Robotic Milking Systems

Part 5: Cow Flow Strategies

January 2022

Robotic milking continues to gain widespread acceptance especially on smaller farms (<250 cows) in Western Europe and North America. However, a wide variation exists in productivity, labor efficiencies, and strategies for getting cows to and through the RMS. Over the years, it has reduced to three main strategies for getting cows to and through the robot: Free Flow (FF), Guided Flow (GF), and Hybrid (or Modified) Flow (HF).

Free Flow

In FF a cow is able to get up and get a drink or bite to eat and then lay down which maximizes lying time. They are open to access the robot, water, food, or pasture at any time. Typically, these barns are an open freestall aside from temporary fetch pen gates. Although they have also been seen with bedded packs. Free-flow is the most utilized cow flow strategy for RMS due to the ease of management and increased animal welfare of free choice.

Guided Flow

In GF she must proceed through a selection gate in order to access the feed bunk. If she has not been milked within a set time she will be directed to the commitment pen to be milked. Otherwise, she will be allowed to proceed to the feed bunk. Guided Flow can be further divided to milk-first or feed-first protocols. As the names suggest the strategy puts a priority on either getting the cow milked or getting her fed. Often these flows are controlled by one-way finger gates or graze way gates. Guided flow barns are able to be converted to free flow with removal of the sorting equipment and gates.

Hybrid Flow

HF is a combination of the two. Here there is at least one cross alley open so that the cows may get up to eat as fresh feed is delivered. However, there is a commitment pen and the only way out is through the robot.

Comparison

Each strategy has pros and cons, and facilities can be designed so that any strategy can be instituted. Individual farm circumstances and goals should determine the choice of strategy. Table 1 (back, page 2) draws direct comparisons between each strategy while listing the pros and cons of each. Existing barn layout and management preferences will influence the choice of cow flow strategies. Consider the farm's management and resources when making a decision.

Table 1. Comparison of Three Cow Flow Strategies.

Parameter	Free Flow	Guided Flow	Hybrid Flow
Pros	- Freedom to move around pen and access feed when it is delivered - Lower initial cost (fewer sort gates) - Cows don't get trapped waiting to visit RMS	- Easier to manage, potentially with less labor - Less fetching of cows - Less pellets in RMS, more use of high-quality forages - Sort options when exiting selection gate	- Access to feed when it is delivered - Reduced fetch rates versus free flow
Cons	- Often feed more pellets in RMS - Requires more fetching - Footbath use and gating may be more complex - Potentially longer and more irregular milking intervals - May require more FTEs to operate	- May not be able to access fresh feed as easily when it is delivered - In a milk-first set-up they may return directly to a stall to lie down because they've already been standing for an extended period of time - Cows may be trapped in the commitment pen for longer periods if no alerts have been set - Additional costs for smart gates	- Access cross-over alley may be at farthest point in barn - Cows may be trapped in the commitment pen for longer periods if no alerts have been set - Additional costs for smart gates
Feed Fed in Robot lbs./cow/day[1]	11.4	8.0	10.8
Production Averages lbs./cow/day	85	78	83
Fetch Rates[2]	8%	5%	

FACT SHEET SERIES: Robotic Milking Systems
Part 1: Overview of RMS
Part 2: RMS Management Changes and Considerations
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Part 4: Starting Up a New RMS Facility
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[2] Salfer, J.A., J.M Siewert, M.I. Endres. Housing, management characteristics, and factors associated with lameness, hock lesion, and hygiene of lactating dairy cattle on Upper Midwest United States dairy farms using automatic milking systems. J. *Dairy Sci.* vol. 101:9, ppg. 8586-8594 Sept. 2018.