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Distillers Grains Forms and Storage

Dr. Shane Gadberry, Assistant Professor

Distillers grains and distillers solubles are co-products of manufacturing ethanol from high starch grains such as corn. While distillers solubles has a distinct form and is commonly used as a liquid supplement (condensed corn distillers solubles), the term “distillers grains” is often used generically to describe a variety of co-products. For clarification, distillers grains may be purchased as a high-moisture co-product or it may be partially or completely dried. In addition, some plants may add 20 percent solubles back to the distillers grains. As a result, what is generically termed “distillers grains” should be more appropriately described as wet distillers grains (WDG), dried distillers grains (DDG), wet distillers grains plus solubles (WDGS), dried distillers grains plus solubles (DDGS) or modified distillers grains plus solubles (MDGS).

Wet, modified and dried distillers grains plus solubles contain approximately 35 percent, 46 percent and 90 percent dry matter, respectively. From a manufacturing standpoint, the ethanol plants would prefer to move product in the wet form as opposed to investing in the energy to dry the distillers grains to a moisture content as low as 10 percent. However, from a logistics point of view, anyone purchasing these products must account for the cost of shipping a load of wet distillers grains that will contain 65 percent water versus dried distillers grains that will contain 10 percent water.

Traditionally, the cost per ton of delivered energy from wet feeds has not been as competitive as dry feed options. However, in recent years, loads of wet and modified distillers grains have arrived at Arkansas farm gates cheaper than their dried price.

A challenge with high moisture feed is storage and handling. Recent research and demonstration projects conducted by the University of Nebraska examined various means of storing

wet and modified distillers grains. In theory, storing wet feeds – either wet distillers grains or corn gluten feed – is not much different than preserving high-moisture forage or grain. The number one enemy is oxygen. Forages are packed to exclude oxygen. This supports anaerobic fermentation that results in lactic acid production which in turn preserves the forage. Wet distillers and corn gluten products have a moderately low pH which mimics the effect of lactic acid production in forages. As a result, with these products – as long as air is excluded – spoilage losses should be minimal.

The challenge with these feeds is that the material is not easily compacted. Wet distillers grains may be placed in silo bags; however, if forages are not blended with the wet feed, the bagger should not be allowed to apply pressure during bagging. Bagging pure wet feed under pressure will eventually cause the bag to rupture. Alternatively, a minimal 15 percent (dry matter basis) grass hay to 85 percent wet distillers grains should modify the moisture and density enough to allow pressurized bagging.

Storing wet feed in a bunker is another option. Pure wet distillers grains do not pile easily. A mixture of 40 percent hay to 60 percent distillers grains (dry matter basis) was shown to be sufficient for compaction and maintaining the weight of a pay loader. Modified distillers grains would require less forage than wet distillers grains because of the difference in initial moisture of the two feedstuffs. If mixing forage and feed is not practical, filling the bunker in layers is an option. A modified bunker, such as a rectangular arrangement of round bales lined with plastic, has served to store modified wet distillers grains with little spoilage.

In conclusion, co-products from ethanol production vary in type, moisture and nutrient composition. High-moisture forms may be

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cheaper at the plant; however, if you do not live within close proximity of a plant, cost of delivery, storage, spoilage losses and shrink must be factored into the price. Because these feedstuffs contain a moderately low pH, storing these products in a manner that excludes oxygen

presents the opportunity for individuals who are not close to the manufacturing facility to utilize these feeds over a longer period of time or to purchase them in advance of when they will be used. Limited feeding studies on stored

wet corn co-products suggest that cattle perform positively to ensiled wet corn co-products. For more information, see "Storage of Wet Corn Co-Products," available at http://beef.unl.edu/byprod/feeds/manual_04_08.shtml.

Does It Pay to Fertilize Pastures for Stocker Cattle?

Dr. Paul Beck, Associate Professor

Current economic conditions indicate that retaining ownership of calves through the stocker phase may be economically beneficial. Last fall 500-pound steer calves were bringing around \$90 per hundredweight. The price for 825-pound feeder steers in the Oklahoma City area sales was right at \$84 per hundredweight last week. This \$6 per hundredweight slide for 300 pounds of gain indicates a value of gains of \$73 per hundredweight gain, meaning if body-weight could be added to calves for less than 73 cents per pound, it would have been profitable to have retained these calves. Last week Arkansas sale barn prices for 5 weight steers was \$103 per hundredweight, and September futures prices for 750-pound feeders was around \$96 per hundredweight, a value of gain of \$81 per hundredweight.

The performance of stocker calves is much more sensitive to forage quality and stocking rate than other classes of

livestock. Fertilization of warm-season grass pastures increases the crude protein content and increases forage growth by 30 pounds for every pound of actual N applied. The additional forage growth must be utilized to maintain forage quality and avoid waste. Research at the Southwest Research and Extension Center at Hope was conducted to look at the effect of rate of nitrogen fertilization and stocking rate of steers grazing warm-season grass pasture on animal performance, gain/acre and profitability. For three years, pastures were fertilized with 100, 200 or 300 pounds of nitrogen per acre. Calves were placed on pastures at 1.5, 2.5, 3.5 or 4.5 steers per acre for each level of fertilizer.

As stocking rate increased, regardless of fertilizer rate, total body weight gain of calves decreased (from 212 to 55 pounds per calf), but gain per acre increased from 288 pounds per acre up to

626 pounds per acre and then began to decline. With added fertilizer, the stocking rate that maximized gain per acre increased from 2.5 steers per acre at the 100 pounds N per acre rate (432 pounds per acre) to 3.5 steers per acre for the 200 and 300 pound N per acre rate, 508 and 626 pound per acre, respectively. The net return per acre using this year's projected cattle prices and \$375 per ton ammonia nitrate costs is greatest with 2.5 steers per acre stocking rate at both the 100 and 200 pounds N per acre rates, \$150 and \$162 per acre, respectively. The greatest profitability was with the high fertilization rate and the 3.5 steer per acre stocking rate (\$222 per acre). This indicates that when profit potential is high for purchased or retained stocker calves, managing pastures to maximize gain per acre produces greater net returns for the enterprise, and the additional expense of fertilization is still a beneficial investment.

Why Don't We Grow These Forages in Arkansas?

Dr. John Jennings, Professor

I have received several calls lately about new forages that have shown up in popular press articles. In this article, I'll discuss the forage potential of teff, perennial peanut and sugar beets for Arkansas. For any new forage species, always ask how it will benefit your forage program before buying seed.

Teff

Teff is a warm-season annual grass originating from Africa where it is selected for grain. In the U.S. it has been selected for forage production and can be expected to grow well in Arkansas. It is a fine-stemmed, leafy grass that produces slightly less yield than pearl millet but is much easier to dry for hay. Seeding rate for teff is 10 lb/acre and the planting date is late April to early June – same as for

seeding bermudagrass. There are 1.3 million seed/lb, and the tiny seed must be planted shallow similar to bermudagrass seed. Seed can be planted with a no-till drill or broadcast. If planting with a no-till drill, adjust the machine so the disk openers roll on the surface without cutting the sod but so the press wheels have enough down pressure to push the seed into the sod surface. Teff is slow to establish, so sod suppression and weed control are imperative. For broadcasting the seed on a tilled soil, roll the soil to make a well-firmed seedbed, then broadcast the seed and roll once more. If the seedbed is not firm, the seed will be pushed too deep resulting in poor establishment. Soil test recommendations for "Summer Annuals for Hay" (U of A Crop Code 141) would be a good place to start for lime and fertilizer, except

reduce the N to 30 to 50 lb/acre at planting and reapply after each cutting as needed. For grazing instead of hay, the recommendations for P and K can be reduced by half. For hay harvest, raise the mower height to not mow shorter than 3 inches. Shorter cutting height sharply reduces regrowth. First harvest will be about 40 days after planting, and the crop can be harvested or grazed on a 28- to 32-day interval until frost. Teff is not cold tolerant and dies at frost. Forage quality is similar to other forage grasses. Crude protein ranges from 9 to 14 percent, and TDN ranges from 55 to 65 percent if cut at optimum maturity. Yield potential is expected to be 2 to 4 tons/acre under dryland conditions. Teff is being touted as a good horse hay due to the fine stems, but as with any forage, good hay

is a result of good harvest management. Varieties include Tiffany, Dessie, Corvallis, Emerald, Excalibur, Horse Candi, Pharoah and Velvet.

Perennial Peanut

Reports on perennial peanut get many producers excited because it is a perennial forage legume that has few pests, produces good yields, is good quality and reportedly rivals alfalfa for quality horse hay. This species has many excellent characteristics, but perennial peanut is not cold tolerant and is not adapted to Arkansas. It is only grown in the deep south, mainly along the Gulf Coast. Alternative legumes for Arkansas

are alfalfa, many clovers and even forage-type soybeans.

Sugar Beets

Some producers needing high-quality forage or supplement have asked about using sugar beets for grazing. Sugar beets are most commonly grown in the upper Midwest (Michigan, Wisconsin, North Dakota) where summer temperatures are mild enough to favor high sugar accumulation in the roots. Sugar beet varieties have been developed for high sugar content in the roots and not forage growth. Sugar beets are perennial plants producing a thick root and leafy top the first year and bolting the

second year to produce a seed stalk before dying. Sugar beets are relatively difficult to establish and have several pests. Seeding rate is 1 lb/acre and the seeding date is very early spring. Up to 60 days may be required after planting for the tops to cover the soil, so weed invasion is a problem. Frost halts growth, limiting fall production. While it may be possible to grow sugar beets for grazing in Arkansas, the lower forage yield and multiple pest and production issues make it a questionable crop for our area. Brassica species including kale, turnips and rape are more suitable for Arkansas conditions and can produce a higher yielding, good quality grazing crop for high nutrient demand livestock.

Genomic Evaluations for Dairy Cattle

Dr. Jodie Pennington, Professor

Genomic sire evaluations of dairy cattle were released for the first time in January 2009. These evaluations are designed to supplement the information for genetic assessment of bulls and cows available through the traditional pedigree, progeny and performance of the animals. Bull studs or artificial insemination (AI) organizations vary in how they use the information, so it is important to note how proofs are determined in order to differentiate between proofs listed by traditional progeny assessment and that of genetic evaluation.

Cows and bulls can now be genomically tested for approximately \$250 with the new Illumina BovineSNP50™ Bead Chip. AI organizations have used the test to determine genetic information on about 5,800 bulls. The goal eventually will be to test the genetic information on potential young sires so that only the young sires with the highest levels of genetic rating will be progeny tested, thus increasing the likelihood of a young sire having higher producing progeny and decreasing the average costs of getting a proven bull in the stud.

SNP stands for single nucleotide polymorphism. The BovineSNP50™ chip determines which SNPs are in a bull's genetic makeup and adds these together to get an estimate of his genetic merit. The cattle genome is a genetic code that consists of four nucleotides: A-adenine, C-cytosine, G-guanine and T-thymine. Each parent contributes roughly 3 billion nucleotide pairs which

are packaged on 30 chromosomes to their offspring. Variation in this code is responsible for much of the difference in performance among animals. For example, a "G" at a specific location in a sire's DGAT1 gene (located on the 14th chromosome) instead of an "A" is associated with an increase of approximately 0.15 percent fat and a decrease 300 pounds of milk in his daughters.

Of the 58,000 SNPs or snips, 38,416 are used as predictors of performance on the BovineSNP50™ chip. A majority of the identified SNPs have little effect by themselves, but cumulatively they can predict performance with a reasonable degree of accuracy. It is hoped that genetic progress will increase more rapidly in the future because the interval between sire generations will decrease. Previously, bull studs waited until a bull had a progeny test at around 5 years of age before they used a bull for contract matings and usually limited his use until high-reliability proof was available. The new genetic evaluations by genomics may allow bulls to be used in contract mating much earlier, but more data is needed before such practices replace current methods of progeny testing to develop proven sires.

Genomic information allows a bull to have a genetic proof at approximately 60 percent reliability before he has a milk-producing daughter. However, most producers want bulls to have 80 to 90 percent reliability before they use the bull extensively. Presently, it takes about

1,000 daughters for a bull to have 90 percent reliability, while it may take only 100 daughters to have 90 percent reliability with genomics.

The reliability of non-Holstein bulls will be lower than for Holstein bulls as more genetic information is available for Holsteins. Efforts to combine breeds into a single genomic evaluation haven't been fully successful at this point. Genomic evaluations will improve for the non-Holstein breeds, but it will require time.

Genomic evaluations of young bulls are a big step forward, but they are not perfect. Some AI organizations are using genomic selection more than others. As you select a bull for use with artificial insemination, it is important to look at the reliability of the bull and determine how much of the proof is related to genetic information and how much is related to progeny testing.

Genetic evaluations from progeny tests presently will remain the standard for bull proofs as the genomic-tested bulls will have lower reliability than traditional progeny-tested bulls. When using the genomic information on a bull, it is recommended that it be used with more confidence than that of previous young sires. It is advisable to spread risk by using more bulls if much emphasis is placed on genomic proofs. Some companies are marketing bulls that have a genomic evaluation and no daughters in "6-packs" to help spread risk effectively.

Cost Effective Management Strategies: 300 Days Grazing

Kenny Simon, Program Associate-Forages

Input cost such as feed, fertilizer and fuel, the three “Fs,” are essential items to livestock and forage producers. In 2008, these costs were increasing at an alarming rate, setting record high levels. With the high cost of inputs, producers are forced to take a second look at their operational records and look for ways to manage more effectively. Grazing forages more efficiently, getting more of the expensive forage ingested by the cattle, is beneficial to producers.

One of the ways livestock producers can extend the grazing season is by stockpiling forages. Stockpiling is the practice of allowing forage growth to accumulate in one season for grazing in a later season. Stockpiled forages grown from late summer through fall can be grazed at a lower cost than feeding hay and supplements. Additional savings can be realized because allowing a herd to graze stockpiled pastures takes less time, labor, fuel and equipment than moving and feeding hay to the herd. Therefore, less total hay is needed, which reduces hay production costs as well.

In 2008 there were two counties involved with stockpiled bermudagrass projects, Cleveland and Saline counties. In Cleveland County, eight acres of bermudagrass was designated for stockpiling. In late July, existing forage residue was removed to a stubble height of approximately three inches. At that point, the livestock were removed from the pasture and the bermudagrass was allowed to accumulate until late October. On October 21, 55 1,000-pound mature cows were turned in on the stockpiled grass. Cattle strip grazed across the

County	No. AU	Actual Cost/AU	Comparative Estimate/AU	Estimated Savings/AU	Farm Savings
Cleveland	55	\$0.00	\$12.83	\$12.83	\$705.61
Saline	48	\$7.77	\$18.44	\$10.67	\$511.66

pasture, being rotated twice a week and pulled out on November 11. At turn-in, there was 4,845 lb of dry matter available per acre, with a nutrient analysis of 18.8 percent crude protein and 64.3 percent TDN. The stockpiled bermudagrass did not receive any fertilizer, so there was no cost associated with stockpiling. If the producer had not stockpiled the bermudagrass and the cattle were fed stored hay, it would have cost \$12.83 per animal unit with a total cost of \$705.61. The stored hay had a nutrient analysis of 8.9 percent crude protein and 51.7 percent TDN, which means additional supplements were needed to maintain the cattle’s body condition. These cost savings do not take into account the difference in nutritional value between the stockpiled grass and the hay.

In Saline County, ten acres of bermudagrass were set aside for stockpiling. Existing forage residue was removed by the end of July. On August 2, 150 lb of urea per acre was applied to the bermudagrass to maximize yield potential. The forage was allowed to accumulate until October. On October 6, 35 1,370-pound mature cows were turned in on the stockpiled grass. Cattle strip grazed across the pasture being rotated once a week and were pulled out on October 26. At turn-in, there was 3,375 lb of dry matter

available per acre. Cost of stockpiling was \$7.77 per animal unit, for a total cost of \$372.60. If the producer had not stockpiled the bermudagrass and the cattle were fed stored hay, it would have cost \$18.44 per animal unit with a total cost of \$884. By utilizing stockpiled bermudagrass, the producer saved \$10.67 per animal unit, with a total cost savings of \$511.66.

In addition to the stockpiled bermudagrass projects, there are currently twelve counties involved in 34 individual components of the 300 Days Grazing program. The program consists of five components with eight projects: 1) Stockpiled Forages (bermudagrass and fescue), 2) Improved Grazing Management (rotational grazing), 3) Complementary Forages (winter annuals and summer annuals), 4) Legumes and 5) Efficient Hay Management (storage and feeding). Any livestock species can be used for these demonstrations. For example, an equine producer may be interested in reducing hay storage losses or hay feeding losses. We’ve even stockpiled forages for equine grazing.

For more information on 300 Days Grazing demonstrations, please visit our website at http://www.aragriculture.org/forage_pasture/grazing_program/default.htm.

Schedule of Events

Contact your local county agent for details.

April 15—Dairy Cow Care and Forage Field Day (Washington County)

April 18—4-H Goat Conference (Pulaski County)

April 21—Livestock and Forestry Branch Station Field Day (Batesville)

April 24—Arkansas Forage and Grassland Tour (Booneville)

April 29—4-H Grassland Contest

April 30—Wheat Grazing Field Day (Lafayette County)

May 12—Pizza Ranch of Arkansas (Little Rock)

May 14-16—Horsemanship School - Fayetteville (Pauline Whitaker Arena)