

Modified Distillers' Grain with Solubles Stored for an Extended Period in a Silo Bag Used to Develop Breeding Heifers

A.S. Leaflet R2288

Daryl R. Strohhahn, professor of animal science; Daniel D. Loy, professor of animal science; Daniel G. Morrical, professor of animal science; H. Joe Sellers, area extension livestock specialist; Dennis Maxwell, ag specialist

Summary

Developing breeding heifers were fed two levels of modified distillers' grains with solubles (MDGS), 17.7 and 32.7% of ration dry matter, in combination with haylages over a 122 day period. Heifers that received 32.7% MDGS in their diet started on feed significantly slower and gained significantly less during the first 46 day period. However, during the remainder of the test the 32.7% MDGS heifers gained significantly faster while consuming less feed than either the controls or the 17.7% MDGS treatment group. After 122 days on trial there were no significant difference in ADG or dry matter conversion between the control or treatment groups, but the 32.7% MDGS group consumed significantly less dry matter per day. There were no significant differences between treatment groups for either synchronized AI pregnancy rate or overall pregnancy rate.

Introduction

Due to the rapid expansion of the ethanol industry cow-calf producers are asking many questions concerning the use of wet distillers' grain in their operations. Because most cow-calf producers cannot use a semi-load of wet distillers' grain quickly methods for extended storage are foremost on their mind. Additionally, producers are inquiring about how these long-term stored products will feed in various management systems. Previous work in the feedlot suggest distillers' grain are excellent sources of nutrients for the diets of feedlot cattle, but have not been utilized to a large degree in heifer development programs. The goal of this trial was to evaluate the use of modified distillers' grain with solubles stored for an extended period of time with growing and developing breeding heifers.

Materials and Methods

On October 17, 2006 three loads of modified distillers' grain with solubles (MDGS, analysis see Table 1) from Big River Resources LLC, West Burlington, Iowa was delivered to the McNay Research Farm southwest of Chariton, Iowa. Storage procedures for the bagging (see picture highlights) on October 18th is described in A.S. Leaflet R2289. Feeding of the stored MDGS occurred from mid-January to mid-May, 2007, therefore, length of use from the MDGS bag was 83 to 208 days post-bagging.

A total of 145 Angus heifers ranging in age from 8 to 16 months (see picture highlights) were split randomly, yet accounting for sire differences, into three treatment groups with two replicates in each treatment. The rations used in this trial are outlined in Table 2 and were formulated to achieve heifer development gains of 1.85 to 1.95 lbs per day with limited intakes. These formulations with limited intakes were made because past experience with hay containing reeds canary grass usually resulted in below normal intakes. Diet formulation was based on feeding haylage supplemented with combinations of either corn, MDGS or soybean meal to achieve the desired gains. Added energy to achieve desired gains was accomplished by supplying either 50% or 100% of the net energy from MDGS. The 50% MDGS-50% Corn diet had 17.7% of the diet dry matter from MDGS, while the 100% MDGS diet contained 32.7% of the diet dry matter from MDGS. Control (corn-soybean meal based) diet fed heifers were fed to reflect what has historically been done at the McNay Research Farm.

All diets were evaluated and balanced according to NRC 1996 for major and minor minerals plus vitamin A, D and E. Of concern was sulfur intake because the MDGS feed analyzed with .86% (dry matter) and the hay forages analyzed from .15 to .21% sulfur. The 100% DG diet gave a nutritional warning on sulfur intakes using the BRANDS ration development software when fed at 3% to 5% less than normal intakes. Additionally, the McNay Research Farm is located in an area noted for water high in sulfate content. Water analysis at the McNay Research Farm feedlot showed sulfate levels from 1280 to 1410 ppm. Therefore, when this was taken into consideration the 100% DG diet gave total sulfur intakes exceeding .50% of the diet dry matter, which is 25% above the NRC maximum tolerable concentration. However, results of the feeding trial did not suggest this level was a problem.

Table 1. Analysis of modified distillers' grain with solubles and haylages used at ISU McNay Farm for bagging (100% dry matter basis).

Item	Modified Distillers' Grain with Solubles	Reed Canarygrass Haylage	Bromegrass Haylage
Dry Matter, %	49.73	53.11	58.13
Moisture, %	50.27	46.89	41.87
Crude protein, %	28.96	11.47	9.91
ADF, %	12.11	45.48	47.34
NDF, %	27.92	68.36	71.16
Fat, %	13.57	4.09	3.61
Ash, %	4.98	--	--
Calcium, %	.04	.43	.44
Phosphorus, %	1.01	.31	.19
Magnesium, %	.33	.17	.15
Potassium, %	1.21	1.27	1.18
Sulfur, %	.86	.21	.15
TDN*, %	89.7	53.47	52.02
NEm*, Mcal/cwt	101.27	49.47	47.19
NEg*, Mcal/cwt	70.02	24.27	22.15
NEI*, Mcal/cwt	94.44	54.17	52.55
*MDGS determination via OARDC methods, haylages use ADF methods			

At the conclusion of the feeding experiment all heifers were placed on the control ration. Sixty-seven of the 145 heifers were removed from the trial as they did not fit the animal breeding project and the remaining 78 heifers were artificially inseminated using the CO-Synch + CIDR fixed-time AI estrus synchronization system. This was initiated 28 days after the feeding trial ended. All heifers were bred once using the fixed-time AI system followed by a 12 day cleanup AI using the HeatWatch system and then a 21 day cleanup using bulls. Heifers were palpated for pregnancy using standard procedures.

Data was analyzed utilizing the GLM procedure of SAS with the least square means option.

Results and Discussion

Performance variables measured include growth rate, feed intakes, and efficiency of gains. Table 3 shows growth rate by period through the end of the MDGS which was 122 days. During the first period heifers on the Control and 50% DDG-50% Corn diets consumed significantly more feed, gained significantly better, but did not convert significantly better than the 100% MDGS group. However, during the second and third periods the 100% MDGS group out gained and showed numerically better feed conversion than the control and 50% MDGS-50% Corn treatment groups while consuming significantly less dry matter per day over the entire 122 day test. Therefore, by the end of trial at 122 days there were no significant differences between the treatment groups in ADG and dry matter conversion, however, the 100% MDGS group did consume significantly less dry matter on a daily basis. There were no significant differences in ending body condition score.

Table 2. Rations for 2006-07 McNay DDG Heifer Trial (percent of dry matter).

Ingredient	Control	50% MDGS	100% MDGS
MDGS	--	17.7%	32.7%
Corn	24.0%	13.4%	--
Brome or Reed Canary Grass Silage	53.4%	51.3%	50.1%
Alf-Grass Haylage	17.8%	17.1%	16.7%
SBM	4.3%	--	--
Mineral Mix	0.5%	0.5%	0.4%

Reproductive status is summarized in table 4. An overall pregnancy rate of 82 percent was achieved with 50 percent pregnant to the fixed-time AI, 11.5 percent of the cleanup AI and 20.5 percent to the cleanup bulls. Although numerical differences in pregnancy appear, there was no significant difference between ration treatment groups.

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Table 3. Feed intakes, heifer gains and feed efficiency by period for treatments versus control.

		0% MDGS-100% Corn CONTROL LS Means	50% MDGS- 50% Corn Treatment LS Means	100% MDGS Treatment LS Means	Significance Level
Number Heifers		47	48	49	
Period 1:	ADG	2.04	1.86	1.63	<0.01
1st 46	DM/FG	10.18	10.33	10.61	NS
Day	Ave Daily DM intake	20.62	19.22	17.09	0.02
Period 2:	ADG	2.13	2.40	2.39	0.01
2 nd 43	DM F/G	11.52	9.42	8.05	NS
Days	Ave Daily DM intake	24.36	22.39	19.12	<0.05
Period 3:	ADG	1.21	1.26	1.63	<0.01
3 rd 33	DM F/G	19.40	18.40	12.11	NS
Days	Ave Daily DM intake	22.38	21.74	19.71	NS
Overall Study 122 Days	ADG	1.85	1.89	2.10	NS
	DM F/G	12.27	11.13	8.89	NS
	Ave Daily DM intake	22.41	21.02	18.52	<0.05
	Final Body Condition Score	5.80	6.12	5.94	NS

Table 4. Summary of AI program and pregnancy rates by treatment group 2006-07 McNay DDG Heifer Trial.

<u>Item</u>	<u>Control</u> (head = %)	<u>50% MDGS</u> (head = %)	<u>100% MDGS</u> (head = %)	<u>Overall</u> (head = %)
Pregnant to Fixed-Time AI	13/27 = 48.1%	11/22 = 50.0%	15/29 = 51.7%	39/78 = 50.0%
Pregnant to Cleanup AI	5/27 = 18.5%	2/22 = 9.1%	2/29 = 6.9%	9/78 = 11.5%
Pregnant to Cleanup Bulls	6/27 = 22.2%	4/22 = 18.2%	6/29 = 20.7%	16/78 = 20.5%
Total % Pregnant	24/27 = 88.8%	17/22 = 77.3%	23/29 = 79.3%	64/78 = 82.0%
Total % Open	3/27 = 11.2%	5/22 = 22.7%	6/29 = 20.7%	14/78 = 18.0%

Photo Highlights from McNay MDGS Bagging & Heifer Development Trial



MDGS going into bag: 10-18-06.



MDGS 200 days post-bagging: 5-10-07.



Heifers at end of feeding trial: 5-14-07.