Diagnosis of Subacute Ruminal Acidosis (SARA) On-Farm by Analyzing Bacterial Toxins in the Feces

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The currently available tools for the diagnosis of SARA include measurement of pH in rumen fluid samples collected using a stomach tube or by rumenocentesis. These tools are not accurate, and can cause heath problems to the cow. As a result, other tools for the diagnosis of SARA must be developed. It has been suggested that the concentration of bacterial toxins (LPS) in the feces may also be an indictor of SARA in dairy cows. We conducted a survey of 10 dairy farms in Manitoba to study factors that could affect this concentration. Each farm was visited once to collect composite milk samples and fecal grab samples of 15 early and peak lactation Holstein cows with an average of 62 days in milk (DIM) and 15 late lactation Holstein cows with an average of 272 DIM. Daily milk yield, days in milk, and parity were recorded. Milk was analyzed for fat, protein, and somatic cell counts (SCC). Feces were analyzed for LPS. Diets were analyzed for neutral detergent fibre (NDF). Farms were divided into 5 farms with low dietary NDF (< 34 % DM) and 5 farms high dietary NDF (> 34% of DM). The concentration of LPS in the feces was influenced by the level of NDF in the diet, farm, daily milk yield, and parity. Days in milk, milk protein, and milk fat did not have an effect on fecal LPS. An increase in parity was associated with a reduction in fecal LPS, but an increase in daily milk yield was associated with an increase fecal LPS. Farms with low dietary NDF had higher fecal LPS than farms with a high dietary NDF (27,087 vs. 14,672 EU/ml). An increase in SCC tended to increase fecal LPS. Results suggest that low dietary NDF, which is a risk factor for SARA, is associated with high LPS in the feces. This may be explained by increases in fermentation, and in the death and toxin production of bacteria in the hind gut that accompany SARA. The measurement of LPS in feces could, therefore, help with the diagnosis of this disease. The relationship between SCC and fecal LPS suggests a relationship between SARA and mastitis, which needs future research.

Implications: Feces samples are easy to collect. The measurement for bacterial toxins (LPS) in these samples gives information on the fermentation, death of bacteria, and production of bacterial toxins in the hind gut, all of which can be increased during SARA. The measurement of LPS in feces can, therefore, help with the diagnosis of SARA and of excessive fermentation in the hind gut.