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# Dried distiller's grains in steam-flaked corn finishing diets with decreased roughage levels

## Abstract

Distiller's grains are the primary coproduct derived from fuel ethanol production. As the fuel ethanol industry expands into the High Plains, distiller's grains are becoming increasingly available as an alternative feed for livestock. Optimizing the use of distiller's grains in flaked grain rations is important to maintaining a competitive advantage among feedlot producers in this region. Because distiller's grains are relatively high in fiber, it is conceivable that the level of roughages in feedlot diets could be reduced when distiller's grains are fed to cattle. Roughages normally have low energy density; therefore, the cost per unit of energy from roughages usually is relatively high compared with cereal grains or grain co-products. If the use of distiller's grains would allow roughage levels to be decreased in finishing diets without deleterious consequences for health or performance, this generally would be viewed as a positive attribute. Our objective was to evaluate performance of feedlot cattle fed diets with and without distiller's grains, and assess the effect of reducing the level of added roughage in diets containing distiller's grains.

## Keywords

Cattlemen's Day, 2008; Kansas Agricultural Experiment Station contribution; no. 08-212-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 995; Beef; Cattle; Corn finishing diets; Decreased roughage levels

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## **DRIED DISTILLER'S GRAINS IN STEAM-FLAKED CORN FINISHING DIETS WITH DECREASED ROUGHAGE LEVELS**

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### **Introduction**

Distiller's grains are the primary co-product derived from fuel ethanol production. As the fuel ethanol industry expands into the High Plains, distiller's grains are becoming increasingly available as an alternative feed for livestock. Optimizing the use of distiller's grains in flaked grain rations is important to maintaining a competitive advantage among feedlot producers in this region. Because distiller's grains are relatively high in fiber, it is conceivable that the level of roughages in feedlot diets could be reduced when distiller's grains are fed to cattle. Roughages normally have low energy density; therefore, the cost per unit of energy from roughages usually is relatively high compared with cereal grains or grain co-products. If the use of distiller's grains would allow roughage levels to be decreased in finishing diets without deleterious consequences for health or performance, this generally would be viewed as a positive attribute. Our objective was to evaluate performance of feedlot cattle fed diets with and without distiller's grains, and assess the effect of reducing the level of added roughage in diets containing distiller's grains.

### **Experimental Procedures**

Crossbred-yearling heifers (n = 384) were used in a finishing experiment to compare three dietary treatments. Diets all contained

steam-flaked corn as the principal energy source. Dietary treatments (dry basis) included a control with 0% dried distiller's grains with solubles (DDGS) and 15% corn silage, and two diets containing 25% DDGS—one with 15% corn silage, and the other with only 5% corn silage. Heifers were fed in 24 pens with 15 to 16 cattle per pen and eight pens per treatment. Cattle were transitioned to finishing diets using a series of step-up rations. Final finishing diets were fed twice daily for a period of 85 days. The weight of each pen was measured at the start of the study and again immediately before transporting to a commercial abattoir in Emporia, KS. At harvest, incidence and severity of liver abscesses and hot carcass weight were recorded. After a 24-hour chill, USDA yield grade; USDA quality grade; marbling score; 12th-rib fat thickness; kidney, pelvic and heart fat; rib-eye area; and incidence of dark cutting beef were recorded for each animal.

### **Results and Discussion**

Cattle fed the diet containing 25% DDGS with 15% corn silage had feedlot performance equal to that of cattle fed the control diet without DDGS. Carcass attributes were mostly unchanged when distiller's grains were substituted for flaked corn, except that cattle fed 25% DDGS produced a greater percentage of yield grade 4 and yield grade 5 carcasses. These results are consistent with observations

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in previous experiments, in which cattle fed DDGS tended to deposit greater amounts of body fat. Feeding DDGS had no negative effect on quality grade. In fact, the percentage of carcasses that graded USDA Choice or better was numerically greater when cattle were fed diets with DDGS. No other notable effects on carcass characteristics were observed in this study.

Reducing levels of corn silage from 15% to 5% reduced feed intake by approximately 5% in cattle fed DDGS compared with cattle fed the control diet without DDGS. Gains were numerically lower and efficiencies were

slightly improved by feeding the lower roughage level, though these differences were not statistically significant. Cattle fed the low-roughage diet maintained carcass attributes similar to those in other treatments.

### Implications

When corn silage is used as the roughage source, dried distiller's grains are an effective replacement for steam-flaked corn. When dried distiller's grains are added to finishing diets, it might be feasible to decrease roughage levels with no deleterious effects on cattle performance or carcass quality.

**Table 1. Composition of Experimental Diets Fed to Finishing Heifers. Diets Contained Steam-flaked Corn with 15% Corn Silage, 15% Corn Silage plus 25% Corn Distiller's Grains with Solubles (DDGS) or 5% Corn Silage with 25% DDGS**

Item, % dry matter	Steam-flaked corn		
	0% DDGS	25% DDGS	25% DDGS
	15% Silage	15% Silage	5% Silage
Steam-flaked corn	75.30	55.52	65.76
Corn silage	14.81	14.85	4.94
DDGS	-	24.72	24.67
Soybean meal	4.32	-	-
Urea	1.17	0.33	0.16
Limestone	1.58	1.85	1.81
Mineral/vitamin supplement <sup>1</sup>	0.68	0.58	0.51
Feed additive premix <sup>2</sup>	2.14	2.15	2.15
Nutrients			
Crude Protein	13.90	14.27	14.02
Calcium	0.59	.57	0.63
Phosphorus	0.23	0.39	0.37
Ether extract	3.24	4.81	5.23
Neutral detergent fiber	9.75	18.35	11.80

<sup>1</sup>Mineral/vitamin supplement formulated to provide (dry basis) 1,200 IU/lb Vitamin A, 0.15 ppm cobalt, 10 ppm copper, 0.5 ppm iodine, 60 ppm zinc, 60 ppm manganese, and 0.25 ppm selenium.

<sup>2</sup>Provided 300 mg Rumensin, 90 mg Tylan, and 0.5 mg MGA/day in a ground corn carrier.

**Table 2. Performance Characteristics for Heifers Fed Steam-flaked Corn-based Finishing Diets with Reduced Corn Silage Levels and 25% Corn Dry Distiller's Grains with solubles (DDGS)**

Item	Steam-flaked corn			SEM
	0% DDGS	25% DDGS	25% DDGS	
	15% Silage	15% Silage	5% Silage	
Number of pens	8	8	8	-
Number of heifers	125	126	126	-
Initial weight, lbs	835	831	831	7.57
Final weight, lbs <sup>1</sup>	1082	1074	1072	9.21
DMI, lb <sup>1</sup>	19.87 <sup>a</sup>	19.34 <sup>ab</sup>	18.79 <sup>b</sup>	0.32
ADG, lb <sup>1</sup>	2.91	2.85	2.83	0.07
Feed/gain <sup>1,2</sup>	6.85	6.79	6.65	0.14

<sup>1</sup>Final live weight was computed by taking hot carcass weight divided by 63.5 dressing percentage.

<sup>2</sup>Statistics were performed as gain:feed, reported as feed:gain.

<sup>ab</sup>Means within a row without a common superscript letter differ (P<0.05).

**Table 3. Carcass Characteristics for Heifers Fed Steam-flaked Corn-based Finishing Diets with Reduced Corn Silage Levels and 25% Corn Dry Distiller's Grains with Solubles (DDGS)**

Item	Steam-flaked corn			SEM
	0% DDG	25% DDG	25% DDG	
	15% Silage	15% Silage	5% Silage	
Hot carcass weight, lb	687	682	681	5.84
Dressing percent	63.23 <sup>a</sup>	63.46 <sup>ab</sup>	63.73 <sup>b</sup>	0.20
USDA quality grade				
Prime, %	0.78	0.00	0.00	0.45
Upper 2/3 choice, %	15.26	12.55	9.53	2.73
Choice, %	55.11	62.24	61.93	4.00
Select, %	40.10	37.76	36.46	3.88
No roll, %	1.62	0.00	0.78	0.74
Low grade, %	0.78	0.00	0.00	0.45
Dark cutter, %	0.83	0.00	0.83	0.70
Marbling score <sup>1</sup>	517	505	503	8.66
Average yield grade	2.62	2.74	2.66	0.07
Calculated yield grade	2.67 <sup>c</sup>	2.90 <sup>d</sup>	2.72 <sup>cd</sup>	0.09
Yield grade 1, %	2.40	1.56	1.62	1.02
Yield grade 2, %	39.27	36.35	39.11	4.50
Yield grade 3, %	53.49	47.92	48.18	4.78
Yield grade 4 and 5 %	5.68 <sup>c</sup>	14.12 <sup>d</sup>	11.09 <sup>cd</sup>	2.87
Liver abscess, %	1.62	3.96	6.30	1.65
Kidney, pelvic, heart fat, %	2.24	2.28	2.27	0.04
Back fat 12 <sup>th</sup> -rib, inches	0.55	0.58	0.56	0.02
Rib eye area, square inches	13.34	12.79	13.15	0.17

<sup>1</sup>Marbling Score 500=Small.

<sup>ab</sup>Means within a row without a common superscript letter differ (P<0.05).

<sup>cd</sup>Means within a row without a common superscript letter differ (P<0.10).