

## Robotic Milking Systems

### Part 3: Designing and Setting up a New RMS Facility

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A robotic milking system (RMS) represents a significant investment in the infrastructure of the farm. This may be a retrofit into an existing structure or the construction of a completely new facility. In either case it requires a bit of a paradigm shift in the way facilities are designed or remodeled and animals are managed. A robotic freestall, even a retrofit, is going to have a much different layout than a standard freestall. The focus is on maximizing the ease of cow decision making and flow to the robot, feed bunk, and resting stall while minimizing human contact. With limited human interaction, herd dynamics change and the animals become more docile and curious.

#### Basic Barn Design

There are some basic design templates for robotic barns, however, there is no one-size-fits-all freestall. The ideal barn design depends on:

- requirements of the farm manager(s)
- managerial philosophies and protocols
- existing structures and equipment
- any local codes and regulations

The modular nature of these RMS units allows for a great deal of flexibility in locating them within the facility. However, you will still want to place them as close to the milkhouse as possible. Neither research nor regulations dictate a maximum distance, but wash water must maintain a minimum temperature of 160°F throughout the entire wash cycle. Longer pipes make this more difficult. In most cases, transfer pipes are insulated and run through heated overhead ducts or below grade tunnels to minimize the effect of ambient temperatures.

Newer facilities are eliminating the center feed alley in favor of perimeter feed alleys. This allows for the grouping of the RMS as well as consolidation of separation areas and utility services. This also optimizes worker efficiency in the robot rooms, reduces boot washing for sanitary entry, and eliminates traffic through the feed lane.

Separation areas, or sort pens, help to make use of the labor-saving herdsman capabilities of the

RMS. Fresh, lame, sick, or treated cows can be kept in an area of high visibility that allows for easy 24/7 access to the robot. This can also be used as a waiting area where cows can be sorted upon exit and segregated for breeding, dry treating, vet attention, etc. and still have 24/7 access to feed, water, rest, and the RMS.

Locate a treatment chute in this area, as well. The chute is where you will do all your dry treating, vaccinations, or other vet work – in other words, outside of the robot. You never want them to associate the robot with any unpleasant experiences.

Ventilation is as important here as any other livestock facility, however, special consideration should be given to the robot area. Place a large circulation fan above the rear of the robot to keep air moving over the cow while she is milking. This not only keeps the cow cool and provides an inviting environment, it also keeps biting flies off her while she is in the robot.

#### Around the RMS

Minimize the obstacles to and from the robot itself. There should be a minimum of 8' of clearance at the entrance and exit of a single robot, but 14' between robots in tandem. There should be a protected entrance area of about one cow length. This prevents a boss cow from pushing another cow waiting to get in out of the way. There should be a minimum of 20' of open area adjacent to the robots. This gives the cows opportunity to comfortably distance from one another while they wait their turn.

Fetch pens (where you gather cows that haven't visited the robot lately) are best kept small and temporary. When you fetch a cow you want to put her into the robot right away so she gets the idea that it's important to go to the robot. Generally, you'll fetch the cows only one or two at a time. Placing her in a small pen will encourage them to enter the robot ASAP. Blocking entrance traffic from the rest of the herd until the fetch cows are milked will help speed the process. It's

not unlikely that a cow has to be fetched only because she is a little timid or lower ranking. By blocking other traffic it leaves her more comfortable to enter the robot. The pen should be temporary only in the sense that once the fetch cows are milked the gates can be lifted or swung out of the way so that the entrance is not obstructed. That said, whether sorting or fetching, it's important to think strategically about placing the gates. By opening and/or closing the right gates, one person should be able to easily sort or fetch a cow.

Cows exiting the robot should not cross paths with cows approaching the robot. This may require additional design effort for a retrofit. Extending the exit lane one body length with a one-way gate at the end may reduce the frequency of delayed exit by timid cows.

Place a waterer right outside the exit of the robot. Just like in a parlor, cows will drink the majority of their water immediately following milking. However, this waterer should be at least 10' away (15' better) from the robot exit so as to not hinder cow flow.

### **Sizing the RMS**

Figure an RMS to service a maximum of 60 cows. More than this and wait times increase and daily visits decrease – you'll want to aim for that 2.8-2.9 visits/cow/day target. In practice 55-58 cows per RMS is better, especially in higher producing groups or herds. This allows animals to cycle through comfortably, including those peak production animals coming 4-6 times/day, as well as give you some downtime for daily maintenance.

Theoretically, you could milk as many as 75 cows per robot. However, cows are not robots and their behavior dictates that the theoretical maximum will never be reached. They are animals

with a herd mentality and are subject to diurnal rhythms. There will be lulls in the traffic to the robot – usually between 2 – 3 AM and 2 – 3 PM. (The best time to fetch cows may be at these times.) Anecdotally, larger herds are finding maximum group sizes of 180 cows is most efficient, both from a management perspective and equipment investment. Three RMS units can be paired up with three in an adjacent group and housed in a single robot room.

### **RMS Specific Needs**

Provide supplemental heat during the cold season. This may be a 12"- 15" diameter pipe with a fan forcing air from the utility room to the robot room. This will create a warm positive pressure in the robot room. Radiant in-floor heat in the robot room and around the robot will minimize ice build-up. Removable vinyl freezer strips may be necessary around the perimeter of the box in colder climates.

A major difference between RMS and parlor barns is that cows in RMS barns never leave the stall area. As such, tractor scraping should be avoided and automatic alley scrapers or slatted floors preferred. RMS barns should offer wide alleys and multiple crossovers every 15 – 20 stalls to provide escape routes when equipment is delivering bedding and/or grooming stalls. This constant occupancy makes it difficult to move cows through this space and to another pen (i.e.- dry group → prefresh → calving → fresh group.) Therefore, it is important to think strategically about locating these groups or provide dedicated travel lanes. Avoid constructing dead ends requiring you to back equipment in or out. Equipment travel through the barn should be straight and one way to minimize animal disturbance.

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### **FACT SHEET SERIES: Robotic Milking Systems**

Part 1: Overview of RMS

Part 2: RMS Management Changes and Considerations

Part 3: Designing a New RMS Facility

Part 4: Starting Up a New RMS Facility

Part 5: Cow Flow Strategies

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