Strategies to use oats, barley, and corn DDGS more efficiently

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Project Title: New Strategies to More Efficiently Utilize Cereal Grains (oats, barley, corn) and Bioethanol By-Products for Beef Cattle

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Background: Corn, barley and oats are the primary ingredients in beef cattle finishing rations. However, the protein and starch are degraded very rapidly and unnecessarily in the rumen (particularly for barley and oats). This can result in three big problems: (a) digestive disorders like bloat and acidosis, which can be highly expensive in terms of dollars each year; (b) an imbalance between protein breakdown and microbial protein synthesis, resulting in unnecessary N loss from the rumen and inefficient use of dietary energy; and (c) inefficient feed utilization can result in nutrient loss in the manure. A strategy to optimize barley and oat utilization and availability for beef cattle is needed. Corn is to be included in the study as a grain of reference to most other areas of North America.

Objective:
To optimize utilization of barley, oats and corn in feedlot diets that combine one or all of these grains with bioethanol co-products.

What They Did:
In Vitro study: To determine the effects of replacing barley, corn and oats with wheat-based DDGS on nutritive value of the diets, each of 3 grains (barley, corn and oats) were mixed with 2 sources of DDGS in 5 grain to DDGS ratios: 4:0, 3:1, 2:2, 1:3, and 0:4. Composition of each mixture and degradation rates of primary components (OM, CP, Starch, NDF) in the rumen of cattle were measured.

Feeding Trial: A feeding trial was conducted to determine how different rates of DDGS replacement of barley-based finishing diets affected the rumen, animal performance, and feed efficiency of finishing cattle. In this study, 100 crossbred steers with initial body weight of 475 lbs were randomly allotted to 10 pens and fed one of 3 barley-based finishing diets. A control diet where steers were fed pure barley, a diet where 15% barley was replaced with DDGS, or 25% barley was replaced with DDGS. Diets were balanced to provide equivalent net energy concentrations but varying protein concentrations. The cattle were fed for 110 days when their average live weight was 676 lbs.

What They Learned:
In vitro study: Replacing grains with DDGS improved the nutritional value of the diets except starch, which was significantly reduced. Soluble, slowly degradable and undegradable protein fractions increased as DDGS replaced any of the grains while the rapidly and intermediate degraded fractions of protein were decreased. Replacing barley with 20-30% DDGS had the ideal protein energy ratio for steers, and both DDGS mixtures, the ideal rate of DDGS was between 15 and 20% of the grain DDGS mixture.

Feeding Trial: In the animal feeding study, average daily gain, dry matter intake, gain to feed ratio, feed efficiency, carcass traits, fatness, carcass quality, and yield grade were similar across steers from all diets. What it Means: Supplementing barley with DDGS at 25% and corn and oats with DDGS at 30-50% can improve overall rumen digestion. Feeding DDGS to replace 10-15% of a barley-based feedlot diet may have an economic benefit depending on the cost of the grain and the DDGS.

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