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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 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.

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

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

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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Footnotes:

1Brandy D. Cleveland, graduate student; Chad G. Bower, graduate student; Amy L. Redfield, graduate student; Gary A. Sullivan, assistant professor, University of Nebraska–Lincoln Department of Animal Science, Lincoln, Neb.
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