Effect of Distillers Grains on Natural vs. Conventional Supplements and Production Methods on Feedlot Performance, and Carcass Characteristics

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Abstract
This trial was initiated to determine the effects of natural production methods for beef cattle during the finishing period versus conventional management in diets containing 20 percent modified distillers grains with solubles (MDGS). Seventy-two backgrounded steers were assigned to one of two treatments: 1) conventionally (CON) managed calves received growth promotants (implants/ ionophores) and antibiotics if required and 2) natural (NAT) calves were not given growth promotants or antibiotics. In place of the ionophore in the natural diet, a supplement comprised of a commercially-produced, live yeast, *Saccharomyces cerevisiae,* was included in the totally-mixed ration. Overall the steers managed and fed conventionally consumed more feed, were heavier and had greater average daily gains compared to naturally-managed calves ($P < 0.0001$). Efficiency overall for pounds of feed/ pound of gain was significantly different due to treatment ($P = 0.02$) and hot carcass weight, REA, and KPH were all significantly affected ($P < 0.04$) by treatment. Backfat was not affected by treatment ($P = 0.48$). Yield grade was not significantly different due to treatment ($P = 0.53$). However, NAT steers had higher marbling score ($P = 0.02$).

Introduction
Growth in the ethanol industry has increased the amount of distillers grains available for feed. Natural beef production has become of interest and demand. Natural beef, which must meet the criteria of "never-ever" receiving implants, ionophore or antibiotics, and reasonably priced ethanol byproducts could allow North Dakota's cattlemen to create a natural cattle feeding industry within the state.

Materials and Methods
Seventy-two black Angus steers were backgrounded at the Hettinger Research Extension Center and shipped to the Carrington Research Extension Center for finishing. Upon arrival at Carrington, the steers were allotted in one of two production management treatments: natural (NAT) in which the steers received no implants, antibiotics or ionophores, or conventional (CON) in which the steers were managed receiving all common conventional finishing practices. Finishing diets (65 Mcal/lb.) were formulated to meet or exceed NRC (1996) nutritional beef cattle recommendations (Table 1).

Steers fed the finishing diet including 20% MDGS with natural or conventional supplement.

Table 1. Finishing ration with 20% MDGS in natural and conventional diets.

	----------% DM----------	
Item	Conventional	Natural
Corn	58.40	58.71
Canola	2.89	2.93
MDGS	22.19	22.29
Silage	7.21	7.56
Straw	7.58	7.65
$CaCO_3$	0.50	0.57
Ionophore	1.21	-
Natural Suppl	-	0.28

The finishing ration was formulated to contain a minimum of 20 percent modified distillers grains with solubles (MDGS) and to include a conventional supplement in the form of an ionophore at 300 mg/hd/d, or a natural yeast-based supplement *Saccharomyces cerevisiae* at 400 mg/hd/day. Steers were fed once daily ad libitium and had free access to fenceline waterers. Steers were weighed every 28 d and feed delivery was recorded daily until harvest. Conventional steers were re-implanted with a terminal trenbolone acetate (TBA) commercial implant. Steers were harvested when cattle were observed to have obtained 60 percent choice by trained CREC personnel. Steers in the CON treatment reached this visible appraisal 13 d earlier than the NAT steers, so steers were harvested by treatment block 13 d apart.

Results

Growth Performance and Efficiency

Dry matter intake for all periods except period one was significantly different (Table 2). Overall the steers managed and fed conventionally consumed 24.63 pounds/hd/d where as the natural consumed only 21.50 ± 0.62 pounds/hd/d. Final body weight ($P < 0.0001$) was 1383.15 vs. 1296.40 ± 13.89 pounds for CON versus NAT, respectively. Overall ADG ($P< 0.0001$) was 3.97 vs. 3.26 ± 0.07 pounds for CON versus NAT treatments. Anderson et al. (2008) did not report significant differences in DMI or ADG in cattle managed conventionally versus naturally, but did report differences in efficiency in favor of the ionophore supplement that was comprised of *yucca schidigera* extract and cobalt. Efficiency overall for pounds of feed/ pound of gain was significantly different due to treatment ($P = 0.02$; CON 6.18 vs. NAT 6.60 ± 0.15). Gain pounds / feed pounds was not significantly different overall ($P = 0.09$; 0.16 vs. 0.15 ± 0.01) for CON versus NAT, respectively.

Table 2. Intake gain and efficiency of calves fed using natural or conventional production methods.

Item	Conventional	Natural	St. Error	P-value[a]
Weight, lb.				
Initial Wt., Feb 11	856.31	832.53	7.50	0.010
Period 1, Mar. 11	974.74	927.49	12.86	0.004
Period 2, Apr 8	1114.82	1033.11	12.70	<0.0001
Period 3, May 7	1237.28	1126.21	13.86	<0.0001
Final Wt. (Period 4)	1383.15	1296.40	13.89	<0.0001
Dry Matter Intake, lb./hd/day				
Period 1	19.62	18.50	0.96	0.271
Period 2	25.03	20.53	1.10	0.002
Period 3	25.32	23.38	0.70	0.020
Period 4	27.45	23.00	0.68	<0.0001
Overall	24.63	21.50	0.66	0.001
Average Daily Gain, lb./hd/day				
Period 1	4.23	3.39	0.32	0.028
Period 2	5.00	3.77	0.26	0.001
Period 3	4.22	3.20	0.17	0.000
Period 4	3.65	3.21	0.12	0.005
Overall	3.97	3.26	0.07	<0.0001
Feed Efficiency				
Feed (DM)/Gain				
Period 1	4.67	5.53	0.34	0.030
Period 2	5.03	5.47	0.37	0.268
Period 3	6.00	7.33	0.35	0.003
Period 4	7.53	7.20	0.31	0.312
Overall	6.18	6.60	0.15	0.021
Gain/Feed (DM)				
Period 1	0.22	0.18	0.01	0.023
Period 2	0.20	0.19	0.01	0.282
Period 3	0.17	0.14	0.01	0.000
Period 4	0.14	0.14	0.00	0.615
Overall	0.16	0.15	0.00	0.095

[a] *P*-values < 0.05 are considered significant.

Carcass

Carcass quality traits are reported in Table 3. Hot carcass weight, REA, and KPH were all significantly affected (*P* < 0.04*)* by treatment. Conventionally-managed cattle had a greater HCW than the NAT (860.7 vs. 764 ± 6.36 lbs.) and greater REA (14.00 vs. 12.96 ± 0.12 sq in). Backfat, also, was not affected by treatment (*P* = 0.48). Final yield grade is a composite calculated score which encompasses fat cover, HCW, KPH and REA to determine the ratio of muscle to fat of the carcass which was not found to be significantly different due to treatment (*P* = 0.53). However, NAT versus CON steers had greater marbling score (515.8 vs. 487.3). Berthiaume et al. (2006) reported similar quality grade results in steers receiving growth promotants in a conventional production scenario versus a natural system. Anderson et al. (2008) reported that steers fed a natural supplement had similar carcass characteristics of those receiving an ionophore.

Table 3. Carcass performance of calves fed MDGS using natural or conventional production methods.

Item	Conventional	Natural	St. Error	P-value[a]
HCW lb.	860.72	764.00	6.36	<0.0001
Marbling in.[b]	487.27	515.82	7.52	0.023
Back Fat	0.58	0.53	0.05	0.390
Ribeye area, sq. in.	14.00	12.97	0.12	0.000
Kidney, pelvic, heart[c]	2.42	2.63	0.07	0.043
Final YG[d]	3.25	3.12	0.15	0.534

[a] *P*-values < 0.05 are considered significant.

[b] Marbling score is based on intramuscular fat in the ribeye, 300-399 = select; 400-499 = low choice.

[c] Kidney, pelvic, heart fat is estimated as a percent of carcass weight.

[d] Yield grade is a composite score for describing the proportion of muscle to fat in the carcass. It is based on several criteria and used for determining value. Low numbers indicate a very lean carcass, high numbers a fat carcass.

Summary

In summary, steers that were managed using modern conventional production practices had a greater live weight, DMI and ADG, but a lower feed to gain ratio than steers finished naturally without the use of implants or ionophores. Hot carcass weights of the CON steers were significantly heavier than NAT, with CON steers having larger ribeye areas. No difference across treatments was seen for backfat and yield grade. However, NAT steers had better marbling score.

Acknowledgements

The authors would like to thank Ivy Natural Solutions, Overland Park, KS, for their donation of the ProTernative Continuous Fed yeast product and Intervet, Millsboro, DE, for their donation of the Revalor implants.

Partial support for this research was provided by the U.S. Department of Agriculture-Agricultural Research Service Northern Great Plains Research Laboratory, Mandan, ND. Specific Cooperative Agreement No. 58-5445-7-315. *Disclaimer: Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.*

Literature Review

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