Rumen Degradability Of Four Protein Sources: Soybean Meal (SBM), Canola Meal (CM) And Corn or Wheat Dried Distillers Grains (DDG)

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Different sources of protein are currently used in dairy rations, including SBM, CM or by-products of ethanol production, but there is little data available on their rumen degradation in a single study. Therefore, the objective of this study was to compare the dry matter (DM) and crude protein (CP) in situ rumen degradability of SBM, CM, high protein corn DDG with solubles (HPDDG) and wheat DDG with solubles (WDDG). Each protein source was incubated in the rumen of four rumen-fistulated lactating Holstein cows, in nylon bags for 0, 2, 4, 8, 16, 24 and 48h according to NRC (2001) guidelines. DM and CP ruminal degradability was estimated from rumen-undegraded residues, corrected or not for small particle loss (Hvelplung and Weisbjerg, 2000). Data were fitted to an exponential model to estimate degradation parameters; effective degradability (ED) was calculated with a passage rate of 7%/h. DM and CP contents for SBM, CM, HPDDG and WDDG averaged 89, 90, 92, and 90% and 54, 40, 40, and 37%, respectively. WDDG and SBM had higher uncorrected ED ($P<0.05$, DM: 75 and 73%, CP: 85 and 66%) than CM and HPDDG (DM: 57 and 56%, CP: 59 and 48%). This was attributed to a higher soluble fraction in WDDG and a higher potentially degradable fraction and rate of degradation in SBM (9.0 vs. 5.8%/h for the other feeds). Small particle loss from the bags significantly contributed to the DM and CP disappearance, being higher for WDDG (32% of DM, 46% of CP feed) than for the other feeds (11, 15, 17% of DM and 16, 20, 19% of CP for SBM, CM and HPDDG). As a result, the corrected ED was lower than the uncorrected ED for all feeds, especially for WDDG where ED decreased to 53% (DM) and 61% (CP). However, this correction did not alter feed ranking, with SBM and WDDG being more degradable than CM and HPDDG. The results suggest that small particle loss correction is relevant for protein sources and that higher RUP supply would result with CM and HPDDG substituting SBM, assuming they would have similar intestinal digestibility.

Implications: Rumen degradability of CM observed in this trial is lower than reported in NRC (2001) tables and could partially explain why supply of metabolizable protein would be higher than predicted by the current NRC model (2001). Part of the loss from the nylon bags incubated in the rumen is not due to microbe action and should be accounted for when determining the degradability of a feed ingredient.