

## HIGH PERFORMANCE MILKING PARLORS

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Milking labor is a large input on any dairy farm. Milking routine and parlor design affect the efficiency of this input and ultimate herd size for years after construction is completed. We are going to discuss milking routine and how parlor design impacts the job components of milking your cows. Much of this information comes from hours of time-motion studies initiated by Dennis Armstrong, of the University of Arizona.

### What's involved in milking?

To evaluate the overall performance of milking parlors or the effect of a new innovation on parlor performance, it is essential to look at each component in the task of milking a cow. Following are the ranges in time taken to complete various components of the milking process in herringbone parlors:

Entrance	4 - 12 sec/cow
Wash/prep	11 - 28
Attachment	8 - 12
Idle & Adjustment	4 - 12
Exit	1 - 12
Total time/cow	35 - 74 sec/cow

You can see there is a lot of variation in the time it takes to perform the tasks of milking. If your routine or parlor design can trim even one second from one of these tasks without adding to idle time, you have improved cow throughput. Let's look at the individual components to identify some things that might improve your parlor's performance.

### Cow entrance

Feeding grain in the milking parlor can improve (reduce) entrance time. Cows are anxious to eat a palatable grain mix and remember it is offered at milking. However, it only takes a cow or two that consistently stops to eat from a feedbowl in the middle of the parlor to destroy this advantage. Feedbowl covers can encourage cows to move forward before stopping, but the trend is still away from grain feeding in the parlor since cows can't consume their required grain even in three passes through the parlor. The large advantage to grain feeding upon entry times decreases as cows are trained that grain is not available.

Shortening the walking distance can reduce entry time. The polygon herringbone cuts the distance and number of cows entering the parlor in half. Parallel parlors reduce

distance by nearly half with the same numbers entering. Parallels also have a wider platform and smaller or absent grates which both benefit entry time.

Opening and closing gates is part of the entry time. Power gates with controls at either end of the parlor can speed the milker's job over walking to each end to manually open or close gates. This benefit will speed cow exit as well.

The holding area affects cow entry. Holding pens should be sized with 12 to 15 square feet per cow for your largest group. We'll talk more about grouping later, but holding times of more than 2 hours must be avoided in today's higher producing herds and holding cows a maximum one hour per milking will benefit herds milked 3 times daily. Cows should enter the parlor straight ahead; have them turn when exiting. The holding pen should be as open to the parlor as regulations allow with good lighting between the pen and the parlor. Crowd gates improve cow entry about 10% and overall throughput about 5%. The gates improve employee satisfaction and will speed first-lactation strings more. Cows should learn to enter the parlor without coaxing. Finally, holding pen washing reduces cow cleaning in the parlor. An ideal holding pen would include a wash pen sized for the group and a drip pen with crowd gate sized for the group, essentially two holding pens.

### **Cow washing and preparation**

Dirty cows increase prep time an average 16 seconds per cow. This can lead to a difference of 20% in parlor throughput. Stall and lot management is critical to parlor performance. Holding pen washing helps when management can't, but cows must be dry when the machine goes on for long-term udder health. A full sized drip pen allows cows to air dry and reduces further drying in the parlor. Most herds with pen washing and adequate drip facilities can immediate pre-dip or strip cows on entry.

Clipping udders is an old-fashioned idea that needs some new life. Clipping udders on each fresh cow makes drying udders easier and reduces the opportunity for mud and manure to build up on the udder. Some farmers are burning off hair with a broad flame from a small propane burner. It works well with minimal discomfort to the cow. Tail switch trimming is beneficial in flush manure and in parallel milking systems.

Often, cows will enter the parlor by themselves if someone is not standing near the entrance to a side. When the first cow enters a parlor, the milker should follow the cow to the front and begin prepping her. Other cows will follow. Waiting for all cows to be in on a side before prepping adds to "entry time" and increases the time to "units on."

### **Milking time**

This is the "biggy" in cow throughput. A cow takes so long to milk so we can't do anything about this one. Right? Not quite true. Management plays a role here, too.

Proper cow stimulation increases the rate of milk flow. Properly stimulated cows can milk out up to one minute sooner and more completely. It may take some adjustments in larger parlors to stimulate cows through towel drying and to attach the milking unit within one minute. Most plans of prepping 4 or 5 cows and machine attachment don't require more time or walking than to do a whole side at one time.

Grouping cows can improve parlor flow. Segregating cows that take longer than 12 minutes to milk in a separate group can improve throughput on the remaining groups 25%. As parlors get bigger, like a double 50 parallel, grouping by milking speed will become more important. Groups should also be sized for the parlor. If you have a double 20, cow groups should be in increments of 20 cows (80, 100, 120, and so on) to fill the side as the holding pen empties.

"Parlor pressure" is the idea that employees will milk as fast as necessary. If you have a two hour milking, there is not as much pressure to milk quickly as when you have an eight hour shift followed by another milking crew. This your decision. You may want cows milked and cared for completely in the parlor, rather than going for maximum throughput. But switching to 3X milking or adding cows may make that decision for you.

#### **Unit adjustment or re-attach time**

This is mainly a function of milking unit support, performance of teat cup inflations, vacuum supply, and so on. The position of the milking unit and hoses appears to have some effect, too. Parallel parlors, where the milk hose and pulsator tube pass between the rear legs, have less time in adjustment and re-attach compared to herringbone parlors (0.5 compared to 1.5 sec/cow). And the machine positioning isn't as easy in parallels. The improvement comes from reduced cow movement and the inability to step on the side of the unit or the milkhose.

Teat cup extenders can prevent slippage and fall-off on wide uddered cows. The milker trades unit set-up time for adjustment time, however. They are advisable for udder health and proper milking of pendulous udders.

Machine stripping cows can add 20% to milking time if done on every cow. Cows are trained to be machine stripped. If you want all your cows stripped, start today. If you don't want to pay for this practice that adds little to milk in the tank, tell your milking employees "hands off," except for a problem cow or two.

#### **Idle time**

This is the time spent washing boots or hands, re-stocking towels, trimming a milkhose, etc. Some milkers "make" idle time. In other words, they wash their hands when there are units to attach, teats to dip, and so on. Speeding up parlor performance for these



employees is a matter of employee management. In other cases, there is nothing to do for a time in the milking routine. To reduce this idle time, you simply add milking units.

The first two-milker parallels were 20 on a side, 20 total units per milker. Idle time in these parlors was twice as high as a double 20 herringbone. If four more units are added (double 24), idle time evens out.

Performance of mechanized parlors with similar idle times.

	<u>Dbl-20 Herringbone</u>	<u>Dbl-24 Parallel</u>
Entrance	4.8	3.6
Udder prep	10.5	8.7
Attach	12.4	9.5
Adjust	1.5	0.5
Spray/Dip	4.0	3.5
Exit	0.4	0.4
Idle	6.4	5.0
Total Routine	40.0	31.2
Cows/hour	180	230
Cows/man-hour	90	115

## Exit time

Getting cows out of a barn was a bigger problem once than it is today. Shorter, narrower buildings made cows turn 180° into a narrow alley when exiting. With more overall room in the barn for exit alleys and turning, exit time has decreased. Feed bowl covers are helpful in barns with stationary front stalls so cows can't continue eating or eat small amounts out of several bowls as they walk out. Shortening the walking distance also helps, as in polygon or "pregnant" herringbone parlors.

The biggest improvement in exit time has come with "rapid exit" front stalls that lift or swing completely out of the cow's path at the end of string milking. These are gang applications of the old "California walk-through" parlors of the late 1950's. Rapid exit will cut exit time 300-400% and overall milking time 7-10% with tight idle time. For best performance of rapid exit barns, make sure lighting in the exit alley is bright and uniform. Cows don't like the contrast of crossing from a well-lit parlor platform to a dark exit alley. An exit lane of 8 feet is adequate for cows to move forward and to turn toward the holding area. An alley too narrow won't allow rumps to clear from under the elevated front stalls; too wide allows cows to stand comfortably without turning to leave the parlor.

There is always some socializing between cows in the holding pen and exit alleys. A solid fence near the front of the holding area will help cows start down the exit lane before stopping. We can't eliminate all the delays from cows stopping in the lane, however. The goal is to get cows started out to the point that gates can be closed and milking can resume.

### **A few additional thoughts**

**Shift milking** - Employees in a milking parlor are the same as employees in any job. They take an hour into their shift to reach peak efficiency. Then efficiency slowly declines until about one hour before the end of the shift when efficiency increases as the job completion nears. There is good data that parlor performance will improve during an eight hour shift if employees break for 15 minutes in the middle of the shift. In parlors where more than one person is working, one might take a break while others continue working. However, stopping milking for all employees to break still improves cow care and parlor throughput over eight hours. Most employees prefer straight shift milking, but the break is good personnel and cow management.

**Number of people in the parlor** - Economics of milking say you need to milk the cows as fast as possible with the fewest number of milkers. If you mechanize the parlor, it should result in fewer milkers or faster cow flow. Often we are faced with the decision of "Can I milk with one less person or should I add stalls to keep them all busy?" Many farmers cut one milker leaving the remaining employee(s) overloaded. Machines get dirty. Teat dipping may be haphazard. Cows are treated rougher. More farmers are learning this is false economy. They are hiring a roving employee who gets groups of cows into the holding pen, washes units between exit and entry, keeps the towel racks full, milks during breaks, and runs errands throughout milking. These "rovers" can be paid minimum wage and be part-time workers. They can be very helpful in parlor performance and cow care at a low cost.

Some people work best alone; others work better together. Multiple people in the parlor can make training a new milker easier and can increase safety for employees because there is always help available. However, the responsibility for the milking is not clearly defined and personalities of employees working together can cause problems. This becomes a decision based on the people working and the capabilities of your equipment. Larger parlors nearly always require multiple employees working as a team.

**Safety** - Worker safety will become a more important issue in the 1990's. Some states already charge sizable premiums for worker compensation insurance. Safety needs to be designed into milking facilities and trained into workers' routines. Parallel parlors offer some advantages in reducing injuries from cows. A higher platform (about 40") can reduce stress on back and shoulders. Think safety when making changes to a high performance parlor.

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