Relative Value of White Corn When Fed to Finishing Cattle and Its Effects on Color of Carcass Fat

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Summary

White corn was compared with yellow corn in a 180-day finishing trial with 600 lb. Angus steers fed 90% concentrate diets. Steers fed yellow corn consumed 3.3% less feed and were 3.8% more efficient in feed utilization. Rate of gain and carcass characteristics were similar for steers fed white or yellow corn. The color of subcutaneous fat over the ribs was significantly whiter from carcasses of steers fed white corn compared with those fed yellow corn. The results of this study indicate that white corn may be used instead of barley to produce whiter fat in beef carcasses.

Introduction

White corn is grown for milling to produce human food products, but occasionally it is available for livestock feed if there is over-production or if the grain is off-grade and cannot be used to produce food. Consumers usually prefer white fat in finished beef, and some export markets place high value on color of fat in cuts of beef. Feeding barley rather than yellow corn results in whiter fat in beef carcasses. Feeding white corn to cattle might also result in whiter fat in the carcass. The purpose of this experiment was to compare the feeding value of white and yellow corns when finishing beef cattle and to determine if feeding white corn affected the color of fat in the carcass.

Materials and Methods

One hundred-twenty Angus steer calves were purchased for this experiment. When the study was started, the average weight of the steers was 600 lbs. The steers were divided into 2 groups based on frame score calculated from measured height at the hips and days of age. Steers were randomly allotted from these 2 groups to 20 pens of 6 steers each. Eight pens of cattle (4 of each frame score) were allotted to white corn and 12 pens (6 of each frame score) were allotted to yellow corn. The rations contained: corn 78.7%; corn silage 10%; ground hay 5%; molasses 0.75%; and supplement 5.55%. The white corn was Garst 8527W, grown on a university farm. The yellow corn was commodity corn, purchased in central Iowa. The corn was processed in a roller mill to break or crack a majority of the kernels. The mixed grass hay was ground through a 2-in. screen. The concentrate portion of the diets was prepared as a mix in a stationary horizontal mixer and weighed in a mixer wagon separately from the corn silage and ground hay. After mixing, total mixed diets were fed to the cattle twice per day. Periodically the mixed diet, corn silage, hay, and corn grain were sampled to determine dry matter and crude protein. Feed removed from the bunks was sampled to determine dry matter.

The steers were implanted with Component E-S® at the start of the trial and reimplanted with Component TE-S® 84 days later (96 days prior to harvest). The steers were sold in 2 groups 4 days apart to facilitate collection of carcass data. Steers fed white and yellow corn were equally represented in each sale-group. The steers were fed an average of 180 days. Weights of hot carcasses were taken after slaughter, and measurements on the carcasses were obtained after 24-hr. postmortem chill. The federal grader called marbling score; percentage of kidney, pelvic, and heart fat (KPH); and yield grades. Ribeyes between the 12th and 13th ribs on the left side of the carcass were photographed with a digital camera, and fat thickness and muscle area were measured from the digital image using a calibrated computer software program.

Color of the subcutaneous fat between the 12th and 13th ribs was scored by comparison to the Japan Meat Grading Association color chart. The chart has a 9-point scale, ranging from white to yellow, for color of fat in beef carcasses. The color of the subcutaneous fat in the digital camera image of each carcass was compared with the chart colors to establish a value for each carcass.

Pen means were used as the experimental unit in the statistical analysis. Data were analyzed as a completely randomized design by analysis of variance, with source of corn as the treatment and frame score as a block. Standard error of the means and least significant differences were calculated.

Results and Discussion

Steers fed white corn had the same gain but consumed more dry matter feed compared to steers fed yellow corn (Table 1). Because of the difference in feed consumption, steers fed yellow corn were more efficient. There is no obvious explanation for the observed difference in feed intake.

Carcass weights, dressing percentages, fatness and muscularity of the carcasses, and carcass grades were nearly identical for steers fed white or yellow corn (Table 2). Overall, these steers had excellent carcasses, grading 80% Low Choice or better, 20% Certified Angus Beef, and 72% yield grades 1 and 2.

Color of the fat over the ribs was significantly whiter in the carcasses of steers fed white corn (Table 2). The scale used to score the fat color was 1 = white and 9 = yellow. A score of 2.2 for the steers fed yellow corn indicated a trace

of yellow. Cattle fed high levels of roughage or those grazing pastures often have yellow fat due to pigments of the forage. The steers fed yellow corn probably did not have many yellow pigments in the fat because they were fed a high concentrate diet with minimal quantities of roughage for nearly 200 days. Feeding white corn during the 180 days prior to harvest reduced the color score of the fat to 1.8, a small but significant reduction. Barley often is fed to cattle to produce whiter fat for some export markets. The results of this study indicate that white corn has feed value similar to yellow corn for finishing beef cattle and may be a substitute for barley to produce whiter fat in beef carcasses.

Table 1. Performance of Angus steer calves fed white or yellow corn.

	Corn		
Item	White	Yellow	SEM
Starting wt., lbs.	608.7	603.8	4.45
Ending wt., lbs.	1209.1	1207.3	8.71
Days fed	180	180	
Daily gain, lbs.	3.34	3.35	0.047
Feed DM per day, lbs.	18.3[b]	17.7[c]	0.23
Feed/gain	5.49[d]	5.28[e]	0.052

[a]Standard error of the mean.
[b,c]Means with different superscripts are significantly different (P < .05).
[d,e]Means with different superscripts are significantly different (P < .1).

Table 2. Effects of feeding white or yellow corn on carcass measurements of Angus steer calves.

	Corn		
Item	White	Yellow	SEM[a]
Carcass wt., lbs.	741.3	740.8	5.25
Dressing percent	61.3	61.4	0.22
Fat thickness, in.	0.45	0.44	0.020
Ribeye area, sq in.	12.9	12.5	0.22
KPH, %	1.70	1.74	0.086
Marbling[b]	554	544	17.9
Color of fat[c]	1.78[d]	2.22[e]	0.087
Carcass grades			
Percent Choice	21.6	20.8	
Percent Choice -	54.2	62.5	
Percent Select	22.8	16.7	
Percent Standard	1.4		
Percent Yield Grade 1	4.2	8.3	
Percent Yield Grade 2	67.2	64.6	
Percent Yield Grade 3	27.2	25.0	
Percent Yield Grade 4	1.4	2.1	
Percent Certified Angus Beef	20.1	20.8	
Calculated yield grade	2.66	2.71	0.081

[a]Standard error of mean.
[b]500 = Small[0], 400 = Slight[0].
[c]Color of fat is related to nine point scale, with 1 = white and 9 = yellow.
[d,e]Means with different superscripts are significantly different (P < .01).

Implications

The results of this study suggest that white corn can be fed to finishing cattle without loss of performance or carcass quality and yield grades. The advantage of whiter fat in carcasses from cattle fed white corn may have value in some export markets.

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