



9. Milk Analysis Workshop 2 Creating Additional Value from Milk Analysis

Title presentation

Implementing an on-farm decision-support tool based on fatty acid profiles from bulk tank milk

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Abstract

Milk fatty acids (FA) originate from synthesis in the mammary gland (de novo), feed intake or body fat mobilization (preformed), or both (mixed). Rapid analysis of bulk tank FA profiles through Fourier-transform infrared (FTIR) spectroscopy could therefore be a valuable tool in dairy management. Bulk tank samples (N = 573,000) from 3,395 dairy herds in Quebec, Canada were analyzed by FTIR from April 2019 to February 2020. On a milk basis, each 0.1-unit of increase in de novo FA increased milk fat by 0.201 units (R² 0.67) and protein by 0.117 units (R² 0.65). Seasonal cycles were distinct with decreased de novo and increased preformed FA during the summer months (FA basis). Jersey herds had, thereby, a less important drop in de novo FA than Holstein herds (-0.7 versus -1.3 g/100 g FA) in August as compared to April. Across seasons, Jersey herds had higher de novo (+1.5 g) but lower preformed FA (-2.9 g/100 g FA) and a greater milk fat content (+0.8%-units) as compared to Holstein herds. A snapshot analysis was conducted with herd averages for April 2019 across 2,035 Holstein herds having high de novo (HDN; mean ± SD of 27.9 ± 0.73 g/100 g FA) if above, and low de novo (LDN; 25.9 ± 1.14 g/100 g FA) levels if below the population median, based on the monthly herd average concentration of de novo on FA basis. Compared to LDN herds, HDN herds had greater (P ≤ 0.001) test day milk fat (4.11 vs 4.06%; SE 0.008) and true protein (3.21 vs 3.15%; SE of 0.005) content, and greater (P ≤ 0.001) test day yields for milk (33.5 vs 32.6 kg; SE of 0.92), fat (1.17 vs 1.12 kg; SE of 0.008), and true protein (0.97 vs 0.91 kg; SE of 0.007). In addition, HDN herds had a 4% higher (P ≤ 0.001) cumulated milk value at test day (+ CAD268) than LDN. These findings suggest that HDN herds may have adopted management and dietary practices that promote de novo synthesis of milk FA, and support optimal ruminal function and productivity. Continuous monitoring of FA profiles by FTIR can be thus a valuable dairy management tool. A graphical tool was developed with the aim to visualize milk FA profiles with benchmarks and farm-specific historical data, was validated on farm, and deployed in production via an IBM Cognos platform to generate interactive reports for producers and advisors.