Time for Technology

Robotic milking calls for new approaches to barn design.

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Robotic milking is one element in an emerging shift in direction for the modern dairy farm. It is one of many examples of systems that use robotics to reduce labour requirements and that use sensor based data collection and computerized interpretation to reduce management requirements. Other precision technologies such as automation of feeding, robotic calf feeding, pedometers, rumination and temperature sensors, and in line sensors that measure components, and metabolic and hormonal parameters in milk will make it possible for a single operator to manage a much larger dairy. Some dairies using these technologies are producing 1.5 to 2 million litres of milk per person per year. But on other farms, failure to properly adapt both management and facilities means only a small portion of the potential benefits are realized. The advent of parlor milking fifty years ago dramatically changed the way cows were housed on farms that adopted this technology. In the next fifty years, precision technologies will result in changes that are just as big if not bigger. While many of these changes are difficult to predict, and impossible to plan for, understanding how robotic milking impacts on barn design can help make us more open to new ideas.

Milking robots are compact modular units that require minimal barn space. They can work in almost any location of an exisiting freestall or bedding pack barn, and they can be easily moved to a new facility in a later phase of expansion. But many renovations involve numerous compromises. Too often we become focussed on overcoming the challenges of small stalls, narrow alleys, and low sidewalls, when the right decision might be to build new. To make sure we don't lose sight of all the compromises we make, I suggest that in any plan to renovate an existing barn, every "compromise" gets recorded on paper so that prior to construction a final review of the "renovation vs build new" decision can be undertaken.

The four goals or "cornerstones" that form the foundation of any dairy barn building project should be cow comfort, labour efficiency, cost and value for the capital invested, and flexibility of the layout for future expansion. Since well managed robot milking barns require surprisingly little labour, almost every successful robot farmer will want to add more cows and machines within five to ten years. Hence the best barn plans will be easy to double in size while maintaining their simplicity and convenience. The best dairy barns are designed with an understanding of the factors that influence both the efficiency and comfort of the cows and the workers using them. Many of these factors are the same for robotic milking as for barns with milking parlors. For example, cow comfort pays in all types of barns, but it is likely even more important with robotic milking. Both experience and research have shown that well rested cows with healthy feet visit the robotic milking stall voluntarily with the highest frequency. Contributing factors include big comfortable free stalls where feet can dry while the cow rests, floors that drain liquids away from the claw, and cleaning systems and layouts that keep cows' feet clean and dry. With respect to alley scrapers, short scraper runs, wide alleys, and "V" scrapers allow the cow greater opportunity to step over the plough without stepping in manure and free traffic barns provide escape routes that help cows avoid the scraper. Stalls and floors that provide good grip prevent injuries that contribute to lameness, and good ventilation promotes drier floors and drier hooves.

Many other design components for robotic barns are very different from parlor barns. The next few "Time for technology" columns will focus on some of these differences. The design of a robotic milking barn must recognize that milking cows never leave the barn. Hence it is never convenient to move cows through the space occupied by other groups, and it is important to locate groups strategically or provide lanes for cow movement. Since the logical labour organization of a robot barn seldom allows for two

people in the barn at the same time, cow movement from group to group and to the robot or handling area must be set up to be a one person job. Moving through the barn with equipment to scrape manure or bring in bedding is also highly disruptive. Hence tractor scraping manure is not recommended. Bedding delivery is done less frequently and is a less serious issue but automated bedding delivery systems may still be a wise investment in these barns. Track systems that apply chopped straw or shavings to empty stalls are in development and flex auger systems with drop pipes which deliver sawdust/shavings to a central corner in front of four head to head stalls for manual distribution are in commercial use in Europe. Waterbeds or mattresses that require minimal bedding are recommended to reduce the need for bedding. Use of sand bedding will require moving through the barn with bobcats or tractors and to minimize the time involved, layouts that create straight lines through the barn, with doors at each end and layouts with free cow traffic, wide alleys and multiple crossovers that provide simple escape routes for cows when equipment passes through the alleys are recommended.

In summary, some of the key challenges in designing for robots include making sure cows are comfortable and have healthy feet, ensuring that one person can tackle almost any job alone, and designing so that working in among the cows leads to minimal disruption. In future columns I plan to tackle some of the specific components of robotic milking barns, that make this possible, such as perimeter feed alleys, split entry holding areas, and central handling facilities, as well as discussing specific layout ideas for free or guided traffic, and grouping strategies.