Effect of Feeding More Than 70% Wet Distillers Grains Plus Solubles On Feedlot Cattle Performance

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Summary

A finishing trial evaluated effects of feeding greater than 70% wet distillers grains plus solubles (WDGS) on feedlot cattle performance. The WDGS was fed at 40, 70, 77, and 85% of diet dry matter (DM), while roughage levels ranged from 5 to 25% across treatments. Larger ADG and G:F were observed with 40% WDGS and 5% roughage. Higher levels of WDGS were successfully fed with levels of roughage above 8% but the diets were less profitable than the 40% WDGS diet.

Introduction

Replacing corn up to 50% of diet DM as WDGS resulted in superior performance compared to cattle fed 0% WDGS (*2010 Nebraska Beef Cattle Report,* pp. 61-62). The feeding value was consistently greater for WDGS up to 50% of diet DM, compared to corn. Incidences of polioencephalomalacia (polio) increased slightly when cattle were fed diets above 0.46% sulfur and dramatically increased when greater than 0.56% with roughages at 5-7% (*2009, Nebraska Beef Report,* pp. 79-80*; 2010 Nebraska Beef Cattle Report*, pp. 68-69). Polio risk is decreased when roughage level is maintained or increased in the ration. Another trial (*2009, Nebraska Beef Cattle Report,* pp. 76-78) determined effects of feeding WDGS with or without corn on feedlot performance. The objectives of our study were to evaluate the effects of feeding increased amounts of WDGS with typical or increasing levels of roughage on feedlot cattle performance and economics.

Procedure

A finishing study was conducted using 336 crossbred steers (BW = 741 ± 20 lb) that were assigned randomly (8 steers/pen) in a randomized complete block design. Two consecutive day individual weights were collected for initial BW. Cattle were stratified by BW within respective weight block and assigned randomly to 42 pens. Seven treatments included: 1) control (CON) of 85% dry-rolled corn (DRC), 4.7% wheat straw, and 5.0% molasses; 2) (40-5) 40% WDGS, 50.3% DRC, and 4.7% wheat straw, ; 3) (70-8) 70% WDGS, 16.8% DRC, and 8.2% wheat straw; 4) (77-9) 77.5% WDGS, 8.4% DRC, and 9.1% wheat straw; 5) (85-10) 85% WDGS and 10% wheat straw; 6) (77-17) 77.5% WDGS and 17.5% wheat straw; 7) (70-25) 70% WDGS and 25% wheat straw all on a DM basis. Table 1 provides DM, fat, CP, and S of WDGS used in this trial. All diets contained a supplement at 5.0%, which was to keep the Ca:P ratio at a minimum of 1.2 to 1. Supplements also were formulated to provide Rumensin at 30 g/ton DM , Tylan at 90 mg/steer/day, and thiamine at 130 mg/steer/day.

An adaptation period of 21 days was utilized and steers received Revelor-XS on day 1 of the feeding trial. Steers on treatments CON, 40-5, 70-8, and 77-17 were fed for 183 days, from November to May, and steers on treatments 85-10, 77-17, and 70-25 were fed for 225 days, from November to June, to achieve similar final BW. Steers were harvested at a commercial abattoir (*Greater OmahPack, Omaha, Neb.*). Hot carcass weights (HCW) and liver scores were collected on the day of slaughter. After a 48-hour chill, LM area, 12th rib fat thickness, and USDA marbling scores were recorded. USDA yield grade (YG) was calculated from HCW, fat depth, LM area and an assumed 2.5% kidney, pelvic, and heart fat (KPH). A common dressing percentage (63%) was used to calculate carcass adjusted performance of final BW, ADG, and feed efficiency.

Weekly feed samples were taken for DM analysis using a 60 forced air oven for 48-hours. Composite samples for each ingredient over the feeding period were analyzed for CP, fat, and sulfur (S).

Finishing Economics

Budgets were created for all seven diets using the average 2008 five-area yearly weighted direct slaughter steer live price from USDA Market News Service ($93.13/cwt). Initial steer price was calculated as the average initial BW of pens multiplied by $126.39/cwt to make the CON steers profit equal zero. The price of corn was set at $3.50/bu, WDGS price was constant at 85% the price of corn, and wheat straw was constant at $72.70/DM ton (delivered and processed). Yardage was charged at $0.40 per steer daily with health and processing costs of $20 per steer and a death loss of 1.5%. Interest was estimated as 8.0% for feed costs and initial steer cost. Total production costs included total feed costs with interest; all health, processing, and death loss costs; and initial

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Table 1. Composition of diets.

	Corn				No corn		
Ingredient	CON	40-5	70-8	77-9	85-10	77-17	70-25
WDGS[1]	—	40	70	77-5	85	77.5	70
DRC[2]	85	50.3	16.8	8.4	—	—	—
Wheat straw	4.7	4.7	8.2	9.1	10	17.5	25
% Sulfur	0.11	0.41	0.63	0.68	0.74	0.68	0.63
% Fat	3.61	7.23	9.66	10.26	10.80	9.90	9.00

[1]WDGS = wet distillers grains plus soluble.
[2]DRC = dry-rolled corn.

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steer cost with interest. Cost of gain (COG) was calculated by dividing total finishing cost by average gain per pen. Slaughter breakeven (BE) was calculated by dividing the total cost of production by the carcass-adjusted final BW. Profit or loss (P/L) was calculated by subtracting the total cost of production from the final steer value.

Statistical Analysis

All data were analyzed using MIXED procedures of SAS as a randomized complete block design with pen as the experimental unit. The effects of treatment and block were included in the model. Treatment means were compared using a protected F-test and means separation when the F-test statistic was significant.

Results

Performance Results

Two steers were pulled from the trial for respiratory illness, and no steers were diagnosed with polio. Cattle performance data are summarized in Table 2. Treatments 85-10, 77-17, and 70-25 were fed for a total of 225 days to achieve similar final BW, where treatments CON, 40-5, 70-8, and 77-9 were fed for 183 days. Steers fed the 40-5 had the greatest ($P < 0.01$) ADG, F:G, and HCW; however, F: G was similar to steers fed the 77-9. Steers fed 70-25 had the least ($P < 0.01$) ADG, F:G, and HCW. DMI was the greatest ($P < 0.05$) for the 40-5 and CON followed by the 70-8 and 77-17 steers, 77-9, and lastly the 70-25 and 85-10 steers. Steers being fed the CON, 70-8, and 77-9 had similar ADG, followed by steers fed 77-17, then 85-10, which were different ($P < 0.01$). Steers fed CON, 85-10, and 77-17 had similar G:F ($P > 0.10$) but less ($P < 0.05$) than 40-5, 70-8, and 77-9. However, steers fed 85-10, 77-17, and 70-25 were fed 42 days longer. Carcass characteristics also are reported in Table 2. Overall, 40-5 had the greatest and 70-25 had the least marbling scores, LM area, 12th rib fat, and YG when compared to the other treatments. Marbling score was greatest ($P < 0.05$) for CON and 40-5, least ($P < 0.05$) for 70-25, and intermediate for the other treatments. Fat depth at the 12th rib was greatest for the 40-5 treatment, followed by the intermediate treatments and CON having subtle differences. The lowest rib fat was observed for cattle fed the 70-25 treatment.

Table 2. Performance results for treatments.

Dietary Treatment[1]:	CON	40-5	70-8	77-9	85-10	70-17	70-25	SEM
Performance								
DOF	183	183	183	183	225	225	225	—
Initial BW, lb	594	595	593	593	595	593	593	9
Final BW, lb	1254[b]	1389[a]	1261[b]	1246[b]	1242[b]	1282[b]	1153[c]	15
DMI, lb/day	22.6[b]	22.9[a]	20.2[b]	19.1[c]	17.8[d]	19.1[bc]	18.2[d]	0.24
ADG, lb	3.60[a]	4.33[a]	3.65[b]	3.57[b]	2.88[d]	3.07[c]	2.49[e]	0.06
F:G	6.25[b]	5.29[a]	5.52[b]	5.35[ab]	6.17[c]	6.37[c]	2.63[d]	—
Carcass Characteristics								
HCW, lb	790[b]	875[a]	795[b]	785[b]	783[b]	807[b]	726[c]	9.62
Marbling score	525[a]	523[a]	491[b]	468[bc]	457[c]	467[bc]	404[d]	9.12
LM area, in^2	12.35[ab]	12.[9a]	12.22[bc]	12.10[bc]	11.63[c]	11.75[c]	11.97[bc]	0.002
12th rib fat, in	0.42[c]	0.61[a]	0.48[bc]	0.44[bc]	0.43[c]	0.5[b]	0.27[d]	0.02
YG	3.0[de]	3.7[a]	3.4[bc]	3.2[cde]	3.3[cd]	3.6[ab]	2.5[f]	0.1

[1]CON = control diet of 85% DRC; 40-5 = 40% WDGS and 5% wheat straw; 70-8 = 70% WDGS and 8% wheat straw; 77-9 = 77% WDGS and 9% wheat straw; 85-10 = 85% WDGS and 10% wheat straw; 77-17 = 77% WDGS and 17% wheat straw; 70-25 = 70% WDGS and 25% wheat straw.
[a,b,c,d,e,f]Within a row, means without common superscript differ (P<0.05).

Table 3. Effect of Inclusion of WDGS on economics when corn is $3.50/bu and WDGS is 85% the price of corn.

	Treatments[1] (%DM)						
Dietary Treatments[1]	CON	40-5	70-8	77-9	85-10	77-17	70-25
BE, $/cwt[2]	93.13	84.18	89.87	89.52	95.42	91.73	101.20
P/L, $/head[3]	0.00	124.33	54.61	45.02	-28.42	17.97	-93.04
COG, $/cwt[4]	64.00	52.90	55.35	55.94	67.58	61.90	75.02

[1]CON = control diet of 85% DRC; 40-5 = 40% WDGS and 5% wheat straw; 70-8 = 70% WDGS and 8% wheat straw; 77-9 = 77% WDGS and 9% wheat straw; 85-10 = 85% WDGS and 10% wheat straw; 77-17 = 77% WDGS and 17% wheat straw; 70-25 = 70% WDGS and 25% wheat straw.
[2]Breakeven (BE) = (initial steer cost ($126.39/cwt) + feed cost[5] + interest[6] + health&processing[7] + yardage[8] + deathloss[9]) / FW.
[3]Profit/Loss (P/L) = final steer value ($93.13/cwt) – (initial steer cost ($126.39/cwt) + feed cost[5] + interest[6] + health & processing[7] + yardage[8] + deathloss[9]).
[4]Cost of Gain (COG) = (feed cost[5] + interest[6] + health&processing[7] + yardage[8] + deathloss[9]) / (FW-IW).
[5]Feedcost = DRC($3.50/bu); WDGS ($125/DM ton); Wheat straw ($72.70/DM ton).
[6]Interest = 8.0% interest applied to initial steer value (initial BW * $126.39/cwt) and to feed costs.
[7]Health & Processing = $20/steer applied
[8]Yardage = $0.40/steer/d applied
[9]Death loss = 1.5% death loss applied

Economic Results

When corn is priced at $3.50/bu and WDGS is 85% the cost of corn, then the 70-25 treatment had the greatest breakeven value at $101.20. The 40-5 treatment had the lowest breakeven value at $84.18/cwt, followed by the 77-9, 70-8, 77-17, CON, and lastly 85-10. When CON is equal to zero, the greatest loss is seen with the 70-25 treatment at -$93.04/head followed by 85-10, and the greatest profit is observed with the 40-5 treatment with $124.33 followed by the 70-8, 77-9, and lastly the 77-17. Likewise, COG was greatest for the 70-25 treatment, followed by the 85-10, and 77-17 due to these treatments having lower final BW and extended DOF. The 40-5 treatment has the least COG, followed by the 70-8 and 77-9, which were similar, and lastly CON with a COG at $64.00/cwt. Treatments with the blend of WDGS and some inclusion of corn (70-8, 77-9) had greater profit, lower COG, and lower breakeven prices than the treatments with no corn (85-10, 77-17, 70-25) or the CON treatment.

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