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Combinations of Steam-Flaked Corn, Dry-Rolled Corn, and Dried Distillers Grains Yield Beef with Similar yet Subtle Changes in Sensory Traits[1]

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Introduction

Rapid expansion of fuel ethanol production has made available abundant supplies of distillers grains with solubles, which are well-suited as a substitute for cereal grains in finishing cattle diets. Several recently reported experiments have revealed that feeding distillers grains may have adverse effects on carcass value as a result of the tendency to produce carcasses with lower quality grades and/or higher yield grades. The effects on quality grade have been most evident in flaked-grain diets, but effects on yield grade are more or less independent of the type of grain fed. In Kansas, two common methods for processing grains are steam flaking and dry rolling. Thus, feeding cattle distillers grains with different grain processing types is an important consideration for feedlots. Our experiment was designed to evaluate meat quality and composition in heifers fed flaked-corn diets containing dry-rolled corn and/or dried corn distillers grains.

Experimental Procedures

Crossbred yearling heifers (n = 689) were used in a finishing trial to evaluate the effects of feeding dry-rolled corn (DRC) and dried corn distillers grains with solubles (DDGS) in steam-flaked corn (SFC) diets. Diets consisted of SFC with 0 or 25% DDGS and 0 or 25% DRC (Table 1) in a 2 × 2 factorial arrangement of treatments. Heifers were blocked into light and heavy weight groups according to initial body weight and were fed in 28 dirt-surfaced pens with 23 to 25 head per pen. Heifers in the heavy and light weight blocks were fed once daily for 137 and 157 days, respectively. Four animals were randomly selected from each of 24 pens, and wholesale ribs were removed from one side of each carcass after a 24-hour chill. Ribeyes were collected from the rib sections and analyzed for color display life, lipid oxidation, and sensory attributes. Steaks (1-in. thick) were evaluated for color shelf life during a 7-day simulated retail display period as well as for purge loss during a 21-day aging period, weight loss during cooking, and lipid oxidation (TBARS). Sensory attributes were analyzed by the Department of Human Nutrition at Kansas State University on a 15-point scale. Traits analyzed were initial tenderness, juiciness, chewiness, beef flavor, residual connective tissue, mealy texture, fiber awareness, bloody/serumy flavors, metallic flavors, and rancidity.

[1] This project was funded in part by beef and veal producers and importers through their $1-per-head checkoff and was produced for the Cattlemen's Beef Board and state beef councils by the National Cattlemen's Beef Association.

[2] Dakota Gold Research Association, Sioux Falls, SD

Results and Discussion

Steaks from cattle fed the different diets did not differ in color display attributes or TBARS values (P>0.20; data not presented). Weight loss during cooking was greater for steaks from heifers fed DRC diets compared with steaks from their counterparts without DRC (P<0.05; Figure 1). Purge loss was not different among treatments (Figure 2). Replacing portions of SFC with DDGS had no effect (P>0.10) on sensory traits, lipid oxidation, or retail color display attributes (Table 2). However, addition of DRC to the diet did alter some sensory attributes; it decreased beef flavor and mealy texture and increased metallic flavor and chewiness (P<0.10). Vitamin E concentrations were lower for lean beef from cattle fed DDGS than for beef from cattle fed diets without DDGS (P<0.05; Figure 3).

Implications

Replacing a portion of SFC with DDGS would be expected to result in beef with similar sensory traits but lower vitamin E compared with beef from animals fed traditional flaked-corn diets, whereas adding DRC could cause some subtle negative effects on meat palatability.

Table 1. Composition of finishing diets containing steam-flaked corn (SFC) with or without dried corn distillers grains with solubles (DDGS) and/or dry-rolled corn (DRC)

	SFC		SFC + 25% DRC	
Ingredient, %	0% DDGS	25% DDGS	0% DDGS	25% DDGS
SFC	82.1	58.2	56.8	33.1
DDGS	–	25.4	–	25.3
DRC	–	–	25.5	25.3
Alfalfa hay	5.9	5.9	5.9	5.8
Corn steep liquor	6.5	6.4	6.4	6.4
Supplement[1,2]	2.8	2.5	2.7	2.5
Limestone	1.5	1.6	1.5	1.6
Urea	1.2	–	1.2	–
Nutrients, %				
Crude protein	14.7	16.3	14.8	16.4
Calcium	0.6	0.6	0.6	0.6
Phosphorus	0.3	0.5	0.2	0.4
Potassium	0.4	0.3	0.2	0.3
Ether extract	0.0	2.7	0.0	2.7
Neutral detergent fiber	3.3	10.8	3.3	10.7

[1] Formulated to meet or exceed nutritional requirements and provide 300 mg monensin, 90 mg tylosin, and 0.5 mg melengestrol acetate per animal daily.
[2] Optaflexx was included at 200 mg/animal for the final 42 days on feed.

Table 2. Sensory attributes of longissimus steaks from cattle fed steam-flaked corn (SFC) diets containing 0 or 25% dry-rolled corn (DRC) and 0 or 25% dried corn distillers grains with solubles (DDGS)

	SFC		SFC + 25% DRC			P-values		
Item[1]	0% DDGS	25% DDGS	0% DDGS	25% DDGS	SEM	DRC	DDGS	DRC*DDGS
Initial tenderness	10.3	10.0	9.8	10.2	0.20	0.56	0.98	0.14
Juiciness	4.7	4.7	4.6	4.9	0.20	0.62	0.39	0.52
Chewiness	9.1	9.2	9.4	9.3	0.08	0.07	0.97	0.15
Mealy texture	2.0	2.0	1.9	1.7	0.13	0.09	0.66	0.41
Fiber awareness	8.8	8.8	8.9	8.9	0.10	0.32	0.86	0.59
Residual connective tissue	2.4	2.5	2.6	2.5	0.12	0.37	0.98	0.31
Beef flavor	11.4	11.1	10.9	11.1	0.11	0.09	0.59	0.02
Bloody/serumy	3.9	3.8	3.8	3.9	0.13	0.94	0.96	0.29
Metallic flavor	1.6	1.7	1.9	1.8	0.11	0.08	0.91	0.49
Rancid flavor	0.1	0.1	0.1	0.2	0.05	0.20	0.43	0.48

[1] Sensory attributes were analyzed on a 15-point scale.

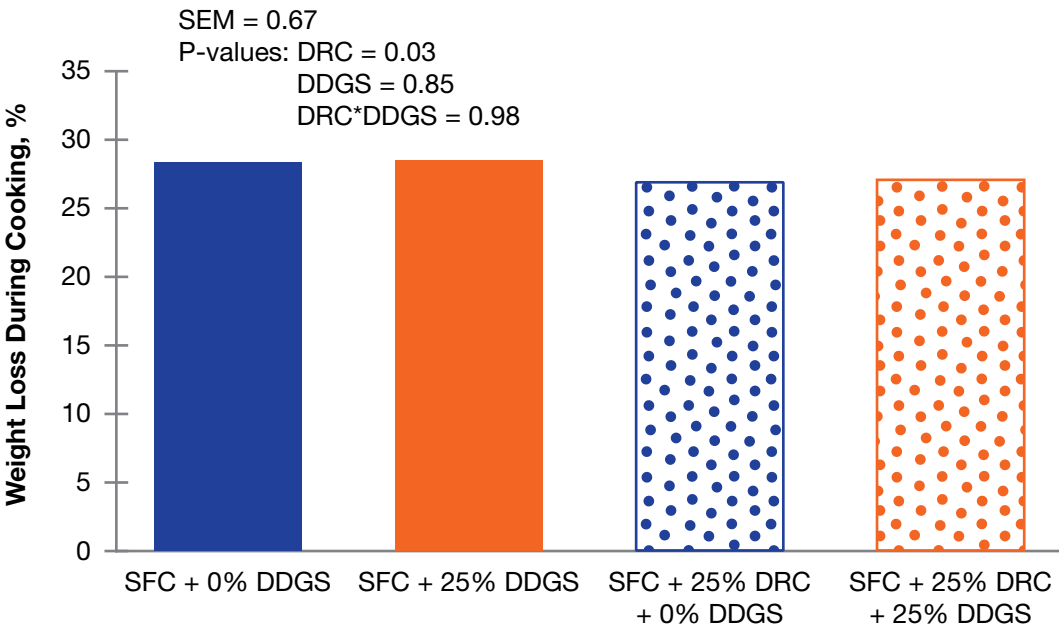

Figure 1. Cooking loss of steaks derived from cattle fed steam-flaked corn (SFC) diets with 0 or 25% dry-rolled corn (DRC) and 0 or 25% dried distillers grains with solubles (DDGS).

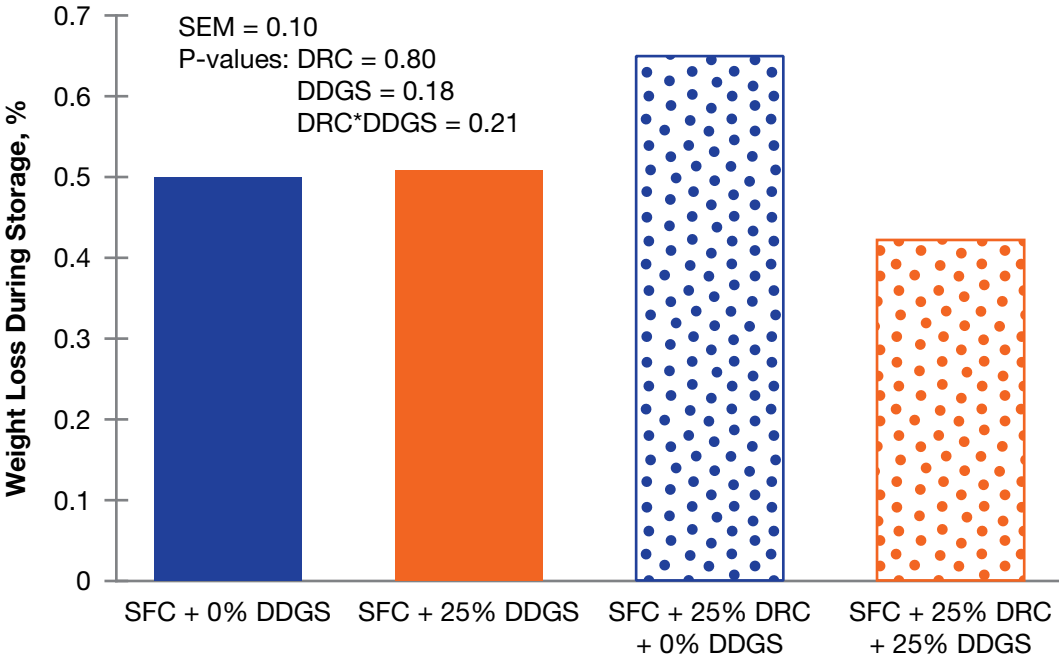

Figure 2. Purge loss of steaks derived from cattle fed steam-flaked corn (SFC) diets with 0 or 25% dry-rolled corn (DRC) and 0 or 25% dried distillers grains with solubles (DDGS).

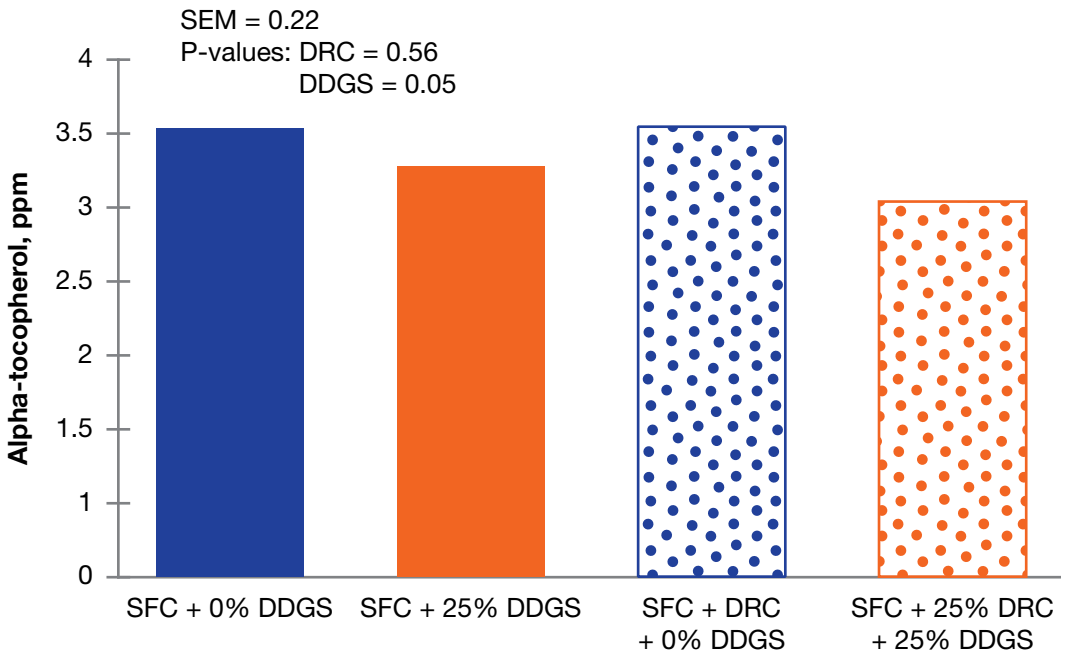

Figure 3. Vitamin E (tocopherol) concentrations of steaks derived from cattle fed steam-flaked corn (SFC) diets with 0 or 25% dry-rolled corn (DRC) and 0 or 25% dried distillers grains with solubles (DDGS).