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The greatest advantage to using distillers grains results from improvements in feeding performance, compared to that exhibited by cattle fed traditional rations based on dry-rolled corn and high-moisture corn. Research suggests there is potential for 20% improvement to ADG and 15-20% improvement to feed efficiency when using wet distillers grains in finishing rations.



FOCUS Distillers Grains Advantage

When you're close to the source, the advantages of this ethanol byproduct feed can't be ignored.

by Troy Smith

If you're a grain farmer whose primary cash crop is corn, you probably view the ethanol boom as purely positive. Watching corn prices climb to \$3.50 and then go beyond \$4 per bushel last winter was enough to make the most stoic corn grower giddy with glee. And the corn-hungry ethanol industry's projected growth promises to keep farmers grinning.

However, the increased use of corn to produce fuel leaves livestock producers with less

reason to smile. The competition has brought higher feed costs capable of draining profit from cattle feeding enterprises. Higher corn cost also puts downward pressure on feeder cattle and calf prices. If there is a bright spot for cattle producers, however, it is that increased production of ethanol also yields a greater abundance of byproduct useful as livestock feed.

According to the American Coalition of Ethanol, a 56-lb. bushel of corn yields 2.8 gallons of ethanol and 17 lb. of distillers grains. The ethanol production process claims the starch, which makes up about 70% of a kernel of corn. The protein, fiber, oils and mineral remain, in about three-fold concentrations, in the distillers grains.

The byproduct has become an important ingredient for feedlot rations, replacing or reducing the amounts of more pricey ingredients used to balance finishing diets.

Distillers grains contain about 30% crude protein and make a suitable substitute for more expensive protein supplements. Containing about 12% fat and offering 15% more energy than corn grain, distillers grains also can reduce the amount of grain needed in a ration.



PHOTO BY TIM SCHUTTE

Ron and Allen Schutte found the readily available and relatively low cost byproduct — wet distillers grains — hard to ignore. The brothers have added distillers grains to the weaning and growing rations fed to bull and heifer calves.

So it's no surprise that many cattle feeders have embraced the use of distillers grains. That's particularly true in states like Iowa, South Dakota and Nebraska, where much of the ethanol industry's growth has occurred and continued expansion is expected. Located close to sources of distillers grains offers the advantage of lower shipping costs. But distillers grains offers advantages to other kinds of operations, too, when used in rations for growing cattle or for supplementing cow herds.

Located near Guide Rock, Neb., and within 30 miles of two ethanol plants, Ron and Allen Schutte found the readily available and relatively low cost byproduct — wet distillers grains — hard to ignore. The owners of S&S Polled Herefords had heard about the product's nutritional value. They understood how its very low starch content would compliment forage-based diets. Still, it was the recommendation of a long-time seedstock customer that convinced the brothers to add distillers grains to the weaning and growing rations fed to bull and heifer calves.

"Our friend Bill Kuehn told us how easy calves wean on a ration containing wet distillers grains," Ron says. "He was right. Newly weaned calves start eating from the bunk almost immediately."

Wet distillers grains has replaced protein supplement in Schutte's growing rations, which include other ingredients like alfalfa, sorghum silage, a little ground corn and a vitamin-mineral supplement. In their experience with the ration, Ron says, feed consumption is consistent. Calves grown during the winter are less apt to go off feed because of extreme changes in the weather. And cases of acidosis and bloat, which were too common in the past, have disappeared since the Schuttes adopted wet distillers grains as a ration ingredient.

Storing the byproduct has been easier than expected, offers Ron. He and his brother had heard that wet distillers grains could be stored for only a few days before spoiling. However, during the winter and early spring months, they have stored the product for up to three weeks without problems.

Although Schuttes have used wet distillers grains for only two years, Bill Kuehn's experience with the byproduct feed began about five years earlier. In addition to managing a commercial Hereford cow herd, Kuehn backgrounds home-raised and purchased calves — about 4,000 head annually. And he calls distillers grains the best feedstuff for coaxing calves to a feed bunk.

"They just eat it. That's all there is to it," grins Kuehn. "The palatability and the way it helps consumption is nearly enough reason to use distillers grains.

They start eating and keep on eating, so stress is reduced, overall health is better and performance is improved."

The cost of the ration is reduced too. Kuehn's calf rations include up to 20% wet distillers grains, on a dry-matter basis, replacing a commercial protein supplement and part of the corn that would otherwise be included in a traditional corn-based ration. And compared to that more traditional ration, it's cheaper to build one utilizing wet distillers grains.

"It's going to vary because the price of corn and byproducts keep changing," says Kuehn. "Recently, we've targeted the kind of gain we want (about 2.5 lb. per day) with a ration costing 15-20 cents less per head, per day, compared to a ration with no distillers grains."

Kuehn grows his calves to about 850 lb. before sending them to a commercial finishing yard. In recent years, most have gone to Platte Valley Feeders, near Kearney, Neb. There, ration make-up is prescribed by Cattlemen's Consulting Services, led by nutritionist Bill Dicke.

Dicke says Platte Valley Feeders currently incorporates wet distillers grains into its rations at moderate levels, which he describes as 25-35% of a particular ration (dry-matter basis). However, inclusion rates vary among feedlots. For that matter, inclusion rates used by any one feedlot can and do vary.

"We're always trying to determine what the optimum level is, but it definitely is a moving target. It depends on the price of corn as well as the price and availability of the byproduct and how it fits a given ration," Dicke explains.

The cost advantage, relative to traditional corn-based rations, varies with the degree to which wet distillers grains is substituted for other protein sources and replaces energy otherwise supplied by corn grain. There is a performance advantage, too, from improved average daily gain (ADG) and feed efficiency (FE), but Dicke says the effect on performance varies with inclusion rate.

Based on his economic analysis of byproduct use, Darrell Mark, University of Nebraska agricultural economist, says the greatest advantage to using distillers grains results from improvements in feeding performance, compared to that exhibited by cattle fed traditional rations based on dry-rolled corn and high-moisture corn. Nebraska research suggests there is potential for 20% improvement to ADG and a 15-20% improvement to FE when using wet distillers grains in finishing rations, with a 40% inclusion rate being optimum for performance enhancement.

According to Mark, even if ration costs do not change

significantly, enhanced performance results in fewer days on feed, which helps decrease interest charges, yardage and other costs. Of course, there may be added expense associated with using distillers grains including freight and feed handling and mixing, which can affect profitability. But particularly for feedlots located within a reasonable distance of a distillers grains supplier, the effect on profit can be pretty good.

"Based on current feed-ingredient prices, rations that replace 30% of corn-based control diets with either wet distillers grains or dried distillers grains result in profit increases of up to \$40 per head," Mark says.

To help producers determine whether distillers grains can work in their own operations, Mark and his colleagues have created a model called Cattle CODE (Co-Product Optimizer Decision Evaluator). The tool is available at <http://beef.unl.edu/> (click on byproduct feeds).

Approach with caution

While distillers grains holds considerable promise as a highly palatable, nutrient-rich feed source, it is not without limitations. According to University of Nebraska Extension Feedlot Specialist Galen Erickson, some of the product's advantages can become liabilities. For example, distillers grains is high in fat, and too much fat in the diet can hinder rumen fermentation and reduce fiber digestion.

Probably of greater concern to many feedlot managers is the sulfur content of distillers grains. It is quite variable among plants that produce distillers grains, and different loads from the same plant can vary considerably as well. High sulfur content is a particular problem in areas where the water also tests high for sulfur. Too much total dietary sulfur may contribute to development of a neurological disease dubbed polioencephalomalacia. Cattle suffering from this malady are commonly called "brainers."

According to Erickson, it is recommended that sulfur comprise no more than 0.04% of diet dry matter. When sulfur toxicity is a problem, he recommends feeding 100-150 milligrams daily of thiamine (a B-vitamin) to counter the sulfur's effects.

Erickson says most dietary problems associated with distillers grains can be avoided if ration inclusion rates do not exceed 40% (dry-matter basis), but producers should not consider that to be a foolproof rule-of-thumb.

Nutrient management is a concern when animals are fed high levels of distillers grains. The product typically contains .8-.9% phosphorus, so additional phosphorus supplementation is not needed (although calcium supplementation may be necessary to balance with phosphorus in finishing rations). However, higher ration inclusion levels result in increased amounts of phosphorus excreted in animal waste. And since distillers grains is high in protein, greater nitrogen excretion can be expected with higher feeding levels too.

That might be a problem in some localized areas, particularly with regard to phosphorus, since more cropland acres are needed to distribute manure nutrients as fertilizer. It becomes a matter of managing nutrient distribution, Erickson says.

"In Nebraska, for example, we still apply phosphorus fertilizer to 70-80% percent of corn acres. Nebraska imports twice as much (commercial) phosphorus fertilizer as is available in manure produced by Nebraska cattle.

Bill Dicke calls the growing availability of ethanol byproducts one of the most significant things to happen to the cattle feeding industry in decades. He notes how feedlots and backgrounding operations located in close proximity to sources of distillers grains and other byproducts enjoy a competitive advantage. As the ethanol industry expands, the availability and accessibility of byproducts is likely to increase, along with use by all production segments.

The role of byproducts is likely to broaden as cow-calf producers consider their use in heifer-development diets or as supplements in grazing programs for yearlings. More producers, including Ron and Allen Schutte, are pondering ways that distillers grains might complement forage-based winter diets for cows including supplementation of cows grazing corn stalks or other crop residues.

A particular advantage exists in the fact that distillers grains

supply energy without the starch that can inhibit digestion of forages. The byproduct provides protein beneficial to rumen microbes and enhances the bugs' ability to break down fiber. Distillers grains are considered a good source of undegradable (bypass) protein, which often is lacking in forage-only diets. All-forage diets are often low in phosphorus, too, so supplementation with distillers grains may meet animal requirements and eliminate the need for additional phosphorus in free-choice mineral mixes.

So, while most distillers grains research has focused more on the product's use in finishing diets, researchers and a growing number of producers are exploring other applications, with high expectations. **HW**



PHOTO BY TROY SMITH

On a statewide basis, we are phosphorus deficient," he explains. "So we have to focus on phosphorus distribution at the local level."

Other limitations associated with use of distillers grains are associated with shipping, storing and handling the product. The weight of wet distillers grains becomes an issue when the user is located a long distance from an ethanol plant because of the cost of shipping a high-moisture product. Freight charges can be reduced by buying dried distillers grains, but the purchase price will be higher because the manufacturer has incurred additional processing costs.

Another major challenge is storage since wet distillers grains can spoil in a matter of a few days, though its "shelf-life" varies with temperature. Research suggests storage time can be prolonged with the use of large plastic bags like those used to store silage. Mixing wet distillers grains with other dry feed sources like straw, hay or corn stalks can also help delay spoilage.

For feedlots handling huge amounts of feed ingredients, specialized equipment may be required to efficiently mix and feed high-moisture distillers grains. Many older feedmills and batch mixers weren't built to handle large volumes of wet product. The moisture can impair the flow through the mill, and delivery to the feed bunk can be problematic for some styles of feed trucks.

For some producers, buying distillers grains in bulk is not desirable. For supplementing cows on winter range, for example, a pellet or range cube may be far more convenient. Manufacturers have struggled to make pellets or cubes that stand up to storage and handling and don't become soft and crumbly. Improved pellet integrity has been reported when another protein source, such as soybean meal, is combined with distillers grains.

Considerable variation has been reported for moisture and nutrient content of wet distillers grains with analyses differing by supplier and even between loads coming from the same supplier. Typically, dried distillers grains presents less variation, but most nutritionists and other consultants recommend nutrient analysis as a wise management practice. **HW**



PHOTO BY TIM SCHUTTE

Distillers grains and beef quality

One of the most controversial issues associated with increased use of ethanol byproduct feeds in cattle finishing rations is the perceived effect on carcass merit. According to some researchers, evidence suggests no significant carcass quality differences between cattle fed traditional corn-based rations (with no distillers grains) and cattle fed rations containing distillers grains, when inclusion rates did not exceed 40% (dry-matter basis).

Kansas State University Extension Feedlot Specialist Chris Reinhardt says most feedlots using corn distillers co-products include them at the rate of 10-30% of the total ration. However, if rapidly growing ethanol production capacity brings a corresponding increase in the supply of relatively inexpensive distillers grains, will ration inclusion rates increase?

Reinhardt believes the rate at which distillers grains is fed can have an effect on carcass marbling scores. After reviewing 13 university studies, he concluded that feeding distillers grains at levels above 30% can result in a negative effect on marbling.

"There is a statistically significant difference. Biologically, it's a modest difference, but it is real," says Reinhardt. "If, for example, a pen of cattle is fed distillers grains at a 40% inclusion rate, we might see 4-7% fewer Choice carcasses, compared to a pen fed a ration with no distillers grains."

According to Reinhardt, scientists suspect that marbling is influenced by the amount of starch in the diet. Starch is believed to enhance marbling, but starch is fermented out of grain during the ethanol production process. While the resulting distillers grains is considered a good source of energy, the energy is largely due to the grains' fat content. And fat does not appear to promote marbling. So, as the ration inclusion rate for distillers grains increases, the starch content decreases. Less starch might mean less marbling and lower carcass quality grade.

When feeding distillers grains, says Reinhardt, it is important to remember the potential effect on yield grade and ways that yield grade might influence carcass quality grade. Research suggests cattle performance levels increase proportionately as ration inclusion levels of distillers grains increase, up to 40%. Feed intake is higher, average daily gain increases and feed efficiency improves, so cattle get fat quicker. Total days on feed may be reduced to avoid getting cattle too fat and reaching undesirable yield grades. That raises the question as to whether the number of days on feed were adequate to allow cattle to reach their potential for carcass quality grade.

By itself, a ration containing more than 30% corn distillers co-products may not wreck carcass quality grades for a pen of cattle. Deposition of marbling is considered to be a life-long process, influenced by genetics and multiple environmental factors including health history, growth implant regimen and grain processing issues. However, if the feeding of distillers grains at higher levels causes a 2-4% reduction in marbling and those other factors also contribute a negative influence, Reinhardt says the additive effect could be considerable.

"Our concern is for the future," he adds. "If co-products become more abundant and the price becomes even more attractive, we'll have to watch inclusion rates to avoid possible reductions in carcass quality." **HW**