



Ridin' Herd

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Corn byproduct use in the beef cattle enterprise

Recently I discussed obtaining byproduct from the ethanol industry this summer and feeding it in late fall and winter. In review, corn byproducts can be used as either a protein or an energy supplement for backgrounding or replacement heifer/cow diets. The energy value of distillers' grain is greater than that of corn, the protein content is three times that of corn, and distillers' grain is a good source of bypass protein (undegraded intake protein, or UIP). In addition, distillers' grain is a good source of phosphorus.

When distillers' grains are fed in high-forage diets, there is no negative relationship between distillers' grain and forage. Furthermore, because the starch has been removed to make ethanol, acidosis is not a concern. With these characteristics, corn coproducts appear to be a good fit as a protein or energy supplement in cow diets that are mostly forage.

Where corn byproducts fit

In the research cited below, distillers' grains were fed in amounts so that sulfur and fat were not problems. Distillers' grains were included in the diets at a supplemental level to add energy, protein or both to diets that were mostly forage.

A two-year study by Martin et al. reported in the *2007 Nebraska Beef Report* evaluated the effects of feeding dried distillers' grains plus solubles (DDGS) during heifer development on growth and reproductive performance. Supplements for both DDGS-fed heifers and control heifers provided similar amounts of crude protein (CP), energy, lipid and fatty acids. Protein degradability of the supplements differed such that UIP exceeded requirements of DDGS-fed heifers.

Heifer pubertal development and overall pregnancy rate were not affected between control and DDGS-fed heifers. However, artificial insemination (AI) conception rate and AI pregnancy rate were improved by feeding DDGS in the heifer-development diet.

The replacement heifers in this study

were supplemented at 0.58% of their body weight on a dry-matter (DM) basis. As an example, if the average weight of the heifers was 600 pounds (lb.), then the group was fed 3.5 lb. per head per day on a DM basis. If dried distillers' grain was fed and it was 90% dry matter, then heifers were fed 4.0 lb. per head per day "as-fed" (3.5 lb. per head per day divided by 0.90 = 3.89 lb. per head per day rounded to 4.0).

Limestone was mixed with the DDGS (40 lb. of limestone per ton) to add calcium to the diet. Heifers in this experiment did not experience sulfur toxicity. The heifers were projected to gain 1.5 lb. per day; their actual gain was 1.35 lb. per day. This experiment demonstrates that distillers' grains, fed at 0.58% of body weight on

a DM basis, do not have a negative effect on reproductive performance in replacement heifer diets.

As beef cow producers continue to explore management practices to reduce costs, especially heifer development costs, there appear to be opportunities to develop heifers using crop residues and distillers' grains. Distillers' grains have a high energy

(108%-112% total digestible nutrients, or TDN) and high protein content (30%). In addition, distillers' grains fit well as a protein and/or energy supplement in many grazing situations.

Growing beef calves

Corn residues are a relatively inexpensive feed resource, but they are low in protein and energy, especially for growing calves. Beef producers often target a specific average daily gain (ADG) when growing calves.

In a study by Gustad et al., DDGS were fed to weanling steer calves grazing nonirrigated corn residue to determine daily gain response and residue intake response to increasing levels of DDGS (from 1.5 lb. to 6.5 lb. per day in 1-lb. increments (*2006 Nebraska Beef Report*). Daily gain increased from 0.9 (1.5 lb. DDGS) to 1.8 (6.5 lb. DDGS) lb. per day. These results provide information for selecting a DDGS supplementation level to achieve a target gain when calves are grazing corn residue.

Although this experiment used steer calves, there is direct application to developing replacement heifers. These data suggest that calves can "program feed" to a specific ADG based on the amount of distillers' grains supplemented while grazing cornstalk residue.

Replacement heifer development

Larson et al. conducted an experiment using cornstalk residue and supplementation as part of the development program for replacement heifers (*2010 Nebraska Beef Report*). While grazing corn residue, heifers were supplemented with 1 to 2 lb. per head per day on a DM basis of a 28% CP cube.

Yearling pregnancy rate varied between 84% and 92%, and subsequent pregnancy rate as 2-year-olds ranged between 77% and 100%. When heifers were supplemented at the higher rate, reproductive performance was numerically greater. A producer could consider, when it can be economical, using DDGS as the supplement because it is a good protein (30% CP) and energy source.

Spring-calving heifers in mid-gestation grazing residue fields the first 25 days will likely meet both their protein and energy needs and should gain weight and body

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condition, especially if some corn is available. After the grain has been consumed, protein and energy supplementation appear to be needed. The remaining corn residue is 53%-54% TDN, and crude protein during this time period will be about 5.3%. For the 1,020-pound heifer in mid-gestation and average body condition, energy and protein in the diet are deficient. These heifers are approximately 0.60 to 0.70 lb. deficient in crude protein and 0.7 to 0.9 lb. deficient in energy. Because distillers' grains are an excellent protein and energy source, and because there is a calculated deficiency in both protein and energy, it appears to be a good fit.

Lactating, fall-calving cows grazing crop residue need careful attention, at least through the breeding season, because nutrient needs are high and nutrients

supplied from the residue don't meet their needs. In an experiment by Griffin et al. comparing calving seasons, August-calving cows were supplemented 1 lb. per head per day of a 28% protein supplement while grazing cornstalk residue from October to April (*2010 Nebraska Beef Report*). Rebreeding performance was 90%, but percentage of calves weaned per cow exposed was 85.7% for cows supplemented at this rate. Distillers' grains could be used as the supplement source in this management strategy.

Summary

Corn byproducts can be used as a protein or energy supplement in cow diets. When fed in high-forage diets, these feeds do not have a negative effect on how the overall diet is utilized by the beef animal.

Overfeeding protein is usually not recommended, because protein is expensive and any excess protein ingested by the cow is used as energy. Because of the unique energy and protein profiles of corn co-products, it may be economical to overfeed one nutrient to meet the requirement of another nutrient.



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Editor's Note: "Ridin' Herd" is a monthly column written by Rick Rasby, professor of animal science at the University of Nebraska. The column focuses on beef nutrition and its effects on performance and profitability.