Feeding Strategies in the Age of Ethanol

Success for a growing number of beef producers will depend on their ability to integrate ethanol byproducts into their feeding regimen.

Story & photo by
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It is a given that ethanol production and the availability of distillers' grains will dramatically increase during the next decade. What is still an unknown is how well individual beef producers will adjust to this new reality.

"When there is a major change, there are always winners and losers," says Terry Klopfenstein, University of Nebraska (NU) animal scientist and one of the country's leading researchers in feeding ethanol byproducts to beef cattle. "The winners will see the opportunities and have the foresight to take advantage of them."

For Klopfenstein, one of the greatest opportunities lies in accessing distillers' grains, a byproduct of ethanol production. A bushel of corn entering an ethanol plant can produce 2.3 gallons of ethanol and 18 pounds (lb.) of distillers' dried grains (DDG).

"We are looking at a dramatic increase in the availability of distillers' grains over the next few years," he says. "It could really benefit those who are willing to modify how they feed their cattle."

Value in feedlot established

At present, the most common use of distillers' grains is in the feedlot as part of a finishing diet. Feedlot operators, anxious to control feed costs, have embraced the feeding of both dried distillers' and wet distillers' byproducts.

Because distillers' grains are low in starch content compared with conventional feedgrains, but still contain the oil and fiber that were in the corn kernel, Klopfenstein sees the byproduct as a uniquely versatile cattle feed. Distillers' grains can be fed at 6%-15% of the diet dry matter (DM), he says. At those levels it serves as a source of supplemental protein.

At higher levels — greater than 15% of the diet DM — it can replace corn as an energy source. Klopfenstein notes that the fat content of distillers' grains (12%) limits the amount that can be fed to no more than 40% DM.

"Cattle just don't do well when you feed them too much fat," he explains. "It probably has some depressing effects on the digestibility of other nutrients."

Recent feedlot studies at Iowa State University (ISU) replaced corn in a finishing diet with chopped cornstalks and distillers' wet grains (DWG). In spite of the fact the steers consumed a ration that contained no grains, researchers recorded close to a 3-lb. average daily gain (ADG) among those animals.

These results are supported by earlier ISU studies that determined the replacement of dry-rolled corn with DWG consistently improved feed efficiency and feed efficiency increased in direct proportion with the percentage of DWG added to a level of 40%. While researchers observed a 7% increase in feed efficiency when 5.2% and 12.6% of corn was replaced with distillers' grains, an increase of 20% in feed efficiency was noted when the inclusion levels of distillers' grains were increased to 40%.

Promise in grazing scenario

Klopfenstein notes that although most of the distillers' grains research has focused on feedlot applications, he predicts the byproduct will play a broader role in the near future.

He points out that calves from weaning until they enter feedlots, developing heifers, and mother cows are fed primarily forage diets, which are often low in protein and phosphorus (P). Distillers' grains have three times more phosphorus than feed corn, and the protein levels in the byproduct are comparable to other popular supplement feeds.

Equally important is the fact that forage-only diets are usually low in undegraded (bypass) protein. Bypass protein is not degraded in the rumen and is essential in meeting an animal's metabolizable protein requirements.

As researchers at NU have determined from recent feeding trials, wet and dry distillers' grains are excellent sources of undegraded protein. In addition, distillers' grains, with their high fat content, can provide developing heifers and young mother cows a cost-effective energy source.

Klopfenstein adds that another advantage to feeding distillers' grains is that they contain very little starch and, therefore, should not depress fiber digestion. This trait is particularly advantageous when distillers' grains are fed in conjunction with grazing corn residues.

He cites a 2006 NU study he and his associates conducted with 120 weanling steer calves, averaging 512 lb. Ninety of the calves were grazed on 90 acres of dryland corn residue for a period of 95 days.

All study animals were stratified by weight and randomly assigned to six incremental levels of DDG: 1.5 lb., 2.5 lb., 3.5 lb., 4.5 lb., 5.5 lb. and 6.5 lb. per head daily, adjusted to a percentage of body weight (0.29%, 0.49%, 0.69%, 0.88%, 1.08% and 1.27%, respectively). The DDG contained 12.4% fat and 30.1% crude protein (CP). Calves were weighed on consecutive days biweekly to adjust the amount of DDG offered. Minerals and vitamins were added to the distillers' grains to meet National Research Council (NRC) requirements. All steers were individually fed supplement using Calan electronic gates.

A control group of 30 calves was not grazed and instead fed a diet of 70.9% brome hay and 29.1% sorghum silage, with DDG treatments assigned randomly within the group.

From the data collected, it was determined that ADG increased significantly with increasing levels of DDG. Grazing calves ranged from 0.9 to 1.8 lb. in ADG, depending on how much distillers' grains were made available.

Klopfenstein points out that adding a specific weight of distillers' grains to a grazing diet could prove a cost-effective way to guarantee a targeted average daily weight gain.

Also observed in the study was the fact that as the level of distillers' grains increased, researchers saw a decrease in the amount of corn residue consumed. This leads Klopfenstein to conclude that

distillers' grains could be used to extend the stocking rates of cornstalks, while still improving ADG.

Caveat emptor — buyer beware

Even though distillers' grains show a great deal of promise as a feed source for the beef industry, there are limitations to their use, says Robbi Pritchard, South Dakota State University (SDSU) ruminant nutritionist.

He notes that while feeding distillers' grains as a protein source — at levels up to 15% DM — holds little risk, monitoring of total sulfur intake is required when feeding rates are pushed much above that.

"I have seen sulfur toxicity in feedlots that are feeding anywhere from 22% up to 34% distillers' grains on a dry-matter basis," Pritchard says. "The best way to avoid the problem is to watch your inclusion rates."

This means testing the total feeding ration and water supply for sulfur content and then adjusting intake to meet recommended standards.

Another issue to arise when animals are fed higher levels of distillers' grains is nutrient management, Cody Wright, SDSU Extension beef specialist, says. "If you feed over 30% distillers' grains, then you will be overfeeding protein and phosphorus," he says. "This will require a modification in your nutrient management plan."

Hauling and storage issues

While distillers' grains offer the beef producer a compact and easily handled feed package in a dried state, Klopfenstein is quick to point out that the high cost of drying high-moisture distillers' grains in the plant makes the process impractical on a large scale.

"From the standpoint of the ethanol industry, it is important to feed the distillers' grains wet," he says. "This limits how far it can be hauled."

He notes that evaluating DWG as a feed can be a complex process, and each operation is unique. "We are in the process of putting together an economic model that a producer could use to determine whether or not feeding distillers' grains works for him," Klopfenstein says. "Once completed, a producer could plug in his own data and get some answers."

Meanwhile, Klopfenstein recommends testing a representative sample for nutritive value and moisture content before making a commitment to a processor. By adding in its cost delivered, a feeder can make an initial determination of whether the product is worth buying.

Klopfenstein adds that in a feedlot environment, high-moisture distillers' grains often require specialized equipment for mixing and feeding. He notes that in a grazing scenario, beef producers have had excellent results dumping DWG on the ground and allowing the cattle to self-feed.

"In a wet state, distillers' grains are highly palatable," he says.

Wright warns that one of the major challenges confronting feeders of distillers' grains is storage. Because of its high moisture content, DWG can spoil in less than a week. "Either you are using it quickly enough that you are receiving deliveries on a regular basis or you need to figure out some way to store it to prevent it from spoiling," he says.

Based on his research Wright recommends storing distillers' grains in silage bags. "We were able to store pure distillers' grains, with moisture content of 70%, all summer without preservatives," he says. "We had at least three months storage on that particular bag."

He notes that distillers' grains can also be blended in the bag with other feed sources. "We have put it in with silage, soybean hulls, cornstalks and scrap hay," he says, adding that reducing the moisture level by mixing with drier materials offers the advantage of helping the bag maintain a shape that is more manageable.

Editor's Note: *To see past* Angus Beef Bulletin *and* Angus Journal *articles about corn coproducts, including DWG and DDG, do a back issue search at* www.angusbeefbulletin.com *and at* www.angusjournal.com.