Researching multiple milkings

Frequent milking of fresh cows is a small investment with a big pay off

By Emma H. Wall and Thomas B. McFadden

Improved milk production efficiency means fewer cows are needed to produce the same amount of milk. It also means more efficient nutrient use and less lost to the environment.

One way to increase milk production efficiency is to milk cows more frequently. Many dairy producers have successfully implemented 3X, 4X or even 6X milking, taking advantage of the known milk-yield response to frequent milking.

More recently there has been growing interest in milking fresh cows more frequently to stimulate milk yield for an entire lactation. This milk-yield response was originally reported in the 1970s by New Zealand researchers. They observed that cows suckled by calves and machine milked during the first eight to 10 weeks of lactation had higher milk yield than their non-suckled twins, both during suckling and through the entire lactation.

Subsequent research has confirmed this response. Research has also shown that frequent milking for just the first 21 days-in-milk (DIM) causes a long-term increase in milk yield that lasts through the entire lactation. That means a small initial investment in time and labor can pay off big with extra milk for the entire lactation.

During the last three years, our group at the University of Vermont has conducted studies to determine the optimal duration and potential economic benefit of frequently milking fresh cows. We used a half-udder design, which requires fewer cows and helps to reduce variation due to nutrition, genetics and cow health. Cows enrolled in our experiments have their left udder half milked 2X and their right udder half milked 4X.

Since the UVM farm currently milks 2X, our 2X/4X cows are milked at the beginning of milking along with the fresh group and then return to their pen. At the end of milking about three hours later, they're brought back into the parlor, and their 4X udder-half is milked again.

After the treatment period, the entire udder is milked 2X for the remainder of lactation, but we continue to monitor milk yield of each udder half separately. When the cow has completed the lactation, daily milk yield of each udder half is multiplied by two to represent a "whole cow" response.

Figure 1 shows the response during our first experiment, which imposed 4X milking for the first 21 DIM. The 4X udder half produced more milk than the 2X udder half both during 4X milking and through the remainder of lactation. These results agreed with previous experiments that were conducted on cow groups, not half udders, so we've continued to use this design.

Because the primary costs associated with this milking routine are incurred during the frequent milking period, our objectives have been focused on decreasing the duration of frequent milking to a two-week period during early lactation. So far we've studied 4X for the first two weeks of lactation and 4X for days seven to 21 of lactation.

The 4X for days one to 21 of lactation is predicted to be the most profitable because milk yield response was greatest for that treatment group. (Table 1, page 30) We saw no effect of 4X on milk composition and somatic cell count (SCC).

Current experiments at UVM

Our experiments and economic analyses thus far have been based on a freestall management system

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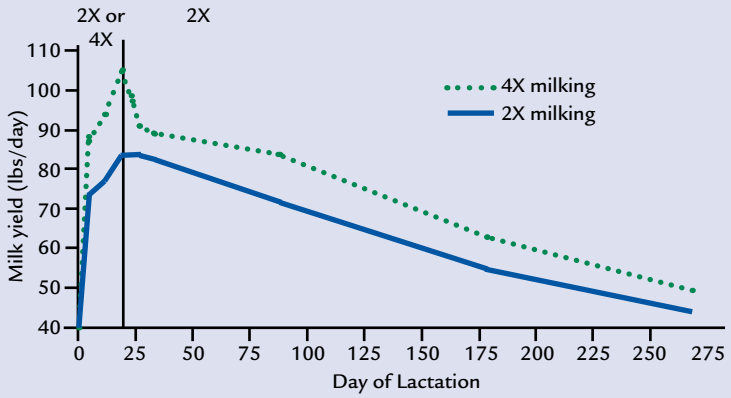
Figure 1. 4X milking for days 1-21 of lactation compared to 2X



Source: Modified from Wall and McFadden, 2007. Used by permission of the Journal of Animal Science; doi:10.2527/jas.2007-0318.
Solid vertical line represents 21 DIM when udder halves, milked 4X, were switched to 2X milking. Data extrapolated from half-udder yields.

FYI

■ **Emma Wall, a Vermont native, received her B.S. in animal science from the University of Vermont in 2001. She managed a Jersey herd in Connecticut, then returned to UVM and completed her Master's. She is working on her Ph.D. in animal science with Dr. Thomas McFadden, chair and associate professor, Department of Animal Science.**

■ **The UVM frequent milking research has been reported in the Journal of Dairy Science: Vol 90(2): 716-720; Vol. 90(11):5042-5048. If you would like a copy of that article, contact Wall at Emma.Wall@uvm.edu**

with milking sessions of three hours. To determine how frequent milking will work on dairies with tiestall facilities, we're currently milking cows 4X for days one to 21 of lactation with only a one-hour interval between regular and extra milkings.

We're also conducting a 4X milking experiment on heifers only and using edema scoring to determine if frequent milking decreases udder edema after freshening. Results of both these experiments will be available next year.

Table 1. Potential economic return of milking 4X daily during early lactation[1]

Milking routine[2]	Feed cost during FM[3]	Feed cost after FM[4]	Labor[5]	Misc. cost	Extra milk inc/cow/yr[7]	Total net inc/cow/yr	100-cow herd[8]
4X 1-21	$19.28	$98	$84	$0.50	$294.75	$92.94	$9,293.60
4X 1-14	$12.86	$100.75	$56	$0.34	$210.29	$40.33	$4,032.85
4X 7-21	$12.86	$98	$56	$0.34	$239.33	$72.12	$7,212.35

[1] Table reproduced from Wall and McFadden, 2007. Used with permission from the Journal of Dairy Science; Vol. 90:5042-5048.
[2] 4X milking for days 1-21, 1-14 or 7-21 of lactation, followed by 2X milking for rest of lactation.
[3] Additional feed to support increased milk production during frequent milking (FM), estimated at $0.92/cow/day.
[4] Additional feed to support increased milk production after FM, estimated at $0.39/cow/day.
[5] Additional labor associated with extra milkings and animal handling during 4X milking, approximately $4/day.
[6] Cost associated with extra milkings, including inflation replacement, teat dip and towels, approximately $0.025/day.
[7] Extra milk income based on $12/cwt.
[8] Total net annual income for a 100-cow operation.

Should you change your milking routine?

To answer that question, consider these factors:

- Is your facility setup conducive to milking fresh cows first and then again at the end of milking? They should be able to go back to their pen to eat, drink and lie down between milkings.
- How close is your fresh pen to the parlor? Research from the University of Arizona indicates that long walking distances or time away from the pen could negate the beneficial effects of frequent milking.
- How long are your milking sessions? If they're less than three hours, the milk yield response may be less than what we've observed.
- How good is your herd management? Would you benefit from seeing your fresh cows twice as much?
- You should expect to see a decrease in milk yield when you switch back to 2X but remember that cows will continue to produce more milk for the rest of their lactation than they would have otherwise.
- Do you currently milk 3X? If so, it may be worthwhile to consider switching your entire herd back to 2X, and milk only fresh cows 4X. The expected milk yield response is similar to 3X, but the cost of labor and supplies is less.

Remember, as for any management that increases production, nutrition programs must be closely monitored and adjusted to maintain superior animal performance.