REDUCED LABOR COSTS WHEN USING A FLOW-CONTROLLED VACUUM IN ROTARY MILKING PARLORS

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Introduction

Current vacuum levels of milking parlors are constant and a trade-off between milk flowrate and teat health. A milk flow-controlled vacuum (FCV; DeLaval), being an increased vacuum during peak milk flow, results in a higher milk flow and therefore shorter milking duration (Reinemann et al., 2020) without negatively impacting teat health (Feierabend et al., 2020). The speed of a rotary milking parlor can thus be increased, resulting in a shorter total milking time with lower associated labor costs. This study estimated the yearly savings of decreasing the milking duration of cows in large dairy herrds with a rotary milking parlor by using a FCV system.

Material and Methods

A stochastic simulation model was built to estimate the total milking duration in large herds with a rotary milking parlor. In each analysis, consisting of 10,000 iterations, a scenario with a constant vacuum (CON) milking system was compared to a scenario with a FCV. Also, a scenario in which 95% of the cows finished milking at the end of rotation was compared to a scenario in which 99% of the cows were finished. Milking duration (seconds) was 483 (CON) and 447 (FCV) for the 95% percentile and 567 (CON) and 558 (FCV) for the 99% percentile in a companion field study (Reinemann et al., 2020). To allow stochastic variation, a normal distribution with a standard deviation of 20 seconds was applied to the milking duration for all four scenarios.

Table 1. Input parameter settings for simulating a rotary milking parlor in large dairy herds.

		Labor (number of employees)			Units not available for milking			
Herd size	Rotary size	Premilking + attaching	PMTD[1]	Fetching cows	Entry	Premilking+ attaching	PMTD	Exit
1000	60	2	1	1	1	6	1	3.5
2000	60	2	1	1	1	6	1	3.5
3000	60	2	1	1	1	6	1	3.5
4000	80	3.5	1	1.5	1	7	1	4.5
5000	80	3.5	1	1.5	1	7	1	4.5
6000	100	3.5	1	1.5	1	8	1	5.5
7000	100	3.5	1	1.5	1	8	1	5.5

[1]Postmilking teat disinfection

The speed of the rotary was calculated by dividing the maximum milking duration by the size of the rotary minus the number of units that are not available for milking due to cows entering and

exiting the parlor, the premilking and attaching activities, and post-milking teat disinfection (Table 1). The speed of the rotary was multiplied by the herd size to calculate the total milking duration of the herd. The difference in total milking duration between the CON and FCV scenarios was multiplied by the number of employees involved in the milking process (Table 1) and the hourly wage of a farm worker ($23 / hr) to calculate the reduced costs per milking. The total reduced costs were finally calculated per year assuming that cows were milked twice a day.

Results and Discussion

In the 99% scenario, the speed of the rotary was 12.1, 8.9, and 7.0 seconds per cow with the CON system and 10.8, 7.9, and 6.2 seconds per cow with the FCV system for rotary sizes of 60, 80, and 100 cows, respectively. Both in the 95% and 99% scenario, this resulted in substantial savings, varying from approximately $25,000 on average in a 1,000 head dairy herd to approximately $149,000 per year on average in a 7,000 head dairy herd when 99% of the cows were finished at the end of rotation. Besides a reduction in labor costs, the time gained due to an increased rotation speed may also be used to milk more cows. Whether such large achievements can also be achieved with other milking parlor types is currently being investigated.

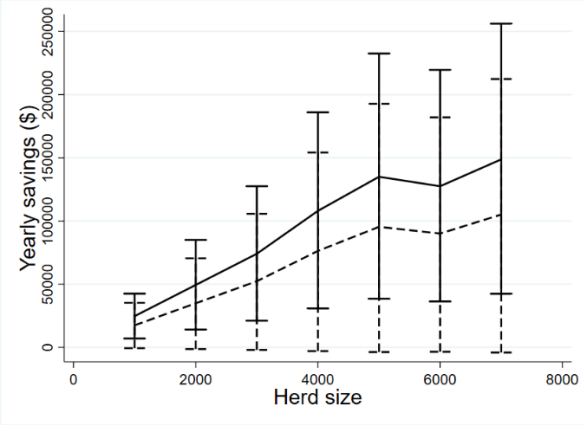

Figure 1. Yearly reduced costs, and their 5% and 95% percentiles, when using a flow controlled vacuum system in large dairy herds with a rotary milking parlor when 95% (dashed line) and 99% (solid line) of the cows are finished at the end of the rotation.

Conclusion

This study shows that labor costs can be substantially reduced in large dairy herds with a rotary milking parlor when a flow-controlled vacuum system is being used.

References

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