

Impact of Concentrate Allowance and Cow Personality on the Behavior and Production of Dairy Cows Introduced to a Free-Traffic Automated Milking System

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Feed is typically used within an automated milking system (AMS) to motivate cows to voluntarily visit the milking unit. However, individual difference in personality traits between cows may also influence their willingness to milk voluntarily. The objective of this study was to determine the effects of concentrate allowance and the personality trait of boldness on the adaptability and production of dairy cows introduced to an AMS. Thirty-two Holstein cows (218 ± 47 DIM; 1.6 ± 0.8 lactations), with no previous exposure to an AMS, were designated as **Bold** or **Shy** based on previous observations of competitive behavior (displacements) at the feed bunk. Within personality trait category, cows were randomly assigned to an AMS concentrate allocation of either 6 (**High**) or 2 (**Low**) kg/d, on a dry-matter basis. Cows were trained to use the AMS over 72 h, being brought to the milking unit and encouraged to enter. After 72 h, cows were fetched to be milked when a minimum of 10 h had elapsed since the last milking. Data on milking activity and production were recorded for 9 wk following the initial training period. Compared to Low cows, High cows tended to have greater milking frequency (2.6 vs. 2.2 milkings/d; $P=0.1$) and had greater milk yield (35.0 vs. 29.9 kg/d, $P=0.01$). Compared to Shy cows, Bold cows tended to have their first voluntary milking visit earlier (5.4 vs. 7.3 d after introduction to AMS; $P=0.1$) and tended to have a shorter amount of time between their first voluntary AMS visit and their first 72 consecutive h with no fetches (15.5 vs. 33.0 d; $P=0.06$). Bold cows also tended to have greater milking frequency (2.6 vs. 2.2 visits/d; $P=0.1$) than Shy cows. Overall, these data indicate that allocating a greater amount of concentrate in the AMS, in a free-traffic setup, may promote adaption to voluntary milking. The results also suggest that Bold cows are more adaptable to an AMS than Shy cows.

Identifying the On-Farm Factors Associated with Elevated Free Fatty Acids in Bulk Tank Milk

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Elevated free fatty acids (FFA) in bulk tank milk are a recent concern in the dairy industry. High concentrations of FFA (> 1.2 mmol/100g of fat) are associated with undesirable milk characteristics, such as off-flavour, rancidity, reduced frothing ability, and inhibited milk fermentation and cheese coagulation. Previous research indicates that physical and chemical agitation cause the milk fat globule membrane to break and release triglycerides that dissociate into FFA. It is hypothesized that milking system type, pipeline diameter, and fat supplementation in the diet affect FFA. An observational case-control pilot study was conducted to identify on-farm factors associated with elevated FFA in bulk tank milk. 50 dairy farms in Ontario received a one-time visit to complete a survey, measure pipelines, and gather feeding information. Bulk tank FFA data were obtained from the Dairy Farmers of Ontario and used as the outcome variable for analysis. The mean bulk tank FFA level was 1.13 ± 0.3 mmol/100g of fat (range = 0.69 to 1.92 mmol/100g of fat). Univariable linear regressions indicated that smaller bulk tank capacity ($P=0.1$), decreased pipeline diameter ($P=0.09$), the absence of a plate cooler ($P=0.01$), and pasture access ($P=0.06$) were associated with FFA > 1.2 mmol/100 g milk fat. Multivariable analysis indicated that farms with a narrower pipeline diameter (< 2 inches) and farms that did not pre-cool milk before entry into the bulk tank were more likely to have elevated FFA; however, these variables only explained a small proportion of the variability in FFA (adjusted $R^2 = 22\%$). The results of this pilot study guide the development of a larger study that will include more farms and detailed measurements. Further, the initial results indicate that the risk of elevated FFA levels may be lessened with larger diameter pipelines and pre-cooling of milk.