Automatic Milking Systems— A Deal or No Deal for Your Dairy?

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Automatic Milking Systems (AMS) are milking cows on over 2,500 farms around the world. There are over 150 farms in the US and over 350 in Canada using AMS. AMS has been growing exponentially since 2000. Decreased labor and increased quality of life can override the high investment costs of AMS. AMS increase management ability by collecting individual cow milk production, milk conductivity, milk clarity, cow activity and rumination data. AMS are a high level management system, not just a tool to milk cows. The increased management ability may be more important than the milking technology. **Bottom Line: Cows and People Like Them!**

Robotic Milking Facts:

- AMS do NOT impair the welfare of dairy cows. Flight responses in freestalls "seems" less with AMS which is good.
- There are more AMS companies planning to enter the U.S. market. Five companies displayed at World Dairy Expo, 2011: Boumatic, DeLaval, GEA Westfalia-Surge, Insentec (Galaxy-Starline) and Lely. Others may be coming as well.
- For dairy herds in the 60-240 cow range, box type AMS may be competitive economically where labor costs or hired labor availability or frustrations are high. For 700+ cow herds, rotary robots may be feasible and available in the near future.
- AMS can be "free flow" with unimpeded access or "guided flow" with one way gates to guide cows to robot or feed.
- AMS range from 140-190 milkings per 24 hour period or 2.4-3.3 milkings on average per cow/day. (Salfer)
- AMS range from 3,000 – 6,000 pounds of milk/AMS/day. (Salfer) Data used to experiment to increase milk/AMS unit.
- The AMS software assists in heat detection, rumination, SCC levels, milk weights and individual grain feeding. These abilities need consideration for cost-benefit analysis. Technology to divert milk from individual quarters is a big challenge.
- AMS have been successful in freestall, bedded pack and grazing operations.
- Water and chemical use tends to be less than parlors, electricity higher but maybe related to increased electrical rates more than increased useage. (Rodenburg)
- There may be increases in milk production (3 lbs per cow per day). With good management, expect production 3 to 5% higher than 2x parlor milking, but can be 6-9% lower than 3x milking. This can be highly variable!
- Equal or improved somatic cell counts, herd health and reproduction with increased management ability. AMS comparable to conventional prepping. Greater success in cleaning base of teat with brush-type but tip of teat cleaner with cup design.

Considerations for Increased AMS Effectiveness: (Salfer, 2011)

Many factors must be considered in barn design. Since cows need to be coerced into milking, anything that makes visiting the AMS easier will improve performance. Here are some considerations in barn design:

- Consider systems that minimize time interacting with cows in the pens. Most producers install automatic scrapers or slats to eliminate having to go in the pen to scrape. Producers that did scrape manure indicated that it took very little extra time to scrape alleys compared to when they milked in a parlor.
- Provide wide alleys and crossovers to facilitate easy cow movement within the pens. Ensure no DEAD END Alleys!
- Highly visible well lit areas around the robot are preferred.
- Providing amenities such as water near the entrance to the AMS are important to encourage cows to visit that area. One producer has extra fans to provide cooling in the holding pen for the AMS.
- Provide a large open area around the entrance to the AMS unit. This allows multiple cows to stand in the area and enter the AMS as other cows exit.
- Provide protection at the exit of the milking unit. This prevents dominant cows from intimidating submissive cows as they exit the AMS.
- Do not move cows between pens. This requires social adjustment and cows will decrease visits after moving.
- Consider designing a barn where all robots are positioned so the cows enter them on their left or right side. Another alternative is to have both right and left entrance robots in the same pen. One study showed that 10% of cows had a difficult time adjusting to entering on the opposite side entry (Rodenburg, 2007).

Nutrition and Feeding Management (Feeding Strategies to Promote Good Cow Flow)

- One of the most important factors in making AMS successful is ration balancing/nutrition management.
- Cows are enticed to visit AMS because of feed, not because of udder pressure. Feed presented in the AMS must be very palatable so that cows want to visit the robot. A survey of 25 AMS herds in North America indicated that they fed an average of 65% forage in the diet. Eleven of the 25 fed a forage percentage between 48-60% in the TMR (de Jong et. al, 2003). Higher forage rations entice cows to enter AMS.

- Most producers are feeding a pellet through the AMS and believe that flavor enhanced pellets better entice cows to visit the robot more and promote better consumption. Ration adjustments are made in the PMR. Some feed two different feeds through the AMS. The preferred second choice was roasted soybeans.
- Preliminary results indicate that most producers are feeding a minimum of 4 lb/cow/day to a maximum of about 19 lbs/cow/day through the AMS.
- When producers and nutritionists were surveyed regarding the key factors to getting good cow flow, all mentioned feeding a pelleted, highly palatable feed in AMS and limiting energy in the PMR. Many producers also mentioned feeding strategies that promoted cows to stay active also promoted good cow flow. Methods that producers tried to accomplish this varied and included: feeding the PMR multiple times per day or pushing up on a regular basis, feeding for low refusals, keeping feeding times and forages consistent, feeding excellent quality forages and cleaning bunks on a regular basis. (Salfer, 2011)

AMS Challenges

- Balancing the palatable pellet and the energy density of the PMR to promote both cow flow and milk production.
- Lame or sick cows (including sub-acute rumen acidosis) do not visit the AMS.
- Disruptions due to manure scraping, herd health checks, hoof trimming, etc. affect throughput.
- Dark teats, long udder hair, reverse tilted udders, touching teats, dancing cows can delay attachment times.
- Initially training cows to AMS can take 3 weeks to 3 months and would not be classified as a pleasant experience.
- AMS can cost over $4,000 per cow just for the AMS unit so new setups could invest over $10,000 per cow.
- Cash flow due to high investment and possibly high repairs after warranties expire can present challenges.
- Maintenance costs and repairs—producers learn to make minor repairs. Parts of most concern are hydraulic arms and lasers after warranty because of their high replacement costs.
- Manager is on call 24-7. Night calls are minimal but when problems occur, downtime needs to be minimized.

The Economics of Automatic Milking Systems (AMS)

- AMS can cost $180,000-$275,000 for the first unit and can handle 55-70 cows. Additional units can be added to various AMS for 75%-80% of the cost of the first or an estimated $360,000 cost for two AMS units. New technology is increasing the number of units one robotic arm can operate and may further reduce the cost per unit. One company indicates an AMS can be leased for $180,000 over 7 years @ 6.5% interest with a payment of $32,819 per year. (Anderson)
- Leased investment cost per hundredweight of milk is about $1.80/cwt ($90/day divided by 5,000 lbs milk/day divided by 100). Estimated range of $1.36 - $2.00 per cwt. without labor.
- Milking labor in a parlor on a 120 cow herd 2x (2.5 hours milking + .5 cleanup = 3 hours x 2 milkings per day) would be 6 hours/day) while two robots would only take 1-2 hours/day (Salfer) for milking activities. Thus, robot labor savings would be 4-5 hours per day on a 120 cow herd valued at $48-$75 per day or $1.06 - $1.36 per cwt. This equates to $17,520 to $27,375 per year.
- An AMS unit may be able to double the cows managed per FTE from 50-60 cows/FTE to 100-120 cows/FTE.

*Claims are made that since AMS are harvesting 1.7 million pounds of milk they are more than 1 FTE equivalent (2,400 hours) whose goal is 1.2 million pounds of milk produced. Note this is not felt to be a fair, good or true comparison since in that 1.2 million pounds of milk being produced, the typical FTE is also feeding cows, handling manure, doing herd health, tending to calves and heifers, equipment repair, etc. Thus, be careful how you compare the economic competitiveness of the AMS.

Summary and Conclusions

AMS have demonstrated they have the ability to harvest high quality milk successfully. It has the opportunity, especially for smaller herds, to reduce labor, milk more frequently and provide flexibility of hours of labor. As with any system, it takes excellent management for success. With AMS particular attention must be paid to nutrition management and cow health. It is important on all farms to figure what numbers, assumptions and concepts are realistic and helpful to use in analyzing the financial aspects of this decision in the context of personal and business needs, priorities and goals.

References

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