Automation Potential in Agriculture

A new report entitled "A future that works: Automation, employment, and productivity" published recently by the management consulting firm McKinsey & Company assessed the technical automation potential of the global economy. Based on 2017 data from the U.S. Department of Labor, the authors (Manyika et al.) estimated the technical automation potential of more than 2,000 work activities in more than 800 occupations. In summary:

- Activities with highest automation potential are: predictable physical activities (81%), data processing (69%), and data collection (64%).
- While few occupations can be automated entirely (<5%), about 60% of all occupations have at least 30% of activities that could be automated.
- Automation potential in the U.S. is 46% (China is 51%, India is 52%).
- Automation potential in agriculture ranks at 58%, based on type of activity: management (<10%), expertise and interface (20 – 30%), unpredictable physical activities (40 – 50%), data processing (70 – 80%), data collection and predictable physical activities (80 – 90%).

Milking cows is a predictable physical task that can be automated. The work is intensive with employees working almost 24/7, every day of the year. This, coupled with the challenge of finding a qualified workforce, makes the milking center one of the most difficult areas to manage. Plus, communication and cultural barriers can complicate the relationship between dairy owners, managers and employees.

For these reasons, robotic milking is becoming popular in dairy farms. It has been reported there are more than 35,000 robotic units on farms worldwide.

Several studies have reported a reduction in labor in dairy farms using robotic milking:

A 2004 study of robotic dairies in Europe reported average labor savings of 20%, with large variation among farms. A 2007 Dutch study with 31 robot dairies and 31 conventional milking systems showed, on average, the total amount of labor, or full-time employee equivalents, was 29% lower in farms with robots.

Yet a 2012 study conducted on 400 dairies in the Netherlands (63 robotic farms and 337 parlors) found no difference in the number of full time employees between milking systems.

University of Minnesota Extension has developed partial budget simulations to model profitability of robotic milking compared with parlor systems for different farm sizes. Using the following assumptions, the researchers (Salfer et at., 2017) estimated the financial impact of both milking systems with farm sizes of 120, 240, and 1,500 lactating cows under current economic conditions in the North Central region of the U.S.: milking labor $16.00/h; management labor $25.00/h; milk price $17.40/lb; feed cost $0.11/lb DM; and loan interest rate 5%. While both the 120-and 240-cow robotic dairies were more profitable than the parlor systems, the 1,500-cow parlor system was more profitable than the robot system. Breakeven labor analysis of the 1,500-cow system showed that at a wage inflation rate of 1%, the breakeven labor rate was $27.02/hour. **M**

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