



## Aging, Antioxidant-Enhancement, and Modified Atmospheric Packaging Improves Appearance of Dark-Cutting Beef

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### Objectives

Color is the most crucial component of a consumer's decision when purchasing beef. Due to their dark appearance, dark-cutters will be discounted at the packing facility. Improving the appearance can increase the value of dark-cutting beef resulting in a greater profit for producers and retailers. The objective of this study was to evaluate the effects of wet-aging, antioxidant-enhancement, and modified atmospheric packaging on color of dark-cutting beef during simulated retail display.

### Materials and Methods

No-roll dark cutting (pH > 6.0) strip loins ( $n = 12$ ) and 10 USDA choice (pH range 5.45 to 5.55) strip loins (IMPS #180) were randomly selected from a commercial purveyor within 3 d post-harvest. Dark cutting loins were sectioned into 2 equal sections and assigned to 1 of 3 aging periods 7, 14, and 21 d, then cut into 3 equal sections and assigned to 1 of 3 treatments, control, 0.1% rosemary, and 0.2% rosemary. Choice loins were sectioned into 3 equal sections and randomly assigned to respective aging periods. Following aging, loins assigned to rosemary enhancement treatments were enhanced to 110% their green weight with a solution consisting of deionized water and 1.1% or 2.2% oleoresin rosemary (Kalsec Herbalox). Following aging and enhancement, sections were sliced into 1.9-cm steaks and assigned to 1 of 3 packaging treatments;

high-oxygen modified atmospheric packaging (HiOx-MAP; 80% O<sub>2</sub> and 20% CO<sub>2</sub>), carbon-monoxide (CO-MAP; 0.4% CO, 69.6% N, and 30% CO<sub>2</sub>) and polyvinyl chloride overwrap (PVC; 20% O<sub>2</sub>). Steaks were on display under continuous fluorescent lighting for 5 d. The surface color was measured utilizing a HunterLab Miniscan XE Plus spectrophotometer each day of display. Lipid oxidation was determined on 0 and 5 d of display utilizing the thiobarbituric acid reactive substances (TBARS) assay. Data were analyzed using the Mixed Procedure of SAS (SAS Inst. Inc., Cary, NC) and values were considered significant at  $P < 0.05$ . The experiment was replicated 8 times ( $n = 8$ ).

### Results

The combination of aging, modified atmospheric packaging, and antioxidant-enhancement improved ( $P < 0.05$ ) redness ( $a^*$  values) and lightness ( $L^*$  values) of dark-cutting beef compared with control dark-cutting beef. HiOx-MAP packaging was the most effective ( $P < 0.05$ ) in improving surface color compared with CO-MAP and PVC packaging.

### Conclusion

The results indicate that the combination of post-harvest technologies such as aging, antioxidant enhancement and packaging has potential to improve surface color and value of dark-cutting beef.