off intervention and provide parameter estimates to power larger trials aimed at optimizing cow comfort, rumen health, and transition management. In this pilot trial, dry-off strategy markedly influenced both the magnitude and duration of rumination depression, while only modestly affecting rumen pH dynamics. Median baseline rumination (Rum(start)) was numerically highest in the Gradual group (567 min/d; IQR 545–589) compared with StopLac (532; 516–548), yet Gradual experienced the largest proportional decline to Rum(low) (357; 293–421), corresponding to a 37% decrease versus 24% for StopLac (403; 370–436). The temporal profile of rumination disturbance differed substantially between groups. Time for rumination to decline to the nadir T(R.decl) was longest in Gradual (123 h; 83–164) and shorter in StopLac (15 h; 10–19).

The extraction, harmonization, and interpretation of the high-frequency rumination and pH sensor data proved technically demanding, requiring extensive manual preprocessing, ad hoc signal cleaning, and repeated contextual validation of apparent patterns. These challenges highlight the inadequacy of current dry-off monitoring metrics and underscore the need to develop novel, data-driven key performance indicators and composite temporal parameters (for example, T(R.decl), T(R.low), T(R.incr), T(R.Total)) that more accurately characterize dry-off dynamics. In addition, the work emphasizes the urgency of implementing new algorithm-based alert rules that can translate complex sensor trajectories into actionable, early warnings for suboptimal dry-off management and emerging health risks at both cow and herd level. References: Florentino, C. C., et al. "A randomized clinical trial evaluating the effects of administration of acidogenic boluses at dry-off on rumination and activity behavior in the 14 subsequent days." *JDS communications* 4.4 (2023): 293-297. Rajala-Schultz, P. J., et al. "Effect of milk cessation method at dry-off on behavioral activity of dairy cows." *Journal of dairy science* 101.4 (2018): 3261-3270. Maynou, G., et al. "Effects of oral administration of acidogenic boluses at dry-off on performance and behavior of dairy cattle." *Journal of dairy science* 101.12 (2018): 11342- 11353