Influence of Two Fat Levels of Dry Distillers Grains in Diets with Corn or Barley on Steer Growing and Finishing Feedlot Performance

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Introduction

Corn distillers grain is produced at multiple ethanol plants in North Dakota. Primarily three moisture levels of corn distillers grain product are available: dry (~90-95% dry matter, DDGS), modified (49-52% dry mater, MDGS) or wet (< 48% dry matter; WDGS). A portion of the distillers grains produced in North Dakota is fed in the state but the majority is exported to other locations within the United States, Canada, and other international locations. The current process typically involves a step to remove corn oil (fat) during ethanol production. This oil removal may alter the nutrient density of the resulting distillers grain feedstuff, which in turn could affect animal performance.

Methods

A 189-day (d) growing (57 d) and finishing (132 d) study using 154 crossbred steers, initial body weight (BW) of 684 lbs., evaluated the effects of corn or barley and two fat levels of dry distillers grains with solubles (DDGS) on growing and finishing cattle performance. Steers were blocked by initial BW into four blocks and assigned randomly to one of 16 pens and one of four dietary treatments within block, in the 2 x 2 factorial study. Grain type (corn or barley), as one factor, was fed at 30 percent and 51 percent of the diet dry matter (DM) in the growing and finishing diets, respectively. Two fat levels of dry distillers grains (DDGS; med-fat, 9.6% or low-fat, 5.8% fat) were included as the other factor and fed at 26 percent diet DM for growing and finishing diets. Growing diets included 19 percent grass hay, 22 percent corn silage, and 3 percent supplement (DM basis). Finishing diets included 20 percent corn silage, and 3 percent supplement (DM basis; Tables 1 and 2). Steers were weighed on d 0 and every 28 d until harvest.

Table 1. Growing diets for steers fed two fat levels of dry distillers grains (DDGS) and corn or barley.

	Medium Fat		Low Fat	
Ingredient, % Dry Matter	Barley	Corn	Barley	Corn
Barley	30.23	--	30.31	--
Corn	--	30.81	--	30.65
DDGS, Low Fat	--	--	25.55	25.48
DDGS, Med Fat	25.66	25.56	--	--
Corn Silage	22.07	21.88	22.02	21.84
Grass hay	18.6	18.44	18.46	18.37
Supplement	3.43	3.31	3.66	3.66
Diet Dry Matter, %	76.01	76.45	76.2	76.46
Crude Protien, %	15.25	14.16	15.24	14.15
NEg, Mcal/lb	49.07	51.78	47.54	50.14
Fat, %	4.12	4.61	3.14	3.62

Table 2. Finishing rations for steers fed two fat levels of dry distillers grains (DDGS) and corn or barley.

	Medium Fat		Low Fat	
Ingredient, % Dry Matter	Barley	Corn	Barley	Corn
Barley	50.94	--	51.11	--
Corn	--	51.41	--	51.51
DDGS, Low Fat	--	--	25.89	25.76
DDGS, Med Fat	26.07	25.9	--	--
Corn Silage	19.48	19.36	19.4	19.31
Grass hay	0.73	0.76	0.72	0.62
Supplement	2.76	2.56	2.88	2.8
Diet Dry Matter, %	76.81	77.48	77.12	77.48
Crude Protien, %	16.31	14.48	16.3	14.46
NEg, Mcal/lb	56.52	60.9	54.98	59.35
Fat, %	4.2	5	3.2	4

Results

No grain type by DDGS fat level interactions were detected ($P \geq 0.29$). Initial and final BW for the growing ($P \geq 0.18$) and finishing phases ($P \geq 0.11$) were similar for low- and medium-fat DDGS (Table 3). Similarly, ADG, DMI, and gain: feed (G:F; lb BW gain/lb of feed consumed) were similar for growing ($P \geq 0.19$) and finishing ($P \geq 0.17$) phases for low- and medium-fat DDGS. Additionally, dressing percent, hot carcass weight (HCW), yield grade, Longissimus muscle area, marbling score, and back-fat did not differ among DDGS treatments ($P \geq 0.18$; Table 4).

Table 3. Growing and finishing performance of steers fed diets with two fat levels of dry distillers grains (DDGS) and corn or barley.

	Grain		DDGS			*P* -Value		Interaction
	Barley	Corn	LF	MF	SEM	Grain	DDGs	Grain x DDGS
No. Pens, n	8	8	8	8	.	.	.	.
Trial Start WT	689.75	682.38	682.63	689.50	3.38	0.16	0.18	0.70
Weight-d57[1]	873.12	856.50	860.13	869.50	7.96	0.17	0.43	0.37
Final weight[2]	1413.25	1393.25	1398.00	1419.00	12.86	0.30	0.11	0.40
ADG, d0-57	3.22	3.05	3.11	3.16	0.12	0.37	0.80	0.39
ADG, d57-end	4.05	4.11	4.03	4.13	0.07	0.80	0.33	0.42
ADG, d0-End	3.80	3.79	3.76	3.84	0.06	0.76	0.36	0.29
DMI,d 0-57	17.75	18.19	17.33	18.61	0.65	0.65	0.19	0.50
DMI, d57-end	21.68	23.37	22.09	22.97	0.42	0.02	0.17	0.35
DMI, d0-End	20.51	21.83	20.67	21.67	0.40	0.05	0.12	0.32
Feed:Gain, d0-57	5.53	5.93	5.59	5.88	0.18	0.15	0.29	0.69
Feed:Gain, d57-End	5.34	5.70	5.47	5.57	0.10	0.07	0.26	0.72
Feed:Gain, d0-End	5.39	5.75	5.49	5.65	0.08	0.002	0.20	0.85
Gain:Feed, d0-57	0.182	0.172	0.182	0.172	0.006	0.26	0.26	0.73
Gain:Feed, d57-End	0.187	0.177	0.184	0.180	0.003	0.08	0.25	0.73
Gain:Feed, d0-End	0.185	0.175	0.183	0.178	0.003	0.002	0.19	0.76

[1]The growing diet was fed from day 0 to day 57. Finishing ration was fed from day 57 to day 180 for four heavy pens and day 194 for pens 12 remaining pens.

Cattle were marketed in two groups with the heavy block (4 pens) marketed 14 days prior to the last three blocks.

Table 4. Carcass performance for steers fed growing and finishing diets with two fat levels of dry distillers grains (DDGS) and corn or barley.

	Grain		DDGS			*P*-Value		Interaction
	Barley	Corn	LF	MF	SEM	Grain	DDGs	Grain x DDGS
No. Pens, n	8	8	8	8	.	.	.	.
Shrunk dressing percent	63.0	63.9	63.63	63.24	0.004	0.09	0.46	0.88
Hot carcass weight, lb	846	846	838.36	853.14	7.2	1.00	0.18	0.41
Yield grade[1]	3.06	3.18	3.10	3.14	0.12	0.47	0.85	0.73
Ribeye area, sq in.	13.6	13.5	13.55	13.53	0.18	0.55	0.94	0.09
Marbling number[2]	451	478	455	475	10.15	0.10	0.19	0.29
Backfat, in.	0.52	0.55	0.54	0.53	0.02	0.38	0.84	0.50

[1]Yield grade is a composite calculation of fat to lean yield in a carcass based on a relationship of hot carcass weight, ribeye area, fat thickness and KPH; low values = lean carcasses.

[2]USDA Quality grades based on scores of 300-399 = select, 400-499 = low choice, 500-599 = average choice, 600-699 = high choice, 700+ = prime.

Corn and barley had similar initial and final growing ($P \geq 0.16$) and finishing ($P \geq 0.17$) BW and ADG. Growing DMI was similar ($P = 0.37$) for corn and barley grain. However, cattle on the corn finishing diets had greater ($P = 0.02$) DMI than barley, resulting in similar ($P = 0.26$) growing phase G:F but a tendency ($P = 0.08$) for barley to be more efficient than corn in the finishing phase. Overall barley-fed steers had greater ($P = 0.002$) G:F than corn. The carcass parameters dressing percent, HCW, yield grade, LM area, marbling score and backfat (BF) were all similar ($P \geq 0.09$) for barley- and corn fed cattle.

Conclusions

Feeding low or medium fat DDGS at 26 percent of the diet DM, in the growing and finishing phases, appears to influence animal performance and carcass attributes similarly. When fed at similar diet DM levels, barley appears to provide a slight feed efficiency advantage over corn.