

Influence of diet change frequency on growth, rumen fermentation, and behavior of prepubertal dairy heifers.

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The objective of this study was to evaluate the effects of diet change frequency on dairy heifer performance, rumen fermentation, and feeding behavior. Ninety Holstein heifers ( $141.8 \pm 11.7$  kg of BW) in 15 pens were randomly assigned to treatments designed to change diets using rapid (30 to 60% hay; **1STEP**), moderate (30 to 45 to 60% hay; **2STEP**), or gradual steps (30 to 40 to 50 to 60% hay; **3STEP**). Heifers were fed for 84 d, and diets were changed every 2 wk starting on d 28. Weights were taken every 2 wk, and skeletal measurements and blood samples were collected monthly. Rumen fluid was collected esophageally 6 h after feeding (2 heifers/pen) to determine pH,  $\text{NH}_3$ , and volatile fatty acids (**VFA**) 2 wk after each diet change. Behavior was evaluated using scan-sampling before and after diet changes for 30 min prior to and 120 min following feed delivery. Data were analyzed with pen as the experimental unit. On d 84, 3STEP heifers were heavier than 1STEP ( $P=0.05$ ) and tended to be heavier than 2STEP ( $P=0.06$ ). Daily gain was significantly improved for 3STEP after the second diet change ( $P<0.01$ ), but lower after the last diet change compared to 1STEP and 2STEP ( $P=0.05$ ). Feed intake was greater ( $P=0.02$ ) for 3STEP from d 35 to 63, yet similar among treatments from d 63 to 84. Skeletal growth was similar with the exception of heart girth, which was greatest for 3STEP on d 84 ( $P=0.01$ ). Blood glucose was greatest for 3STEP after the first diet change ( $P=0.02$ ) and greatest for 2STEP after the last diet change ( $P=0.04$ ). Rumen fermentation profiles were altered following the first diet change, as proportions of acetate ( $P<0.01$ ) and isoacids ( $P=0.10$ ) were greatest and total VFA, propionate ( $P<0.01$ ), and valerate ( $P<0.01$ ) were lowest for 1STEP. Heifers fed using 1STEP spent 51% more time feeding than 3STEP heifers 3 d after the first diet change ( $P<0.01$ ). Time spent feeding was 18% ( $P=0.01$ ) and 14% ( $P=0.01$ ) greater 6 d prior to the second diet change for 1STEP and 2STEP, respectively, compared to 3STEP. Rapid diet changes appear to alter rumen fermentation and feeding behavior, which potentially reduces performance of growing dairy heifers.

Key words: heifer, feeding, growth