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Effect of Wheat DDGS Inclusion on Grain-Based Feed Digestible Nutrient Components and Energy Profiles

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This research program aims to develop strategies to more efficiently utilize cereal grains (oat, barley, and corn) by integration with natural feed additive - bioethanol co-products (high protein, RUP and DVE values) in sustainable beef and dairy production and to assist the beef industry to develop low-cost feeding strategies by utilizing alternative feed resources. In this digestible nutrient and energy study, the objectives were to investigate the effects of inclusion of wheat DDGS in grain-based feed in terms of various digestible nutrient components and energy values. Each of three feed grains of two varieties with wheat DDGS samples from two bioethanol plants were mixed manually to combine in ratios of 4:0, 3:1, 2:2, 1:3, and 0:4. This has resulted in total of 30 (3 grains × 2 varieties × 5 combinations of each) feed mixtures. The results show that wheat DDGS was lower ($P < 0.05$) in digestible non-fiber carbohydrate (tdNFC) (174.0 vs. 688.0, 739.7, 449.6 g kg⁻¹ DM for wheat DDGS, barley, corn, and oat, respectively) and TDN_{1x} (716.9 vs. 859.2, 889.1, and 785.8 g kg⁻¹ DM), but was greater ($P < 0.05$) in digestible crude protein (tdCP) (371.6 vs. 134.5, 85.7, 137.8 g kg⁻¹ DM) and digestible fatty acid (tdFA) (46.1 vs. 6.4, 22.7, 30.9 g kg⁻¹ DM) than feed grains. Therefore, increasing inclusion of DDGS in feed mixtures linearly decreased their tdNFC and TDN_{1x}, while increased their tdCP and tdFA. Wheat DDGS (137.6 g kg⁻¹ DM) was greater ($P < 0.05$) than barley (92.4 g kg⁻¹ DM) and corn (82.5 g kg⁻¹ DM), but was lower ($P < 0.05$) than oat (198.8 g kg⁻¹ DM) in digestible neutral detergent fiber. The energy values (DE_{3x}, ME_{3x}, NEL_{3x} for dairy and NE_m, and NE_g for beef cattle) in wheat DDGS were similar ($P > 0.05$) to oat grain, suggesting DDGS as an alternative to oat in dairy and beef diets. The energy values in wheat DDGS were lower ($P < 0.05$) than in barley and corn grains. Study further indicated that inclusion of wheat DDGS up to 25% of DM in corn or barley based diets will not be a major effect on energy values in dairy and beef cattle diets.

Key words: Wheat-based dried distillers' grains with soluble, energy values; nutrient variation and availability