

DAIRY VETERINARY NEWSLETTER

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Should First Lactation Cows be Dried off Differently than Multiparous Cows?

“Gradual dryoff” is the practice of skipping some milkings before cessation of milking a cow at the end of lactation. I was taught in agricultural and vet school classes that this was to be avoided; abrupt dryoff - no skipped milkings - is physiologically superior for the cow. Nevertheless, like most dairy veterinarians, I experienced clients using gradual dryoff sometimes. When I was a resident at Michigan State University, we sometimes obtained cull dairy cows in early to mid-lactation for reproductive and other classes. We had to dry these cows off when they were often milking at least 60 pounds per day because there were neither facilities nor personnel to continue milking them. (We could bucket milk one or two cows for a few days, but nothing more.) I remember one cow that was milking approximately 100 pounds per day, was pregnant, and she was not a kicker either; I always wondered why she was sold. We would abruptly cease milking and infuse each quarter with dry cow treatment tubes. Some cows had large mammary glands, leaked milk, and had to be milked out again, usually in 48 hours, and re-dry treated. That high producing cow had to be milked out again after another 48 hours and re-treated again. But it always ended without cow welfare, milk leakage, or any other problems. To me and other faculty members, this confirmed that abrupt dry treatment was the way to go.

Dryoff procedures study design

Now there is a new study by P. Gott et al. in J Dairy Sci, May 2016 that revisits the question of abrupt versus gradual dryoff (cessation of milking) at the end of lactation. Four Holstein herds and one Jersey herd in Ohio were studied over 2 years; all were DHIA herds. The farms’ desired dry period lengths ranged between 45 and 60 days.

Cows were dried off on one day per week. “Clinically healthy cows were enrolled 7 - 14 d before their expected dry-off date”. All cows dried off in the same week were assigned to the same group, either abrupt cessation or gradual cessation. This is an unfortunate source of confounding; it would have been ideal to randomly assign half of the cows within each dryoff week to each treatment group. However, the authors state that this made management easier for the farm personnel, and I’m sure that is true. If treatment groups are too complicated, then some animals might receive a mixture of treatments, e.g. cows in the gradual dryoff group could be milked accidentally. Therefore, every other week alternated between cows all dried off gradually or all dried off abruptly. Any cow that ended a second lactation during the study period was not enrolled again. Cows were divided into 2 parity groups: ending first lactation, or ending lactation 2+ (multiparous).

Treatments were: Gradual cessation - milked once daily during the final week of lactation; Abrupt cessation – milked normally until the end of lactation. The authors do a good job of explaining the logistics of milking some cows only once per day: “One herd - - was a tiestall operation and milked cows using a bucket milker at their stall. Three herds

were able to separate gradual-cessation cows from the main milking herd and only allowed the cows to go through the milking parlor once daily during the final week of lactation. On the last farm, all cows went through the parlor during every milking, but cows in the gradual-cessation group - - were identified with brightly colored leg bands on one hind leg so farm personnel knew to milk those cows only once daily during the final week of lactation.” (I would expect that some if not all of the gradual cessation cows who went through the parlor without being milked leaked milk at that time because they had a letdown response, at least for the first couple of days? This was not monitored in the parlor.)

The authors also did a nice job of explaining how they calculated the sample size needed for the study: “Sample size calculation for the study was based on an assumption of approximately 20% of quarters being infected at calving and gradual cessation of milking reducing IMI prevalence at calving by 50%”. This resulted in a minimum requirement for 55 cows in each treatment group.

Aseptic quarter milk samples were collected when cows were enrolled 7 - 14 d before dryoff, at the final milking when dried off, and “within 7 d” after calving, frozen, and were cultured using NMC culture guidelines. Isolation of \geq colony types was defined as contamination. Depending on whether the same organism was present or not at dryoff and within 7 d after calving, quarters were defined as cured, persistent, or having a new intramammary infection (IMI) at calving.

Milk yield of each cow was averaged for d 8 - 9 pre dryoff and for d 2 - 3 pre dryoff. “Cows undergoing gradual cessation of milking were observed for milk leakage once daily on d 1, 2, and 4 after the milking intervention began by one investigator, who walked through the pen of cows and observed the study animals visually for 10 to 15 s each. Cows were observed at a time when they would have normally been milked without the trial intervention. Milk leakage was recorded as yes or no at the quarter level.” I think it would have been interesting to monitor milk leakage for the cows who went through the parlor once each day without being milked; I would expect the greatest chance of milk leakage then.

All 5 herds used dry cow treatment with antibiotics in all quarters, but 4 of the 5 herds also used an internal teat sealant; therefore, only one of the herds was evaluated for leaking milk after dryoff and dry treatment; the authors assumed that ITS would block any milk from leaking. I understand the logistic challenges, but I was disappointed that the leakage of milk was not monitored in those herds where ITS was used. In the discussion section of the paper, the authors commented, “it has been reported that cows may leak milk even after infusion of ITS into mammary quarters (Zobel et al., 2013). Thus, further research is encouraged to monitor milk leakage following dry-off, regardless of ITS usage.” In that one herd not using ITS, cows dried off by either method were observed for milk leakage once daily on d 1, 2, and 4 after dryoff.

It was stated that quarters with any contaminated or missing samples were excluded (the cows’ other 3 quarters were studied), and any cow with more than one quarter with missing data was excluded entirely. However, if cows had missing or contaminated samples 2-3 d before dryoff, but complete culture data 7 - 14 d before dryoff, then those earlier culture results were substituted and used to evaluate cure, persistence or new infections. I don’t think that is the ideal way; IMI status can indeed change during one week, and substituting earlier data for missing data at dryoff was one thing I would have avoided in an otherwise very good study.

Results

316 cows were enrolled, but 5 had a dry period < 30 d or > 80 d and were excluded. Most studies I have been part of or have read use only animals with 45 - 70 d dry; the above wide range of days dry allowed surprised me, but maybe there was a substantial portion of cows dry 31 - 44 d or 71 - 80 d? 26 cows had more than one quarter with missing data and were also excluded from analyses.

This left 285 cows in the final study population (145 gradual cessation, 140 abrupt cessation), 1,086 quarters (542 gradual, 544 abrupt). The parity groups were: 142 cows (544 quarters) ending first lactation, 143 cows (542 quarters) ending lactation 2+. This turned out to be a nice division of cows into the parity groups and both treatment groups.

At d 8 - 9 pre dryoff, milk yield (abrupt, 43.6 lb/d; gradual 44.0 lb/d) was not significantly different (P = 0.76, t test) between cows selected for the 2 treatment groups. In contrast, by d 2 - 3 pre dryoff, the milk yield for abrupt dryoff cows (41.9 lb/d), was significantly higher compared to the 31% milk yield loss for the gradual dryoff cows with skipped milkings (29.0 lb/d) (P < 0.0001, t test).

First lactation cows apparently had better milk yield persistency than older cows. Looking at both treatment groups combined, first lactation cows (45.8 lb/d at d 8 - 9 pre; 37.0 lb/d at d 2 - 3 pre) produced more daily milk in late lactation than multiparous cows (41.6 lb/d; 33.7 lb/d, respectively) (P = 0.004, P = .035, respectively).

Milk leakage during the week before dryoff was only observed in gradual dryoff cows, comprised of 514 quarters of 140 cows. 20 cows (14.3%) and 41 quarters (8.0%) leaked milk; 73% of those leaked milk once, and 27% leaked milk on 2 of the 3 days observed, none leaked at all 3 observations. The proportion of quarters leaking milk on days 1, 2 or 4 after milking once daily began was not shown.

Milk leakage during the first 4 d after dryoff was only observed in the one herd not using ITS, 62 cows, 224 quarters with gradual dryoff, 45 cows, 175 quarters with abrupt dryoff. Considering the even distribution between treatment groups in the overall study, I was surprised that in this herd, 38% more cows were in the gradual dryoff group vs. the abrupt group. This shows the problem of selection bias by enrolling all cows dried off in the same week in the same treatment group, but again logistics of farm management dictated that. Milk leakage after dryoff was seen in: gradual 12 quarters (5.4%), 10 cows (16.1%); abrupt 8 quarters (4.6%), 4 cows (8.9%), not significantly different (P = 0.719, P = 0.271, respectively, exact statistical test not clear). I think the authors used a regression model of some kind for milk leakage; I would have used leakage as an ordinal categorical variable and tested between the categorical treatment groups gradual vs. abrupt using chi-square. I don't think this would affect the statistical outcome, though. Nevertheless, like the authors, I was surprised that "Unexpectedly, cows milked once daily for the final week of lactation tended to have higher odds of being observed leaking milk following dry-off than cows that were dried off abruptly."

Mastitis culture results were not different between gradually or abruptly dried off cows, when both parity groups were analyzed together. At d 8 - 9 pre dryoff: gradual 16.2% of quarters with IMI, abrupt 14.5% IMI; d 2 - 3 pre dryoff: gradual 14.4% IMI, abrupt 12.3% IMI; Within 7 DIM: gradual 7.6% IMI, abrupt 6.6% IMI (all P > 0.435, chi-square). Information on individual mastitis pathogens is in the original paper. I found the results for one pathogen, *Staphylococcus aureus*, interesting because they showed a very common prevalence, and a post-dry treatment antibiotic "cure rate" (reduction in prevalence as determined by positive culture results) response of approximately 60% that is often seen: d 8 - 9 pre dryoff: gradual 5% of quarters with *S. aureus*, abrupt 7%; d 2 - 3 pre dryoff: gradual 5% with *S. aureus*, abrupt 7%; Within 7 DIM: gradual 3% with *S. aureus*, abrupt 2%.

Mastitis culture results were different between parity groups: the cows ending first lactation had more IMI (19.3%) just before dryoff than the multiparous cows (7.4%) (P < 0.0001, chi-square) but after calving, the first lactation cows had less IMI (5.3%) than the older cows (8.9%) (P = 0.021).

Finally, the risk of IMI post-calving by dryoff method was different when this was analyzed by parity group. Logistic regression modelled "the probability of a quarter being infected at calving - - accounting for clustering of quarters within cows and cows within herds." A number of possible explanatory variables such as milk yield were not significant. For cows ending their first lactation, gradual dryoff and no milk leakage after dryoff were associated with less risk of IMI at calving (both P < .023). However, for cows ending 2nd-plus lactation, abrupt dryoff, having no IMI found just before dryoff, and being milked 2X instead of 3X (no other mention of this and no description of how many farms milked 2X or 3X was presented) were associated with less risk of IMI at calving (All P < .006). I suggest reading the entirety of this interesting paper in J Dairy Sci.

The practical significance of this seems to me to vary based on at least one farm-specific characteristic. How feasible and realistic is it for that farm to milk cows ending their first lactation once daily for the last week before they are dried

5600 Old Main Hill
Logan UT 84322-5600

off and dry treated? I can also imagine a scenario where, just as in the paper, some distinct leg band is used to identify the cows who are being skipped at one milking during that week. However, if they are in a heifer group, and when filling the parlor there might be quite a few animals with such leg bands, it would be critically important that milkers not skip the cows who do need to be milked. Imagine the last side in that group with 5 animals, and 4 have the skip milking band. It would be a necessity not to skip the one who needs to be milked just because the group is ending. If this could be accomplished, gradual dryoff for cows ending first lactation might be a good practice. The results of this study also support abrupt dryoff for most animals, and even though it was not a treatment contrast study, demonstrate good efficacy for antibiotic dry cow treatment for all cows at dryoff.

Please let us know your comments and also suggestions for future topics. I can be reached at (435) 760-3731 (Cell), (435) 797-1899 M-Tues, (435) 797-7120 W-F or David.Wilson@usu.edu.



David Wilson, DVM
Extension Veterinarian

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