

Does Subacute Ruminal Acidosis (SARA) affect Fermentation in the Hind Gut?

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Feeding high grain diets to dairy cows can cause subacute ruminal acidosis (SARA) and increase the proportion of starch in the diet that escapes digestion in the rumen. Several of the symptoms of SARA may be due to increased digestion of starch in the large intestine, which may lower the pH and increase the production of bacterial toxins (LPS) in the large intestine. As SARA induced by feeding forage pellets does not increase the content of starch in the diet, the effects of this form of SARA on digestion in the large intestine may be different from that of grain-induced SARA. To test this, a study was conducted with non-lactating dairy cows with cannula in the rumen and in the large intestine (cecum). Experimental periods were 4 weeks long. In the fourth week of each period, cows either received a control diet with 70% of forage (DM basis), or a high grain diet that induced grain pellet-induced SARA (GPI_SARA) (67% concentrate DM basis 37% wheat-barley pellets), or a diet that contained alfalfa pellets that induced SARA (API_SARA) (45% of concentrate 32% of alfalfa pellets). Cows were fed once daily at 9 am. During the fourth week of all periods, rumen pH was monitored continuously in all cows. Rumen fluid, digesta from the cecum, and feces were sampled immediately before feed delivery and at 6 h after feed delivery. All samples were analyzed for LPS. The pH of cecum samples were determined.

The average daily rumen pH was 6.30, 5.99, and 5.98, for control, API_SARA, and GPI_SARA, respectively. The duration of the rumen pH below 5.6 was 56.4, 225.2 and 298.7 min/d for control, API_SARA, and GPI_SARA, respectively. This shows that both forms of SARA resulted in similar depressions of rumen pH. Both forms of SARA decreased the cecum pH, on average, from 7.06 to 6.83. GPI_SARA increased LPS toxins in the rumen, cecum, and feces, from 10,405 to 168,391 EU/mL, from 29,621 to 205,075 EU/mL, and from 50,338 to 229,309, respectively. In contrast, API_SARA only increased LPS in the rumen, from 10,405 to 30,715 EU/mL. As expected, the grain-pellet induced SARA caused a large increase in bacterial toxins in the large intestine than the alfalfa pellet induced SARA.

Implications. Grain-induced SARA increases fermentation and the production of bacterial toxins in the hind gut of dairy cows. Diets for dairy cows must, therefore, be formulated to avoid excessive fermentation in the hind gut.