



# Storage Options

**New storage options for wet distillers' grains allow smaller producers to take advantage of buying opportunities.**

*Story & photos by Ed Haag*

In the past, one of the major drawbacks with feeding wet distillers' grains with solubles (WDGS) was spoilage. Now, thanks to old-fashioned ag ingenuity, there are several options out there. The challenge is to find the best one for you.

It wasn't long ago when wet distillers' grains were used solely by feedlots, the only ones with enough hungry mouths to use up the stuff before it spoiled. For all but the largest feeders, spoilage was a valid concern. At best, the product could remain in the open air for little more than a week before it began to show the overt signs of serious deterioration. In hot weather its longevity was considerably shorter.

Unfortunately, it was also during the hot summer months when the WDGS were most

available to non-feedlot customers. Summer was traditionally a feedlot's slowest period — that time between when last year's calves were finished and harvested and before the new crop of calves was weaned and delivered for finishing.

Because the ethanol plants continued to produce their fuel throughout the summer and needed to find a home for ethanol byproducts, they offered substantial discounts to those who wished to store WDGS and feed them to their wintering beef cows.

But at 65% moisture, the long-term storage options for distillers' grains were limited. In order to prevent spoilage, the wet product would have to be stored in an anaerobic environment — one without air.

## Feeding & Feedstuffs

Two practical options for this type of storage were silage bags and silage bunkers.

Earliest efforts to confine the free-flowing WDGS in large sealed silage bags ended in creating giant water-balloon-like structures that threatened to explode at any minute. Compressing the liquid-like material in these conventional silage bags to push out air and prevent spoilage invited disaster.

"It was like trying to store mashed potatoes," says Terry Klopfenstein, University

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► **Above:** Loading a storage bunker with WDGS can be as easy as backing up a truck.

of Nebraska beef nutrition researcher. “Without the drier material to give it structure, the bags would slump and flatten out.”

Researchers were also confronted with problems when they tried to ensile WDGS in pits. Unlike corn silage and other commonly ensiled cattle feeds, the WDGS was just too wet to be compacted by tractors.

### **The corn gluten model**

For Klopfenstein and his colleagues at the University of Nebraska, the answer to the long-term storage of WDGS could be found in the earlier studies they conducted with storing corn gluten in silage bags.

“Our work with the gluten started when Minnesota Corn Processors decided to build a wet-milling plant in Columbus, Nebraska, in the early 1990s,” Klopfenstein recalls. Because the plant would be one of the first to sell wet corn byproducts directly to feeders rather than expending extra energy to dry it, there was a great deal of interest in knowing whether or not corn gluten could be stored for prolonged periods of time.

“In order for us to do our research, even before the plant was built in Columbus, they would ship truckloads of gluten to us from their Minnesota plant,” Klopfenstein says.

Unlike his later research with distillers’ grains, the corn gluten from Minnesota held its shape in the bag and didn’t slump. Klopfenstein explains that while corn gluten is a different product than distillers’ grains — gluten does not contain fat and is lower in protein — he and his fellow researchers attributed gluten’s ability to hold its shape to its slightly drier condition.

“Distillers’ grains are 65% moisture and

35% dry matter (DM), and corn glutes are 56% moisture and 44% dry matter,” he says. “It is really surprising how little extra dry matter it takes to make it all work.”

From their earlier observations, the Nebraska researchers concluded that by adding 10%-20% more DM to the wet distillers’ grains, an outcome similar to what happened when the 44%-DM corn gluten was bagged would occur with the new distillers’ mix.

### **Study confirms assumption**

After small-scale mixing and evaluation of WDGS amended with a variety of dry forages, byproducts and grains, the researchers were encouraged enough by the preliminary results to proceed with larger-scale testing.

This research was necessary to make sure that the methods developed on a small scale were applicable to a commercial setting. Large-scale testing also played an important part in establishing producer guidelines on how to store WDGS over a period of time, what feedstuffs best blended with the WDGS, and their recommended inclusion rates in order to assure effective long-term storage in silage bags or bunkers.

Klopfenstein notes that his research team’s objective was to find several compatible forage sources that could be added throughout the summer. Alfalfa hay, grass hay and wheat straw were selected for testing, as were dry distillers’ grains and corn gluten feed. Phase 1 of the study examined the effect of adding varying levels of the selected forage and corn byproducts to WDGS to determine what levels effectively stabilized the bagging process. Phase 2 dealt with a similar

investigation focusing on packing the mixes in silage pits.

The goal by the completion of the study was for the researchers to know the appropriate inclusion rate for each feed additive. These rates would represent the percentage of a specific feed needed to render distillers’ grains dry enough to be packed in silage bags or silage pits without difficulties.

### **Some bags a bust**

In order to determine these rates, a variety of mix percentages were tried, ranging from 7.5% to 25% in forages, to 40% to 60% in corn byproducts. In the study, several silage bags split open, including a mix of 7.5% grass hay to 92.5% WDGS, 10% grass hay to 90% WDGS, as well as 40% wet corn gluten to 60% WDGS and 50% wet corn gluten to 50% WDGS.

When the bags were filled at a constant pressure of 300 pounds (lb.) per square inch (PSI), the researchers found that the minimum percentage of forage required in the WDGS mix to consistently maintain the integrity of the bag was 12.5% for wheat straw, 15% for grass hay and 22.5% for alfalfa. They also discovered that combining wet distillers’ grains with 50% dry distillers’ grains proved effective at creating the necessary mass, as did the combination of 60% wet corn gluten with 40% distillers’ grains.

It was noted in the test results that the percentages added were on a dry basis, which was different than the amounts actually weighed out when mixing. Klopfenstein adds that the forages should be compared based on the fiber content, with lower amounts of forage needed with the more fibrous feeds like straw. He goes on to point out that the appropriate conversions to an as-is basis are important because WDGS contains 65% water, meaning the percentage of WDGS on an as-is basis will be even greater.

With the silage bags, one of the principal criteria for packing success was the height of the filled bag. It was determined that a bag that contained a mixture that exhibited greater height — 4½ feet (ft.) to slightly less than 5 ft. — had better pressure distribution and was less likely to split.

### **Bunker storage also effective**

For bunker storage, the research team mixed 40% grass hay and 60% wet distillers’ grains, which proved firm enough to allow for packing with a rubber-tracked skid steer. Using wheat straw, the amount of dry material added to the WDGS could be dropped to between 25% and 32%. In some pits, spoilage was observed in the top 2-3 inches (in.) of the pile, but the quality of the product below that level was consistently good.



► Storing wet distillers’ grain mix in a temporary straw bale bunker is a low-cost solution to spoilage.

Researchers noted the skid steer used to pack the bunkers might have to be considerably lighter than the equipment used in a commercial operation and, as a result, a commercial application might require more dry product to effectively pack the mix.

In all experiments, the mixes were stored more than 45 days, resulting in no reduction in quality during that period of time.

### Positive response from ranchers

An Iowa Beef Center (IBC) survey conducted as recently as 2005 revealed that while more than 70% of Iowa feedlots were using ethanol coproducts in their rations, only 27% of those beef operations outside of the feeder industry were engaged in purchasing the corn byproducts. When the other 73% were asked why they were still not taking advantage of that low-cost source of feed, the response was clear. Storage and spoilage issues were at the top of the list.

For Klopfenstein and his research associates at the University of Nebraska, that attitude is quickly changing as the ethanol industry responds to the feed needs of smaller beef producers. He cites as an example two ethanol plants in Nebraska — one in Central City and the other in Plainview — that produce modified wet distillers' grains with a moisture content of 50%-55%.



► Loading plastic storage bags is not a one-person job.

“We found that the modified wet distillers' grains puts up very well,” Klopfenstein says. “It is dry enough to bag without mixing in other materials.”

As these changes occur, he sees a growing number of cow-calf operators, stockers and seedstock producers adopting the tested methods for the long-term storage of wet distillers' grains. “I have been surprised recently at the positive attitude beef producers have had about feeding distillers' grains,” Klopfenstein says. “There is a lot of interest out there.”

He cites, as an example, an Aug. 29, 2007, open house on feeding distillers' grains presented by the University of Nebraska at its Whitman, Neb., Agricultural Experiment Station.

“There were over 300 people at that event,” Klopfenstein recalls. “A lot of them were already coming up with ideas on how they could modify their operation in order to make the stuff work for them. It was very exciting to see that kind of innovation taking place.”

