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Effect of Inclusion Level of Modified Distillers Grains plus Solubles in Finishing Steers

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Summary

Modified distillers grains plus solubles (MDGS) was fed at 0%, 10%, 20%, 30%, 40%, and 50% of the diet (DM basis) replacing dry rolled corn and high moisture corn. The feeding value of MDGS is 123% to 109% the value of corn as MDGS inclusion increases from 10% to 50% (DM basis). Except for hot carcass weight and calculated yield grade no differences in carcass characteristics were observed between treatments. Finishing diets including MDGS may be fed up to 50% of diet DM; however, optimal performance is likely between 20% to 40% of the diet DM.

Introduction

Modified distillers grains plus solubles (MDGS) is produced by combining the distillers grains and distillers solubles fractions. The ethanol plant will partially dry the wet distillers grains and then apply all the distillers solubles to the wet grains. MDGS varies from the other dry milling byproducts with a DM around 42% to 48%. Previous research has shown wet distillers grains plus solubles (WDGS) and dry distillers grains plus solubles (DDGS) to have a higher feeding value when compared to corn (Vander Pol et al., *2006 Nebraska Beef Report,* pp. 51-53, Buckner et al., *2007 Nebraska Beef Report,* pp. 36-38). The total inclusion of distillers solubles in MDGS provides a higher fat content which may provide a higher feeding value or the drying process may reduce the feeding value relative to corn. Therefore, the objective of this trial was to determine feeding performance and carcass characteristics of feedlot steers fed 0% to 50% MDGS (DM basis).

Procedure

A finishing trial was conducted at UNL research feedlot near Mead, Neb. using yearling crossbred steers (n=288; BW = 732 ± 38 lb) Prior to trial initiation, steers were limit-fed 5 days to minimize gut fill differences (a 1:1 ratio of alfalfa hay and wet corn gluten feed at 2% of BW). On day 0 and day 1, individual BW data were collected, animals were blocked by BW, stratified within block, and assigned randomly to pens. Pen (8 steers/pen) was assigned randomly to treatment. Thirty six pens were used to provide six replications of the six treatments.

Six treatments included a control (CON) with 0% MDGS, 10% MDGS (10MDG), 20% MDGS (20MDG), 30% MDGS (30MDG), 40% MDGS (40MDG), and 50% MDGS (50MDG) on a DM basis. As MDGS level increased across treatments the 1:1 ratio of dry-rolled corn (DRC) and high moisture corn (HMC) decreased. All diets included alfalfa hay and supplement at 7.5% and 5% (DM basis) respectively. The supplement used for CON and 10MDG treatments were formulated to provide 13.5% CP using 1.28% and 0.64% urea, respectively. Corn gluten meal (CGM) was added for the first 100 days for CON and 50 days for 10MDG to meet metabolizable protein (MP) requirements. Supplements were formulated to provide Rumensin (*Elanco Animal Health*) at 320 mg, Tylan (*Elanco Animal Health*) at 90 mg, and thiamine at 150 mg per steer daily.

Weekly feed ingredient samples were collected for DM analysis in a 60°C forced air oven for 48 hours. Steers were adapted to finishing diets using four diets fed for 3, 4, 7, and 7 days with alfalfa hay replacing corn. Steers were implanted on days 1 and 67 with Synovex® Choice (*Fort Dodge Animal Health*). Steers were slaughtered on day 176 at a commercial abattoir (*Greater Omaha Pack, Omaha, Neb.*). Hot carcass weights (HCW) and liver scores were collected on the day of slaughter. Following a 48-hour chill, USDA marbling score, 12th rib fat depth, and longissimus dorsi (LM) area were recorded. A calculated USDA yield grade (YG) was derived from HCW, fat depth, LM area, and a common 2.5% kidney-pelvic-heart-fat (KPH). Carcass adjusted performance was calculated using a common dressing percent of 63% to determine final BW, ADG, and feed conversion (F:G).

The feed efficiency difference between each MDGS treatment and the CON was calculated, divided by the feed efficiency of the CON treatment, as well as the percentage of MDGS in the diet to give a feeding value of MDGS relative to feeding corn.

The MDGS used for this experiment was procured from U.S. BioEnergy Platte Valley (Central City, Neb.). The DM of MDGS was 48.8% and CP averaged 31.0%.

Data were analyzed using the Proc MIXED procedure of SAS. Pen was the experimental unit and treatments were analyzed as a randomized complete block design. Orthogonal polynomial contrasts were constructed to evaluate a response curve (linear and quadratic) for MDGS level.

Results

Performance and carcass characteristics are presented in Table 1. Seven steers died on experiment, five for respiratory and two bloat/digestive upsets. These steers were fairly evenly distributed across treatments (1 CON, 1 10MDG, 2 20MDG, 2 30MDG, and 1 50MDG), and were probably related to harsh winter feeding conditions. Carcass adjusted final BW responded

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Table 1. Yearling steer finishing feedlot performance when fed varying levels of MDGS.[a]

	CON	10MDG	20MDG	30MDG	40MDG	50MDG	SEM	Lin[b]	Quad[c]
Performance									
Initial BW, lb	748	749	748	745	747	748	27	0.32	0.32
Final BW[d] lb	1395	1411	1448	1439	1418	1398	38	0.82	<0.01
DMI, lb/day	23.0	23.1	23.5	23.2	22.8	21.6	0.7	0.03	0.01
ADG, lb	3.67	3.75	3.97	3.94	3.81	3.69	0.10	0.73	<0.01
F:G[e]	6.23	6.11	5.90	5.87	5.94	5.82		<0.01	0.28
Carcass Characteristics									
HCW, lb	879	889	912	906	893	881	24	0.82	<0.01
Dressing percent[f]	63.7	63.4	64.1	64.5	63.5	64.0	0.3	0.32	0.32
Marbling score[g]	520	513	538	498	505	490	17	0.10	0.42
12th Rib fat, in	0.57	0.57	0.61	0.62	0.57	0.54	0.04	0.54	0.12
LM Area, in^2	12.8	12.5	12.8	12.8	12.7	12.7	0.2	0.98	0.97
Calculated yield grade [h]	3.68	3.91	3.92	3.91	3.84	3.64	0.17	0.69	0.04

[a]Dietary treatment levels (DM basis) of MDGS, CON= 0% MDGS, 10MDG= 10% MDGS, 20MDG= 20% MDGS, 30MDG= 30% MDGS, 40MDG= 40% MDGS, 50MDG=50% MDGS.
[b]Contrast for the linear effect of treatment P-Value.
[c]Contrast for the quadratic effect of treatment P-Value.
[d]Calculated from hot carcass weight, adjusted to a 63% yield.
[e]Calculated from total gain over total DMI, which is reciprocal of F:G.
[f]Calculated from hot carcass weight divided by final live BW with a 4% shrink.
[g]450 = Slight 50, 500 = Small 0.
[h]Where yield grade = 2.5 + 2.5(Fat thickness, in) – 0.32(LM area, in^2) + 0.2(KPH fat, %) + 0.0038(hot carcass weight, lb).

quadratically ($P < 0.01$) as MDGS inclusion increased. DMI showed a quadratic response ($P = 0.01$), with 20MDG having the greatest intakes. Similarly, a quadratic response ($P < 0.01$) was observed with ADG as MDGS inclusion increased from 0% to 50% of the diet (Figure 1). Cattle fed 20MDG produced the greatest ADG. Feed conversion (Figure 1) showed a linear improvement ($P < 0.01$) with optimum conversion observed when cattle were fed 50MDG. Calculated feeding value of MDGS relative to HMC/DRC was greatest for 10MDG and decreased as MDGS increased to 50% of diet DM (123% to 109% the feeding value of corn, respectively). HCW responded quadradically ($P < 0.01$) as MDGS inclusion increased in the diet with 20MDG cattle having the heaviest carcasses. The calculated YG responded quadratically ($P < 0.05$) with the 20MDG cattle having the highest YG. Fat depth and marbling score were not affected by diet suggesting that all cattle were finished to similar endpoints.

In summary, MDGS has 109% to 123% the feeding value of corn in feedlot finishing diets. When cattle were fed increasing levels of MDGS, ADG was greatest at 20% to 30% MDGS inclusion, and F:G was lowest at 40% to 50% MDGS dietary inclusion. Finishing diets including MDGS may be fed up to 50% of diet DM, with optimal performance at 20% to 40% of diet DM.

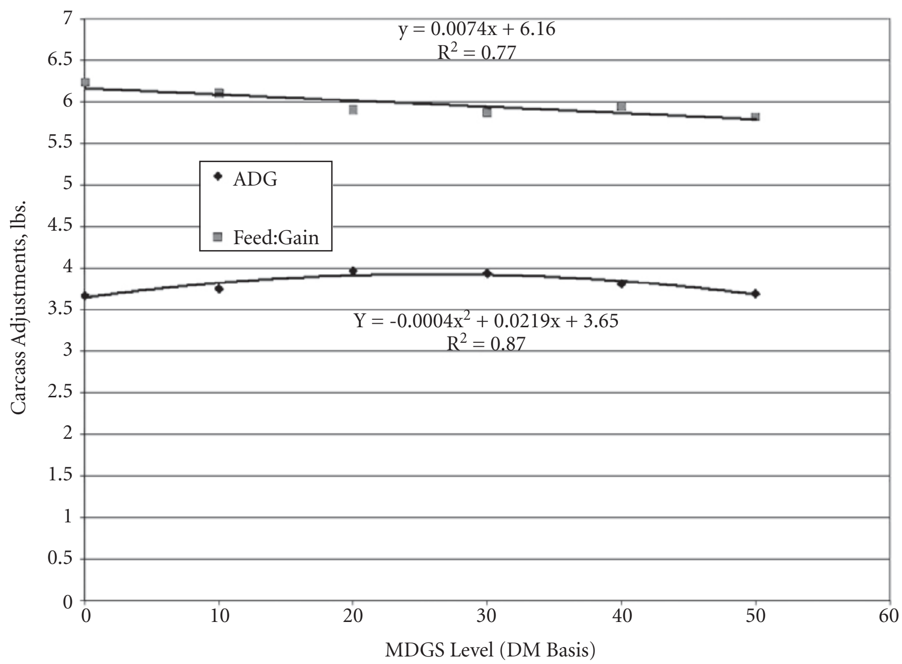

Figure 1. Carcass adjusted ADG and F:G relative to MDGS inclusion.

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