Effect of bi-modal milk letdown on milk production

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Introduction

The dairy industry is relying more on hired labor to milk cows and many dairy operations are increasing pressure on employees to maintain high levels of milking parlor throughput. This management emphasis negatively impacts milking protocols that are aligned with milk quality. Parlor efficiency is often defined in terms of cows milked per hour. However, we need to consider milking efficiency to include milk quality, milk flow, and employee performance (Moore-Foster et al., 2019; Erskine et al., 2019). The purpose of this study was to determine the impact of poor pre-milking preparation (as evidenced by bi-modal milk letdown) on subsequent milk production.

Erskine, RJ, B Norby, LM Neuder, et al. 2019. Decreased milk yield is associated with delayed milk ejection. J. Dairy Sci. (in press)

Moore-Foster R, B Norby, RL Schewe, et al. 2019. Herd-level variables associated with delayed milk ejection in Michigan dairy herds. J. Dairy Sci. 102:696-705.

Materials and Methods

In a Michigan dairy milking three times per day, we evaluated milking efficiency with VaDia® digital recorders as described previously (Moore-Foster et al., 2019). Subsequently, episodes of bi-modal milk letdown were estimated for each cow-milking. Milk flow 30 to 60s post-attachment (gained from the parlor computer) was compared for each cow-milking analyzed by VaDia. From this comparison, we derived a cut-off to divide milk flow observations into either normal or bi-modal milk flow. Our cut-off normal milk flow was > 4 lbs/min, selected for a specificity of ≥ 90% We then tracked milk weights and milk flow (the determinant of bi-modal milking) for 10 days. The percent of milkings (n=30 per cow) with bi-modal letdown was compared to mean daily milk weight over the same period. The dependent variable was average daily milk yield over 10 days. Independent variables included stage of lactation, age, milking shift, and past history of clinical mastitis in current lactation. Multivariable analyses of potential associations between the outcome and independent variables was conducted using longitudinal measures with milk yield for individual cows treated as repeated measures. Linear regression analysis was in a manual backward stepwise manner using a significance level of 0.05 for retaining covariates.

Results

The percent of bi-modal events per cow averaged 46% with a range of 0% to 100%. Frequency of bi-modal letdown was negatively correlated to average daily milk yield. Our final multivariate model (R^2 = 0.32) found a negative association between milk yield and stage of lactation and the frequency of bi-modal milking. Lactation was positively associated with milk yield.

Significance

Cows with increased frequency of bi-modal milking have impaired milk yield. Bi-modal milking is more prevalent in herds that emphasize parlor throughput. This herd management dynamic presents an opportunity for veterinarians to provide evaluation, training, and consultation to improve milking efficiency.