Making decisions regarding the balance between milk quality, udder health, and parlor throughput (part 1)

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As today’s dairy industry consolidates, cows are being milked more rapidly through larger milking parlors on larger dairies than ever before. Because milk is the primary commodity and source of income for producers, the harvesting of milk is the single most important job on any dairy. Producing high-quality milk to maximize yields and economic value requires effective parlor management, an enormous challenge for producers. Managing large parlors includes managing milking procedures, herd management, an enormous challenge for producers when developing, selecting, and implementing a milking parlor. In large parlors milking procedures have a dramatic impact on the number of units one operator can handle in parallel and herringbone parlors. In 1997, Smith et al. published guidelines for the West, about the West, from the West.

Producers have to make the following decisions before they can select or develop management protocols for a milking parlor:

1. How many cows will be milked through the parlor?
2. What milking procedure will be used (minimal or full)?
3. If a full milking procedure will be used (sequential, grouping, or territorial)?
4. Which milking routine will be used (sequential, grouping, or territorial)?
5. Are you willing to train teams of milkers to operate large parallel or herringbone parlors?

This two-part paper reviews factors to consider when developing, selecting, and implementing a milking procedure and/or routine. Part one will focus on milking procedures in different types of parlors. Next month in part two labor training and management issues as well as parlor performance monitoring will be discussed.

Table 1. Time (seconds) required for individual events of the milking procedure.

<table>
<thead>
<tr>
<th>event</th>
<th>minimal*</th>
<th>full</th>
<th>full + 10 sec contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>strip</td>
<td>4-6</td>
<td>4-6</td>
<td>10</td>
</tr>
<tr>
<td>pre-dip</td>
<td>0</td>
<td>6-8</td>
<td>6-8</td>
</tr>
<tr>
<td>wipe</td>
<td>6-8</td>
<td>6-8</td>
<td>6-8</td>
</tr>
<tr>
<td>attach</td>
<td>12-18 sec.</td>
<td>8-10</td>
<td>8-10</td>
</tr>
<tr>
<td>total</td>
<td>24-32 sec.</td>
<td>30-36 sec.</td>
<td>30-36 sec.</td>
</tr>
</tbody>
</table>

*Strip or wipe and attach

Options for milking procedures and routines in parallel and herringbone parlors

The two predominant milking procedures are minimal (strip or wipe and attach) and full (pre-dip, strip, wipe, and attach). Milking procedures impact the number of cows per stall per hour in parallel, herringbone and rotary parlors. In large parallel and herringbone parlors cows per stall per hour were 5.2 when minimal milking procedures were used and 4.4 when full procedures were used. Cows per stall per hour declined from 5.8 to 5.3 when a minimal routine was used compared to a full routine in rotary parlors (Armstrong et al. 2001).

Table 2: Advantages and disadvantages of a minimal milking routine.

- Compromises teat skin sanitation.
- Successful when cows enter the milking parlor clean and dry.
- May require milkers to decide when extra cleaning of dirty teats is required.
- More time required to milk the herd may be decreased (total milking time).
- Steady state throughput is increased.
- Can cause lower milk quality and higher mastitis when compared to full hygiene.

Table 3: Advantages and disadvantages of a full milking routine.

- Maximizes teat sanitation and milk letdown.
- Use 4 separate procedures or can combine into two or three procedures.
- Use when maximum milk quality results are the goal.
- Minimizes machine on-time.
- In large parlors milkers have a dramatic impact on the number of units one operator can handle in parallel and herringbone parlors. In 1997, Smith et al. published guidelines for the number of units that one operator could handle using a minimal and a full milking procedure. When a full milking procedure was used a milker could operate 10 units per side and 17 units per side when using minimal milking procedures. These recommendations were based on allowing 4-6 seconds to strip a cow and attaching all the remaining equipment to the milking unit.

(continued on next page)
units on one side of the parlor within 4 minutes.

In recent years several milking management specialists have been recommending 2-3 squirts per teat (8-10 seconds) when stripping cows to increase stimulation and promote better milk letdown. Some of these management specialists believe that increasing the amount of stimulation reduces unit on times. At this time a strong data set supporting this theory does not exist. An AABP research update reported by Rapnicki, Stewart, and Johnson (2002) indicated that milk flow rate decreased when cows that had been previously stripped were no longer stripped. If this is implemented, producers will have to reduce the number of units one operator can manage per side (Table 1). The sequencing of the individual events of the milking procedure is critical. Rasmussen et al. (1992) reported an ideal prep-lag time of 1 minute and 18 seconds. Prep-lag times of 1.1-1.5 minutes are generally accepted as optimal for all stages of lactation. Some of the advantages and disadvantages of minimal and full milking procedures are listed in Tables 2 and 3.

Three predominant milking routines are used in parallel and herringbone parlors (sequential, grouping, and territorial). These milking routines are presented in Figure 2. The use of territorial routines will reduce throughput 20-30% when compared to sequential routines (Smith et al. 1997). Grouping routines seem to be an alternative to sequential routines without sacrificing throughput. Sequential and grouping rou-
tines are demonstrated in Figure 2. Both full and minimal milking procedures in rotary parlors are presented in Figure 3.

Although it is difficult to determine the “Best” procedure and routine for every dairy, it is possi-
ably more difficult to get employees to understand and follow the recommendations of management.

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Making decisions regarding the balance between milk quality, udder health, and parlor throughput (part 2)

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Part one of this paper published in the April issue discussed options for milking procedures and routines in parallel and herringbone parlors. In part two labor training and management issues as well as parlor performance monitoring are the focus.

Training and Motivating Employees
Since cows are milked by the employees in a dairy, employees are the most important resource of a dairy. Managers are responsible for employee training and development, and employees, in turn, are accountable to management.

Teamwork is defined by Webster as “joint action by a group of people in which individual interests are subordinated to group unity and efficiency”. Together Everyone Achieves More! To have a teamworking environment it must be clear who makes up the team and what each member of the team’s role is.

The most effective way to identify team members and their role within the team is to have a flow chart of every job on the dairy. A flow chart should clearly define the chain of command within the team and who is accountable for each and every member of the team. If a member of the team answers directly to more than one person, the chart organization should be re-visited.

The milking parlor is the heart and soul of any dairy. Harvesting quality milk requires more than just milkers in a parlor. Typically a shift supervisor or leader will be directly responsible for the milking during their shift. Cow pushers bring cows to the parlor to be milked and return them to their pens. In some parlors, cow pushers play a role in the milking routine used to milk the cows. Spreadsheets and other tools may be incorporated to monitor the daily activities in and surrounding the milking parlor.

The most important aspect to training and communicating effectively to employees are through Standard Operating Procedures (SOPs). SOPs provide a clear understanding of responsibilities of a specific job and they prepare employees to succeed. Each SOP should have a specific set of objectives. In other words, if the SOP is followed precisely, employees will be very successful, ultimately contributing to the overall success of the dairy.

Designing jobs (with input from employees) to be effective yet simple, thus allowing each employee doing the same job to perform equal amounts of work, will minimize employee turnover and improve labor efficiency. Well-designed SOPs fit the person to the job, not the job to the person. Standard operating procedures should be written (in the language of choice) and given to all employees prior to performing a job. It is also beneficial to have SOPs posted in plain site in each work area for everyone to see.

The relationship between management and employees is inseparable. Below is an example of a process for milking cows, along with the influence for each step. Although many procedures can be developed depending upon particular management strategies of a dairy, the items below are basic underlying methods that may be employed to maximize milk yield, parlor throughput, and udder health.

Basic Principles For Milking Cows
(For more on Parlor Management for Large Herds, see VanBaale and Smith, 2004).
1. Provide cows with a clean, dry, stress-free environment to help ensure calm cows with clean udders are brought into the parlor (management).
2. Prepare clean dry teats for milking (employee).
3. Properly pre-dip teats with an effective teat dip (employee).
4. Provide some type of physical stimulation (forestrip?) (employee)
5. Dry teats completely with an individual towel or cloth (employee).
6. Attach teat cups appropriately, minimize air inlet, and align units to ensure even milk out (employee).
7. Remove the milking unit as soon as milk flow slows substantially (management (detacher settings) and employees).
8. Post dip with an effective teat dip immediately following removal (employee).
9. Remove cows from the parlor in an expeditious manner (management and employees).
10. Ten percent rule: If ≤ 10% of cows are still milking, properly remove unit and remove all cows from parlor (management and employees).

Protocol Considerations
What about forestripping every cow every milking? Some say “No time to prep”; others say “No time not to prep”. Currently the authors do not know of any published data that suggests additional forestripping speeds up parlor through-
Stewart et al. (2002) reported a 10.2 to 15.6 second reduction in milking time per cow when automatic cluster removal settings were increased. Average milk flow per minute increased 0.11 to 0.42 lb/minute, and milk production was not negatively impacted – thus suggesting that increasing automatic cluster remover settings represents an opportunity to increase parlor performance.

Although often a challenge for large dairies, it is necessary to forestrip milk from teats to detect clinical mastitis. Some dairies have chosen to strip cows intermittently (once a week or as needed) with a herdsperson or lead milker. Others have chosen to forestrip two groups of cows per day, thus on a dairy with 10 pens all cows would be forestripped at least once every five days. If 0.5% of a herd has clinical mastitis, and each case last five days, then only 0.1% of the herd will be diagnosed each day. Which means, in a herd with 1,000 cows milked three times per day it would be necessary to forestrip 12,000 teats to detect one new case of mastitis (W. Nelson Philpot, Ph.D., professor emeritus Louisiana State University, and President of Philpot and Associates International, Inc.).

By identifying the mastitis causing microorganism(s) your cows are infected with (by taking samples to a proven milk quality laboratory) you can improve prevention and treatment. In addition, laboratories can expose other problems such as cows not being sanitized properly during milking, cows being milked wet, poor maternity housing/bedding management, or heifers calving with mastitis. When taking milk samples from cows it is important to:
1) minimize sample contamination during collection;
2) use a proven milk quality lab with an acceptable turn around time;
3) effectively communicating the information between employees and management;
4) effectively utilizing the information to improve mastitis control and overall milk quality.

Routine sampling of fresh cows and clinical cows in addition to bulk tank milk samples is warranted.

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