

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 extensively in the rumen (particularly for barley and oats). This can result in three big problems: (a) digestive disorder like bloat and acidosis, which cost beef producers millions 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 mixtures for beef cattle, 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, for a total of 30 mixtures. Composition of each mixture and degradation rates of primary components (OM, CP, Starch, NDF) in the rumen of cattle were measured.

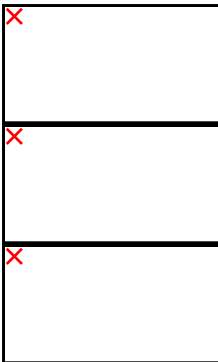
Feeding Trial: A feeding trial was conducted to determine how different rates of DDGS inclusion in a traditional feedlot diet affected the rumen, animal performance, and feed efficiency of finishing cattle. In this study, 300 cross-bred steers with initial body weight of 974lbs were randomly allotted to 12 pens and fed one of 3 barley-based finishing diets. A control diet where steers were fed just barley, a diet where 11% barley was replaced with DDGS, or 22% barley was replaced with DDGS. Diets were balanced to provide equivalent net energy concentrations but varying protein concentration. The cattle were fed for 131 days when their average live weight was 1376lbs.

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 intermediately degraded fractions of protein were decreased. Replacing barley with up to 25% with DDGS had the ideal protein:energy ratio for oats or corn/DDGS mixtures, the ideal rate of DDGS was between 25 and 50% of the grain/DDGS mixture.

Feeding Trial: In the animal feeding study, average daily gain, dry matter intake, gain to feed ratio, final shrunk carcass weight, carcass quality, and yield grade was similar across steers from all diets.

What it Means: Supplementing barley with DDGS at 25% and corn and oats with DDGS at 25-50% can improve overall rumen digestion. Feeding DDGS to replace 10.5 and 20.5% 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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