

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Beef Cattle Reports

Animal Science Department

January 2008

Evaluation of Storage Methods for Wet Distillers Grains Plus Solubles with Added Forages

Daniel R. Adams

University of Nebraska-Lincoln

Mallorie F. Wilken

University of Nebraska-Lincoln

Brandon L. Nuttleman

University of Nebraska-Lincoln

Luke M. Kavorik

University of Nebraska-Lincoln

Joshua R. Benton

University of Nebraska-Lincoln, jbenton2@unl.edu

See next page for additional authors

Follow this and additional works at: <https://digitalcommons.unl.edu/animalscibcr>



Part of the [Animal Sciences Commons](#)

Adams, Daniel R.; Wilken, Mallorie F.; Nuttleman, Brandon L.; Kavorik, Luke M.; Benton, Joshua R.; Greenquist, Matthew A.; Erickson, Galen E.; Klopfenstein, Terry J.; and Rasby, Richard J., "Evaluation of Storage Methods for Wet Distillers Grains Plus Solubles with Added Forages" (2008). *Nebraska Beef Cattle Reports*. 9.

<https://digitalcommons.unl.edu/animalscibcr/9>

This Article is brought to you for free and open access by the Animal Science Department at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Beef Cattle Reports by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Authors

Daniel R. Adams; Mallorie F. Wilken; Brandon L. Nuttleman; Luke M. Kavorik; Joshua R. Benton; Matthew A. Greenquist; Galen E. Erickson; Terry J. Klopfenstein; and Richard J. Rasby

Evaluation of Storage Methods for Wet Distillers Grains Plus Solubles with Added Forages

Daniel R. Adams
 Mallorie F. Wilken
 Brandon L. Nuttleman
 Luke M. Kovarik
 Josh R. Benton
 Matt A. Greenquist
 Galen E. Erickson
 Terry J. Klopfenstein
 Rick J. Rasby¹

Summary

Six experiments indicated minimum amounts of dry feedstuffs needed for storage of wet distillers grains plus solubles (WDGS) in a silo bag, with a constant pressure of 300 psi, were 15% grass hay, 12.5% wheat straw, 22.5% alfalfa hay, 50% dry distillers grains and 60% wet corn gluten feed (WCGF) with the remaining percentage as WDGS (DM basis). For storage in bunker silos, the recommended levels are 40% grass hay, 30% wheat straw and 30% cornstalks.

Introduction

Because WDGS are delivered in semi-load quantities and are perishable in 7 to 10 days, smaller operations may not be able to use WDGS. Similarly, most cow-calf operators do not purchase WDGS because of low feeding rates which can lead to spoilage. Cow-calf operations demand for WDGS is often in the winter. The demand for WDGS in the winter is much higher compared to summer due to a greater number of cattle-on-feed in Nebraska feedlots.

WDGS will keep when oxygen is excluded; however the DM of the traditional WDGS is relatively low (30%-35%). As a result, WDGS by itself is challenging to store in a bunker silo or a silo bag under pressure.

Two other types of byproducts are modified WDGS (DM 45%-50%) and WCGF (DM 45%-60%). These byproducts can be packed into silo bags under pressure but cannot be packed

into a bunker silo without additions.

The objective for the first three experiments was to maximize the amount of WDGS stored with adding minimal forages. In the next three experiments, the objective was to mix in larger amounts of low quality forage with the byproducts to obtain greater use of the low quality forages, while storing the wet byproducts.

Procedure

Traditional WDGS were mixed using a truck mounted feed mixer with weighing capability. During all of the bagging experiments, the bagger was held at a constant pressure of 300 psi. All of the grass hay, wheat straw, and cornstalks were ground through a tub grinder with a 5-in screen; alfalfa hay was ground with a 7-in screen. Feed products used in the experiments contained different DM (Table 1), therefore all percentages are presented on a DM basis.

Experiment 1

WDGS were mixed with one of five different feedstuffs including grass hay, alfalfa hay, wheat straw, dry distillers grains (DDGS) and wet corn gluten feed. During the experiment, adjustments were made based on how the different products bagged.

Grass hay was tested at 17.5%, 15%, 12.5%, 10%, and 7.5% with the remaining percentage being WDGS on a DM basis. Alfalfa hay was tested at 25%, 22.5%, 20%, 17.5% and 15% on a DM basis. Wheat straw was mixed with WDGS at 15% and 12.5% DM basis. Ratios of DDGS:WDGS evaluated were 50:50 and 60:40 (DM basis). Wet corn gluten feed was mixed with WDGS at ratios of 40:60 and 50:50, respectively (DM basis).

Experiment 2

Two semi-loads of WDGS were mixed with 30% grass hay and two loads were mixed with 40% grass hay

(Continued on next page)

Table 1. DM of forage and feedstuffs used in six experiments to evaluated storage of WDGS when mixed together.

	%DM
Experiment 1	
Wet distillers grains plus solubles	34%
Grass hay	90%
Alfalfa	90%
Wheat straw	90%
Dry distillers grains plus solubles	90%
Wet corn gluten feed	44%
Experiment 2	
Wet distillers grains plus solubles	34%
Grass hay	90%
Experiment 3	
Wet distillers grains plus solubles	37%
Cornstalks	77%
Experiment 4	
Wet distillers grains plus solubles	34%
Wheat straw	90%
Experiment 5	
Wet distillers grains plus solubles	36%
Corn stalks	83%
Experiment 6	
Wet distillers grain plus solubles	34%
Grass hay	90%

for storage in silo bunkers. A skid loader with rubber tracks was used for packing mixtures in the bunker silos. To test how well the mixture of grass hay and WDGS packed, a pay loader was driven onto the pile to determine if the mixture would maintain the weight of the pay loader.

Experiment 3

Cornstalks (29% of DM) were mixed with WDGS to be packed into a bunker silo. This mixture was packed into the bunker silo using a skid loader with tracks.

Experiment 4

WDGS were mixed with wheat straw at two different levels and stored in silo bags to be used in a feeding study (2008 Nebraska Beef Cattle Report, pp 33-34). One mixture was 67% wheat straw and 33% WDGS (DM basis). The other mixture was 33% wheat straw and 67% WDGS (DM basis).

Experiment 5

WDGS were mixed with cornstalks and stored in a silo bag. Cornstalks: WDGS were mixed at a ratio of 50:50 (DM basis).

Experiment 6

In the last experiment, WDGS was mixed with grass hay. Grass hay was mixed with WDGS at a ratio of 56:44 grass hay to WDGS (DM basis). The mixture was stored to be fed over the course of the summer to grazing cattle.

Results

Calculations of minimal levels of WDGS and feedstuffs needed to prevent splitting of the bag from Experiment 1 are shown in Table 2. During Experiment 1, the silo bag split open during the bagging process at the 7.5% and 10% grass hay levels. It also split open at the 40% and 50% levels of WCGF. Based on Experiment 2, the minimal level of grass hay with WDGS in a bunker silo was 30% grass

Table 2. Calculations from DM % to as-is % of the minimal levels of WDGS and feedstuffs from Experiment 1.

Product	Ingredient DM, %	% of Mix (DM Basis)	% of Mix/Product		Mixture DM
			DM *100 Parts as-is	% of Mix (As-is basis)	
Grass hay	90.0%	15.0%	16.7	6.2%	37.5%
WDGS	34.0%	85.0%	250.0	93.8%	
% Totals		100.0%	266.7	100.0%	
Alfalfa Hay	90.0%	22.5%	25.0	9.9%	39.5%
WDGS	34.0%	77.5%	227.9	90.1%	
% Totals		100.0%	252.9	100.0%	
Straw Hay	90.0%	12.5%	13.9	5.1%	36.9%
WDGS	34.0%	87.5%	257.3	94.9%	
% Totals		100.0%	271.2	100.0%	
Dry Distillers Grains	90.0%	50.0%	55.5	27.4%	49.4%
WDGS	34.0%	50.0%	147.1	72.6%	
% Totals		100.0%	202.6	100.0%	
Wet Gluten Feed	44.0%	60.0%	136.4	53.7%	39.4%
WDGS	34.0%	40.0%	117.6	46.3%	
% Totals		100.0%	254.0	100.0%	



Figure 1. Picture illustrates the different height and width of silo bags depending on forage or dry feed added. We evaluated the lower limits required and did break the bag when too little forage was added.

hay; however, we recommend the 40% level of grass hay because a skid loader with tracts was used to pack the product into the bunker silo. The skid loader with tracts has a lower lb/in² for compaction compared to a pay loader. The 30% grass hay pile was not able to support the weight of the pay loader when compacting the pile.

In all of the experiments, quality of the stored material was good because

spoilage did not occur. Exclusion of oxygen is necessary for good storage. Mixtures of 12.5% to 67% (DM basis) wheat straw with WDGS in silo bags were successfully stored. Based on Experiment 1 and Experiment 5, it appears that wheat straw and cornstalks have similar characteristics for storage in a silo bag.

The range of roughage levels that can be used for storing in bunker silos



Figure 2. A side-by-side comparison of 40% grass hay and WDGS (left) and 30% grass hay and WDGS (right). Bunker sizes are not identical, but more bulk is produced with the 40% grass hay mixture as expected.

is likely narrower than for bagging, although fewer levels were evaluated. Likely, 30% to 40% roughage with WDGS is appropriate for bunker storage with grass hay or equivalent, and lower levels when using wheat straw or cornstalks.

Producers may need to make adjustments as they store WDGS to make it work within their operations.

¹Daniel R. Adams, graduate student; Mallorie F. Wilken, graduate student; Brandon L. Nuttleman, graduate student; Luke M. Kavorik, graduate student; Josh R. Benton, research technician; Matt A. Greenquist, research technician; Galen E. Erickson, associate professor; Terry J. Klopfenstein, professor; and Rick J. Rasby, professor, Animal Science, Lincoln.