Effect of precision processing barley grain on dry matter intake, milk production, rumen pH and nutrient digestibility in lactating dairy cows

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Grain processing is necessary to make nutrients accessible to the microbial population in the rumen. However, size of barley grain kernels varies greatly, even within a common lot, making it difficult to optimally process barley grain in a manner that ensures uniform fermentability. Current industry practices utilize a narrow setting on a roller mill to ensure all grain particles are damaged. However, this shatters the larger particles, producing excessive fines which contribute to digestive disturbances, such as rumen acidosis. In contrast, wider roller mill settings enable small kernels to pass through undamaged, limiting their digestion by rumen microbes. Past research in beef steers showed that precision processing barley grain based on kernel size improves nutrient digestibility without affecting rumen pH. The objective of this study was to evaluate the effects of precision processing barley grain on DMI, rumen pH, milk production, nutrient digestibility, and sorting index in lactating dairy cows. Twenty multiparous lactating Holstein cows were used in this study to assess milk production, with a subset of 8 ruminally cannulated cows to assess digestibility, in a replicated 4 x 4 Latin square design. Cows were fed diets containing light barley grain (small kernels) precision processed (narrow roller setting; light), heavy barley grain (large kernels) precision processed (wide roller setting; heavy), light and heavy barley grain precision processed (PP) and mixed equal proportions, and light and heavy barley grain mixed equal parts then processed at a single narrow roller setting (industry standard; IS). All diets consisted of 40% grain, 40% barley silage, and 20% of a supplement premix. There were no treatment effects on DMI, rumen pH, rumen metabolites, or sorting index. Digestibility of DM, OM, CP, starch, and NDF were unaffected by treatment. Milk yield, milk fat, protein, and lactose and SCC were also not affected by diet. Cows fed the PP diet had higher MUN (11.0 mg/dL) than cows fed the IS diet (10.4 mg/dL; P = 0.02). Cows fed the light diet had higher MUN (11.6 mg/dL) compared with those fed the heavy diet (10.7 mg/mL; P = 0.05). Higher MUN may be a reflection of rumen microbes capturing less N due to a reduction in the amount of fermentable starch in light and IS diets.

Implications: Precision processing barley grain did not affect productivity, rumen fermentation, or nutrient digestibility in lactating dairy cows although minor effects on MUN were observed. The different responses between dairy and beef cattle might be due to the differences in the level of barley grain in the diet.