2008

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

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Abstract
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 suggests distillers grains 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.

Disciplines
Agricultural Science | Agriculture | Animal Sciences

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Introduction

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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 are described elsewhere in this progress report. 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 photo 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 lb/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% sulfur (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.

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 included 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 more feed, gained better, but did not convert 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 less dry matter per day over the entire 122 day test. Therefore, by the end of trial at 122 days there were no differences between the treatment groups in ADG and dry matter conversion, however, the 100% MDGS group did consume less dry matter on a daily basis. There were no differences in ending body condition score.

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

Acknowledgements

The authors wish to express their gratitude to the Iowa Energy Council for funding this project and the farm staff at the McNay Research Farm for their diligence in total project management.

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 canary grass haylage	Brome grass 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
NEl*, Mcal/cwt	94.44	54.17	52.55

*MDGS determination via OARDC methods, haylages use ADF methods.

Table 2. Rations for 2006–2007 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%

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	Avg daily DM intake	20.62	19.22	17.09	0.02
Period 2:	ADG	2.13	2.40	2.39	0.01
2nd 43	DM F/G	11.52	9.42	8.05	NS
days	Avg daily DM intake	24.36	22.39	19.12	<0.05
Period 3:	ADG	1.21	1.26	1.63	<0.01
3rd 33	DM F/G	19.40	18.40	12.11	NS
days	Avg daily DM intake	22.38	21.74	19.71	NS
	ADG	1.85	1.89	2.10	NS
Overall	DM F/G	12.27	11.13	8.89	NS
study 122	Avg daily DM intake	22.41	21.02	18.52	<0.05
days	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.

Item	Control (head = %)	50% MDGS (head = %)	100% MDGS (head = %)	Overall (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 and 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.