

Public Abstract

First Name:Danielle

Middle Name:Renee

Last Name:Reynolds

Adviser's First Name:Dr. Bryon Wiegand

Adviser's Last Name:

Co-Adviser's First Name:

Co-Adviser's Last Name:

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Title:EVALUATION OF THE RETAIL DISPLAY LIFE OF GROUND BEEF STORED IN MODIFIED ATMOSPHERE PACKAGING AND MODERN LIGHTING CONDITIONS

Color is the most important factor in decision making for the consumer in the retail setting. The objective of this study was to determine the color stability of ground beef patties packaged in modified atmosphere packaging (MAP) under three different retail lighting conditions. USDA Choice chuck rolls were first ground through a coarse 10 mm plate and then reground through a fine 4.5 mm plate and then formed into 27 patties (113.4 g). Patties were then assigned into one of three packaging treatments: HO2-MAP (80% O₂: 20% CO₂), LO2-MAP (20% O₂: 20% CO₂: 60% N₂), or overwrap with polyvinyl chloride (PVC). Then each packaging type was then assigned to one of three retail lighting conditions: low-UV fluorescent bulbs (FLO), light emitting diode (LED), and no light (DRK). Patties were removed on storage days 1, 3, 7, 10, and 14 for analysis of L^a*a^b*, lipid oxidation by thiobarbituric acid reactive substances (TBARS), and percentage of myoglobin states. The entire experiment was replicated three times. There was an interaction between package type and storage day for L^a (P < 0.0001). Patties packaged in HO2-MAP had an increase (P < 0.05) in L^a through storage day but were similar to each subsequent day. L^a increased (P < 0.05) on storage days 3, 7, and 10 for patties packaged in LO2-MAP. PVC patties had increase (P < 0.05) in L^a from storage day 7 to 10. Patties packaged in HO2-MAP and LO2-MAP had higher (P < 0.05) L^a values on storage days 3, 7, 10, and 14 than PVC. Package type had an effect (P < 0.0001) on a* where HO2-MAP > LO2-MAP > PVC, with averages on 15.88, 14.34, and 12.63, respectively. Lighting type also had an effect (P = 0.0005) on a* where DRK = FLO > LED, with averages of 15.32, 14.31, and 13.22, respectively. There was a decrease (P < 0.0001) in a* throughout storage day, 1 > 3 > 7 > 10 > 14, with averages of 23.56, 19.56, 12.98, 8.70, and 6.70, respectively. Lighting type did not have an effect on (P = 0.1045) TBARS. TBARS decreased (P < 0.0001) throughout storage day where 1 < 3 < 7 < 10 < 14, with averages of 0.58, 0.98, 1.67, 2.60, and 4.07, respectively. Packaging had an effect on oxymyoglobin (OMb) (P = 0.0012) where HO2-MAP = PVC > LO2 MAP (51.61, 50.84, and 49.45, respectively) and metmyoglobin (MMb) (P = 0.0025) where LO2-MAP > HO2-MAP = PVC (47.21, 43.92, and 45.16, respectively). Oxymyoglobin values were impacted by storage day where 1 = 3 > 7 > 10 = 14, with averages of 55.68, 54.6, 50.45, 46.48, and 45.95, respectively. Deoxymyoglobin (DMb) followed the same trend with storage day 1 = 3 > 7 > 10 = 14, with averages of 6.45, 6.33, 3.87, 1.63, and 1.42, respectively. Inversely, MMb increased over time with storage day 1 = 3 < 7 < 10 = 14, with averages of 37.87, 39.07, 45.68, 51.89, and 52.65, respectively. There were no differences between lighting type on OMb (P = 0.2410), DMb (P = 0.5229), or MMb (P = 0.2736) percentages. The use of HO2-MAP in retail settings will increase redness in ground beef patties regardless of lighting source, indicating that a movement towards LED lights in the retail setting will not be detrimental to discoloration in products packaged in HO2-MAP.