2011

Comparing Different Drying Methods for Distillers Grains and its Effects on Feedlot Cattle Performance

Brandon L. Nuttelman
University of Nebraska-Lincoln

William A. Griffin
University of Nebraska-Lincoln, wgriffin2@unl.edu

Galen Erickson
University of Nebraska-Lincoln, gerickson4@unl.edu

Terry Klopfenstein
Universitiy of Nebraska - Lincoln, tklopfenstein1@unl.edu

Comparing Different Drying Methods for Distillers Grains and its Effects on Feedlot Cattle Performance

Brandon L. Nuttelman
Will A. Griffin
Galen E. Erickson
Terry J. Klopfenstein[1]

Summary

An experiment was conducted to evaluate the effect of drying distillers grains plus solubles on cattle performance. The control diet contained no distillers grains. The six additional diets contained 35% distillers grains that were 1) wet distillers grains plus solubles (WDGS), 2) dried distillers grains plus solubles (DDGS), 3) dried distillers grains plus wet solubles at time of feeding (DDG + Solubles), 4) dried distillers grains plus solubles plus water (DDGS + H_2O), 5) modified distillers grains with solubles added prior to drier (MDGSPre), and 6) modified distillers grains with solubles added after the drier (MDGSPost). Cattle fed diets with distillers grains had greater ADG and DMI, and lower F:G than the diet with no distillers grains. Diets containing WDGS, MDGSPre, and MDGSPost had lower F:G than other treatments. Drying of solubles had little impact on the feeding value of distillers grains.

Introduction

Drying distillers grains plus solubles had a negative impact on the feeding value of distillers grains in feedlot diets (*2011 Nebraska Beef Cattle Report,* pp. 50-52). Although distillers grains are produced from a different milling process, research with corn bran (*2002 Nebraska Beef Cattle Report,* pp. 72) suggests that drying distillers grains may not alter the feeding value in feedlot diets, but drying the solubles onto the distillers grains may negatively affect the feeding value of distillers grains plus solubles. Distillers grains and distillers solubles are produced as separate feeds during ethanol production. Therefore, the objective of this study was to determine if drying solubles onto distillers grains affects the feeding value of distillers grains plus solubles included in feedlot diets.

Procedure

Green Plains Renewable Energy, Inc. produced five different distillers grains by changing the timing of drying the distillers grains. All distillers grains were produced during the same week from the same plant and stored in silo bags prior to the initiation of the study to eliminate variation in composition of distillers grains. The five different types of distillers grains produced were: 1) WDGS — solubles were added to wet grains; 2) DDGS — solubles were added to wet grains and then dried ~ 90.0% DM; 3) DDG — wet grains were dried with no solubles added; 4) MDGSPre — solubles were added to wet grains and then dried to ~ 47.5% DM; and 5) MDGSPost — wet grains were partially dried and then solubles were added at the same ratio to the partially dried grains resulting in ~ 48.0% DM distillers grains. As a result there were three types where solubles were not dried, and there were two types with solubles dried onto the grains.

Crossbred, calf-fed steers (n = 420; 671 ± 46 lb) were utilized to determine the feeding value of distillers grains as a result of different drying methods. A randomized complete block design was used with an unstructured treatment design. Six days prior to the initiation of the study, steers were limit fed (2% BW) a common diet consisting of 47.5% alfalfa hay, 47.5% wet corn gluten feed, and 5.0% supplement to eliminate variation due to gut fill. On day 0 and 1 of the experiment, steers were weighed and the average of the two-day weights was used as the initial BW. Steers were blocked by BW, stratified within block, and assigned randomly to one of 42 feedlot pens (10 steers/

Table 1. Diet composition.

	Treatments[1]						
	CON	WDGS	DDGS	DDGS +H_2O	MDGSPre	MDGSPost	DDG+ Solubles
HMC	43.4	25.9	25.9	25.9	25.9	25.9	25.9
DRC	43.4	25.9	25.9	25.9	25.9	25.9	25.9
Distillers Grains	—	33.0	35.0	35.0	33.0	35.0	28.0
Solubles	—	2.1	—	—	2.1	—	7.0
Sorghum Silage	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Grass Hay	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Supplement[2]	5.0	5.0	5.0	5.0	5.0	5.0	5.0

[1]CON — Control diet with no distillers grains. WDGS — Wet distillers grains included at 35% of Diet DM. DDGS — Dry distillers grains with solubles added to grains prior to the dryer. DDGS+H_2O — Dried distillers grains with soluble added to grains prior to the dryer and H_2O added at time of feeding to reconstitute DDGS to same DM as MDGSPre and MDGSPost. MDGSPre — Modified distillers grains with soluble added to grains prior to the dryer. MDGSPost — Modified distillers grains with solubles added to grains post dryer. DDG+Solubles — Dried distillers grains with solubles added to grains at time of feeding (~ 80% grains and 20% solubles DM).
[2]Supplements were formulated to provide 330 mg/head/day of Rumensin; 90 mg/head/day of Tylosin.

Table 2. Nutrient composition of distillers grains.

	Type of distillers grains[1]					
	WDGS	DDGS	DDG	MDGSPre	MDGSPost	Solubles
CP, %	33.5	31.8	34.6	31.3	32.3	25.9
Fat, %	12.2	11.5	7.5	12.2	12.8	21.7
NDF, %	37.8	36.9	47.1	35.9	36.6	—
S, %	0.76	0.77	0.63	0.70	0.84	1.26

[1]CON — Control diet with no distillers grains. WDGS — Wet distillers grains included at 35% of Diet DM. DDGS — Dry distillers grains with solubles added to grains prior to dryer. DDGS+H_2O —Dried distillers grains with solubles added to grains prior to the dryer and H_2O added at time of feeding to reconstitute DDGS to same DM as MDGSPre and MDGSPost. MDGSPre — Modified distillers grains with solubles added to grains prior to the dryer. MDGSPost — Modified distillers grains with solubles added to grains post dryer. DDG+Solubles — Dried distillers grains with solubles added to grains at time of feeding (~ 80% grains and 20% solubles DM).

Table 3. Growth performance and carcass characteristics.

	Treatments[1]								
	CON	WDGS	DDGS	DDGS+H_2O	MDGSPre	MDGSPost	DDG+Solubles	SEM	*P*-value
Performance									
Initial BW, lb	691	692	690	689	690	692	690	1	0.34
Final BW, lb[2]	1268[a]	1370[b]	1346[b]	1356[b]	1370[b]	1372[b]	1374[b]	11	< 0.01
ADG, lb	3.09[a]	3.63[b]	3.51[b]	3.58[b]	3.64[b]	3.64[b]	3.66[b]	0.06 [b]	< 0.01
DMI, lb/d	20.4[a]	21.8[b]	22.5[bc]	22.4[b]	22.1[b]	22.4[b]	23.4[c]	0.4	< 0.01
Feed:gain[3]	6.61[a]	6.01[d]	6.40 [ab]	6.22[bc]	6.08[cd]	6.13[cd]	6.40 [ab]	0.01	< 0.01
Carcass Characteristics									
HCW, lb	799[a]	863[b]	848[b]	856[b]	863[b]	864[b]	866[b]	7	< 0.01
Marbling Score[4]	509	539	545	539	529	523	551	13	0.32
12th rib fat, in.	0.43[a]	0.58[b]	0.56[b]	0.55[b]	0.56[b]	0.55[b]	0.55[b]	0.04	0.02
LM, area in.[2]	12.7	13.0	12.9	12.8	13.0	12.9	13.3	1.2	0.38

[a,b,c,d]Means with different superscripts differ ($P < 0.05$) for treatments.

[1]CON — Control diet with no distillers grains. WDGS — Wet distillers grains included at 35% of Diet DM. DDGS — Dry distillers grains with soluble added to grains prior to the dryer. DDGS+H_2O — Dried distillers grains with solubles added to grains prior to the dryer and H_2O added at time of feeding to reconstitute DDGS to same DM as MDGSPre and MDGSPost. MDGSPre — Modified distillers grains with solubles added to grains prior to the dryer. MDGSPost — Modified distillers grains with solubles added to grains post dryer. DDG+Solubles — Dried distillers grains with solubles added to grains at time of feeding (~ 80% grains and 20% solubles DM).

[2] Calculated from hot carcass weight, adjusted to a common dressing percentage of 63.0%.

[3] Analyzed as gain:feed, reciprocal of feed conversion.

[4] Marbling score: 400 = Slight^0; 450 = Slight^{50}; 500 = Slight^0, etc.

pen). Pens were assigned randomly to one of seven treatments. Treatments are presented in Table 1 and consisted of: 1) corn-based control (CON); 2) WDGS; 3) MDGSPre; 4) MDGSPost; 5) DDGS; 6) DDGS + H_2O; and 7) DDG + Solubles. Distillers grains were included in the diet at 35% of the diet DM. Water was added to DDGS to bring the ingredient DM equal to the MDGSPost. Solubles that were added to DDG were sampled and analyzed for fat content (Table 2). Solubles inclusion level was adjusted according to differences in fat level between loads so the fat portion from DDG + Solubles was similar to DDGS. Due to difficulties at the plant at the time of making the products, 100% of the solubles could not be added to WDGS and MDGSPre. Therefore, solubles were added to WDGS and MDGSPre at the time of feeding and consisted of 32.9% grains and 2.1% solubles. Corn consisted of a 1:1 ratio of high-moisture:dry-rolled corn, and all diets contained 4.1% grass hay, 4.1% sorghum silage, and 5.0% supplement.

Steers were implanted on day 1 of the study with Revalor-XS. Cattle were on feed for 187 days and slaughtered at a commercial abbotair (*Greater Omaha Pack, Omaha, Neb.)*. Hot carcass weights and liver scores were collected on the day of slaughter. Following a 48-hour chill, USDA marbling score, 12th rib fat depth, and LM area were recorded. A common dressing percentage of 63% was used to calculate carcass adjusted performance to determine final BW, ADG, and F:G.

Performance and carcass data were analyzed using the MIXED procedure of SAS. The model included block and dietary treatment. Pen was the experimental unit (6 pens/treatment). Differences were considered significant when $P \leq 0.05$.

Results

Cattle growth performance and carcass characteristics are presented in Table 3. Cattle fed distillers grains were heavier than CON ($P < 0.01$). Average daily gain was similar for cattle on diets containing distillers grains, but was less for CON ($P < 0.01$). Dry matter intake was different between diets ($P < 0.01$). Steers fed CON had the lowest DMI, and DDG + Solubles had the greatest DMI, but was not different from DDGS. There were no differences between the remaining distillers grains for DMI. Cattle on WDGS had the lowest F:G, but were not different from steers fed MDGSPre or MDGSPost ($P > 0.23$). Both MDGSPre and MDGSPost gained as efficiently as DDGS + H_2O, but were different from CON, DDGS, and DDG + Solubles ($P < 0.03$). Feed conversion tended to be greater for CON compared to DDGS and DDG + Solubles ($P = 0.07$), but was not different for DDGS and DDG + Solubles ($P = 0.99$).

Cattle on distillers grains diets gained more, and as a result had heavier HCW ($P < 0.01$). Cattle fed diets containing distillers grains were fatter at harvest than CON ($P = 0.02$). There were no differences for marbling score or LM area ($P > 0.32$).

Drying distillers grains had a negative effect on the feeding value. However, contrary to the hypothesis, the addition of solubles to dried distillers grains at the time of feeding did not change the feeding value compared to DDGS. In addition, drying the solubles for MDGSPre did not affect the feeding value when compared to MDGSPost where the solubles were not dried onto the grains.

These data suggest drying the solubles does not alter the feeding value of distillers grains plus solubles. Adding water to DDGS did not change F:G when compared to DDGS without water, suggesting that the increased feeding value of WDGS compared to DDGS is more than just the benefits of added moisture in the diet. In conclusion, drying distillers grains plus solubles does have a negative impact on the feeding value in feedlot diets when compared to WDGS. Drying the solubles onto distillers grains does not explain this change in feeding value.

[1] Brandon L. Nuttelman, research technician; Will A. Griffin, research technician; Galen E. Erickson, professor; Terry J. Klopfenstein, professor, University of Nebraska–Lincoln Department of Animal Science.