Barley Grain Feeding in Lactating Dairy Cows

L. Doepel[1*], T.D. Whyte[1], B.N. Ametaj[1], and A. Hayirli[1,2]

[1]Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB T6G 2P5
[2]Current address: Department of Animal Nutrition and Nutritional Disorders, Faculty of Veterinary Medicine, Atatürk University, Erzurum 25700, Turkey.
Email: [*]lorraine.doepel@ualberta.ca

In Western Canada, barley grain is frequently fed to dairy cows due to its abundance, economic feasibility, and high energy content. However, excessive barley grain feeding can interfere with rumen function and fermentation and consequently cause serious health problems such as acidosis, liver abscess, laminitis, displaced abomasum, and milk fat depression. To minimize these adverse effects caused by readily fermentable nutrients in grains, diets are often enriched with buffering agents such as sodium bicarbonate ($NaHCO_3$) and magnesium oxide.

We fed 4 primiparous and 4 multiparous mid-lactation Holstein cows (536 ± 37 kg BW and 2.78 ± 0.21 BCS) rations containing 0, 15, 30, or 45% barley grain at the expense of barley silage, in addition to 15% concentrate mixture, on a dry matter basis. Each cow was fed each diet for a 21-day period. Milk and rumen fluid samples were collected during the last week of each period.

As barley grain levels increased from 0 to 45%, dry matter intake and milk yield increased from 14.4 to 17.0 kg/d and from 26.9 to 31.0 kg/d, respectively, whereas milk fat percentage and fat yield decreased from 3.69 to 2.87% and from 1.01 to 0.88 kg/d, respectively. Milk protein concentration did not change, but protein yield increased from 0.76 to 0.89 kg/d, resulting from the increase in milk yield. Milk lactose concentration and yield increased from 4.52 to 4.61% and from 1.23 to 1.43 kg/d, respectively, with increasing barley concentration. Cows fed barley grain had lower ruminal pH than those not fed barley (6.34 vs. 6.48), however, pH values were within the acceptable range. As opposed to the expectation that pH would decrease shortly after feeding, decreases in pH were gradual and never dropped to a level indicative of acidosis.

Implications. This short term study indicates that barley grain can be fed up to 45% of diet dry matter without causing health complications as long as the diets are buffered with $NaHCO_3$ (0.7% of diet DM). However, milk fat depression was evident and may be a concern for dairy producers.