Can You Identify Cows That are Tolerant to High-grain Diets in Your Herd?

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It has been indicated that huge variations exist in the extent of severity of rumen acidosis among lactating dairy cows even fed identical diets. In order to manage this nutritional disorder, it is necessary to identify cows that are tolerant and susceptible to high-grain diets on farms. Our previous study reported that the tolerant cows had higher milk urea nitrogen (MUN) concentration than the susceptible ones. Therefore, the objective of the current study was to evaluate if MUN and milk fat content (MF) could be used as the non-invasive indicator to identify cows that are tolerant and susceptible to high-grain diets.

In the screening study, 35 late-lactating Holstein cows (DIM = 250 ± 71.1; BW = 601 ± 45.4 kg) were fed a high grain diet containing 35% forage and 65% concentrate mix ad libitum for 21 d. After 18-d diet adaptation period, milk samples were collected for 3 consecutive days, and analyzed for MUN and MF. The MUN ranged from 5.66 to 13.92 mg/dl among the 35 cows, and the average MF was 3.5%. Then, 5 cows with highest MUN concentrations with MF higher than 3.5% were selected as candidates that are tolerant to high-grain rations (TC), and 5 cows with lowest MUN concentrations with MF less than 3.5% were selected as candidates that are susceptible to high-grain rations (SC). These 10 cows were ruminally cannulated during the subsequent dry period. Then in the following lactation, these cows (DIM = 122 ± 33.2; BW = 615 ± 49.1 kg) were fed a high grain diet containing 35% forage and 65% concentrate mix during mid-lactation. After 18-d diet adaptation period, ruminal pH was measured every 30 s for 72 h. Acidosis index was determined for individual animals to assess the severity of acidosis (area of pH <5.8) normalized for a feed intake level. Although one SC cow did not experience rumen acidosis (acidosis index = 0), the remaining 4 SC cows had higher acidosis index values than all TC cows. Moreover, minimum (5.75 vs. 5.30; $P = 0.02$) and mean ruminal pH (6.35 vs. 6.04; $P = 0.02$) was higher for TC compared with SC cows. However, there was no difference in MUN and MF between TC and SC cows in the second study, indicating that milk composition in mid-lactation might not be a good indicator of rumen pH.

Implications: These results suggested that MUN and milk fat content in late-lactating cows fed a high grain diet are generally useful to identify cows that are tolerant and susceptible to high-grain diets.