VACUUM PRESERVATION

A Method for Storing Wet Distillers Grains

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High moisture corn gluten feed (CGF) and wet distillers grain (DG) are excellent feedstuffs for inclusion into cattle diets. Because these two feedstuffs typically range in dry matter content between 40% and 60%, the length of storage time until feeding without spoilage is limited to 5-7 days when air temperatures are above 70º F and 7-10 days when air temperatures are below 45º F. Consequently, cattle producers with smaller herd sizes and limited daily consumption of DG or CGF have had few choices for utilizing these two feedstuffs. The options have included: 1) hauling smaller loads of DG or CGF from the plant to the farm to minimize spoilage have ultimately resulted in higher transportation costs offsetting the lower purchase cost of DG or CGF, or 2) ensiling the CGF or DG with another feedstuff such as dry corn silage or small grain straws. Ensiling CGF or DG by themselves has proven problematic in both upright and horizontal silos. With a modified bagger, CGF can be stored in a silage bag; but the consistency of DG does not lend itself to bagging.

With the smaller scale producer in mind, Illinois State University recently completed a study to evaluate a low-cost method to store DG. The study was jointly funded by ISU, Archer Daniels Midland Company, Decatur, and Illinois C-FAR. On November 5 and 6, 2003, freshly produced DG (36.53% DM) was placed (using two skid-steer loaders) on a .24mm thick white plastic silo cover in two pyramid-shaped rows containing either 54 tons or 70 tons. Each row was either 10 feet or 15 feet wide at the base, 5 feet high at the peak, and 75 feet long. Prior to covering each row with plastic and sealing the plastic at the base with ground limestone, a 2 inch diameter x 50 feet long perforated flexible, plastic tube was laid on each side of each DG row and connected to a 5 HP 12 gallon 120 volt Shop Vac® (Williamsport, PA) vacuum. The entire process required 2 hours per bag to complete. Each vacuum (2 vacuums per covered row) was turned on 3x:day for a 5 minute duration at 8 a.m., noon, and 4 p.m. Each vacuum was rated to have a positive displacement of 190 CFM of air and would pull the plastic cover tight to the DG within 5 minutes of operation displacing any air trapped between the cover and the pile of DG. Samples of DG were collected at 0 days, 41 days, and 78 days post-sealing and analyzed for dry matter (DM), pH, and the following VFA's: acetic acid, propionic acid, butyric acid, and lactic acid. Initial DG contained 36.2 % DM and 4.6 pH. Over the first 78d of storage, VFA concentrations dropped. In effect, the DG did not ensile, but the storage method did preserve the feedstuff, as the DG had the same appearance as fresh DG when the first bag was opened on January 20 and feeding began. Bag one was fed for 112 days until May 14. Of the 70 tons stored in bag one, 19.8 tons were considered spoiled at the end of 112 days and unfit for feeding. All of the spoilage occurred after April 1. Bag two was opened on day 190 post-sealing (May 14) and fed for 67 days. Of the 54 tons DG stored in bag two, 27.6% was considered spoiled and unfit for feeding. Spoilage in bag two began the day the bag was opened and increased after the first 30 days subsequent to opening. Feeding was terminated on July 20 due to spoilage of the remaining DG. Eighty beef cows in the third trimester were blocked by body condition score (BCS) and randomly allotted within block to 10 pens subject to variation in body weight (BW) to evaluate the vacuum stored high moisture corn distiller's grains as a substitute for shelled corn and soybean meal. Control cows (CNTL) were fed corn silage-shelled corn-soybean meal based diets according to NRC recommendations. The distiller's grains were initially included in treatment cow (TRT) diets to balance for crude protein (CP) but were increased as an energy source as needed over the 182 days feeding period to maintain cow BCS. This procedure resulted in TRT diets containing significantly higher CP, comparing

14.0% vs. 11.3% CP for TRT vs. CNTL diets, respectively. The DG contained 37.l% DM, 32.0% CP, 7.1% fat, and 20.6% acid detergent fiber (ADF). Average daily feed intake (wet wt. basis) was 48.8 lbs. for CNTL and 50.0 lbs. for TRT. Wet distiller's grains represented 21.9% of the dry matter intake for TRT cows and corn + soybean meal represented 25.3% of the dry matter intake for CNTL cows. No significant differences were observed in cow BW, BCS changes, conception rates and estimated milk production, and in calf creep feed intake and end of trial calf weights between the TRT and CNTL diets.

This trial found the vacuum storing procedure could preserve DG for prolonged periods, but the vacuum procedure used did not ensile DG. These data suggest diets containing DG stored for up to 260d using a vacuum preservation method can result in similar beef cow performance compared to cows fed corn silage-shelled corn-soybean meal based diets. The vacuum storage method works well from November-March. Because spoilage can occur during warmer weather, our recommendation is to limit storage amounts under one covered pile to an amount that can be fed within 30 days, from April through October. In this study, spoilage of the DG did not occur until the bag was opened for feeding. For a herd of 40 cows fed 6-10 lbs of DG per head per day, each covered pile should contain 4-6 tons of DG. One shop vacuum will displace the air from several individual 4-6 ton piles. Vacuum storage of wet distiller's grain can be a viable storage method for cow producers and feeders with limited numbers of cattle. This storage procedure allows smaller scale operations the opportunity to take advantage of pricing strategies for utilizing high moisture corn processing co-products generally limited to larger operations.