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# 2015 Beef Cattle Report



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# Effect of Feeding Distillers Grains and Supplementing with Dietary Antioxidants on Ground Beef Color During Retail Display

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## Summary

Ground beef patties from cattle fed corn-based diets with no wet distillers grains (control), wet distillers grains (WDGS), WDGS + 1000 IU/head/day vitamin E, WDGS + 150 ppm/head/day, Ethoxyquin/TBHQ (Agrado Plus, Novus International, St. Louis, Mo.), or WDGS + 500 IU/head/day vitamin E + 150 ppm/head/day Ethoxyquin/TBHQ during the finishing phase were compared to analyze color stability during retail display. As display time increased, patties from all dietary treatments had greater discoloration and became darker, less red, and more yellow. Therefore, beef patties discolored during retail display, but the rate and degree of discoloration were unaffected by diet or antioxidant supplementation.

## Introduction

Each bushel of corn (56 lb) used in dry-mill ethanol production generates about 17.4 lb of distillers grains available for livestock feed (USDA Economic Research Service). This availability provides an economical feed source for cattle. Consequently, cattle fed distillers grains have an increase in polyunsaturated fatty acids, which may decrease oxidative stability (2009 Nebraska Beef Cattle Report, pp. 107-109 and 110-112). The polyunsaturated fatty acids are more easily oxidized and allow off-flavors to develop. In addition, beef from cattle fed distillers grains discolors at greater rate due to oxidation of the muscle pigments. Previous research indicates that dietary antioxidants increase the oxidative stability in fresh, whole muscle meat

Table 1. Visual and instrumental color of ground beef patties.

Treatment	%Dis	L*	Color Analysis				
			a*	b*	Hue Angle	Saturation Index	a*/b* ratio
Corn	24.66	50.21	17.54	10.37	32.65	20.55	1.66
WDGS	25.37	51.30	16.92	10.41	33.84	20.07	1.60
WDGS+Vit E	25.39	51.14	16.73	10.32	33.90	19.85	1.60
WDGS+Agrado	20.28	50.18	18.11	10.57	31.96	21.12	1.69
WDGS+Vit E+Agrado	20.98	49.73	17.82	10.39	32.12	20.80	1.69

products. The objective of this trial was to evaluate the effects of vitamin E and Ethoxyquin/TBHQ (Agrado Plus, Novus International, St. Louis, Mo.) supplementation on ground beef color from cattle fed distillers grains during the finishing phase.

## Procedure

Cattle (n = 100) were randomly assigned to one of five finishing diets: corn based diet with no WDGS (control), wet distillers grains (WDGS), WDGS + 1000 IU/head/day vitamin E, WDGS + 150 ppm/head/day Agrado Plus, or WDGS + 500 IU/head/day vitamin E + 150 ppm/head/day Agrado Plus. At the conclusion of the finishing phase, cattle were harvested at commercial abattoir. Forty-eight hours post-harvest, seven USDA Choice clods from each dietary treatment group were collected from the right side of carcasses, vacuum packaged, and shipped to the University of Nebraska–Lincoln Loeffel Meat Laboratory. On day 14, each clod was independently ground and formed into 4 oz patties using a manual, single-patty press. Two patties from each clod were overwrapped with oxygen permeable PVC film and placed under simulated retail display for seven days at 37°F. During retail display, percent discoloration (%Dis; 5 person panel; 0% = no discoloration to 100% = full discoloration) and objective color (L\* a\* b\*) were evaluated for seven days. The a\*/b\* ratio, hue angle, and

saturation index were then calculated. Data were analyzed by treatment with repeated measures (day) utilizing the PROC MIXED procedures of SAS (SAS Institute, Inc., Cary, N.C.).

## Results

There were no dietary treatment effects for any of the color traits measured ( $P > 0.39$ ) suggesting that diet did not affect the retail shelf life of fresh ground beef. This is in contrast to the increased discoloration rate in cattle finished on modified wet distillers grains from a previous study (2014 Nebraska Beef Cattle Report, pp. 105-106). As expected, there was a time effect for percent discoloration, L\*, a\*, b\*, a\*/b\* ratio, hue angle and saturation index ( $P < 0.0001$  for all). As retail display time increased, patties from all dietary treatments had greater percent discoloration and became darker, less red, and more yellow. Lower values of a\*/b\* ratio and saturation and greater values of hue angle are indicators of discoloration, and all were shown over time in the beef patties (Table 1). Regardless of diet, retail display life of beef patties was similar for both instrumental and visual color analysis.

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