Alfalfa Cut At Sundown and Harvested As Baleage Increases Performance of Late-Lactation Dairy Cows

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It is well known that the concentration of total nonstructural carbohydrates (TNC) varies diurnally in forage because of the plant's potential to accumulate sugars during the daylight. Fourteen multiparous (8 ruminally cannulated) and 2 primiparous lactating dairy cows were paired by parity and milk yield, and randomly assigned to 2 treatments in a crossover design to investigate the effects of alfalfa cutting time on performance, ruminal metabolism, and microbial protein synthesis. Half of each alfalfa field (total of 3) was cut at sundown (PM) after a sunny day while the second-half was cut at sunup (AM) on the following day. Both PM and AM cuts were field-wilted and harvested as baleage (531 ± 15 g of DM/kg of fresh matter). The difference in TNC concentration between PM and AM baleages varied from -10 to 50 g/kg DM. Each pair of baleage was fed *ad libitum* to cows once daily with no concentrate. Intake of DM (+ 1.0 kg/d), and yields of milk (+ 1.0 kg/d), milk fat (+ 70 g/d), and milk protein (+ 40 g/d) were significantly higher in cows fed PM than AM alfalfa. Concentration of milk urea N and excretion of urea N as a proportion of total urinary N were significantly reduced, and milk N efficiency was increased when feeding PM vs. AM alfalfa indicating an improvement in N utilization. Ruminal molar proportion of acetate and total VFA concentration were both higher with AM baleage while proportion of valerate was greater with PM baleage. Digestible organic matter (OM) intake, OM digestibility, and plasma Lys concentration were significantly higher in cows fed PM alfalfa suggesting that more nutrients were available for milk synthesis. Significant lower body weight gain and retained N as a proportion of N intake were observed in cows fed PM alfalfa, thus indicating that nutrients were channeled to milk synthesis rather than to body reserves. Omasal flow of microbial N increased (+ 21 g/d) significantly when cows were fed PM vs. AM alfalfa possibly because bacteria from cows fed PM alfalfa captured more ammonia than those from cows fed AM alfalfa. Enhanced OM intake can also explain the observed increase in bacterial protein synthesis with PM alfalfa.

Implications: Enhancing TNC concentration of alfalfa by shifting forage cutting from sunup to sundown increases performance, N utilization, and microbial protein synthesis in late-lactation dairy cows.