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## Consumer Sensory Evaluation of Beef Following Display in Varied Packaging Types

J. Ponce\*, J. C. Brooks, and J. Legako

Animal and Food Science, Texas Tech University, Lubbock, TX, USA

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## Objectives

This study aimed to determine the impact of packaging systems and muscle type on consumer sensory perception.

## Materials and Methods

Paired strip loins and top sirloin butts collected from USDA Choice, “A” maturity beef carcasses ( $n = 10$ ), were used in a 2x5 factorial arrangement to determine the effects of muscle and packaging type on beef flavor. All subprimals were packaged under vacuum and aged for 14d. After initial aging, all subprimals were fabricated to produce *Gluteus medius* (GM) or *Longissimus dorsi* (LD) steaks. At 14d steaks were randomly assigned to 1 of 5 package types: high-oxygen modified atmosphere lidded trays (80% O<sub>2</sub>/20% CO<sub>2</sub>, HIOX), carbon monoxide modified atmosphere lidded trays (0.4% CO/30% CO<sub>2</sub>/69.6%N<sub>2</sub>, CO), rollstock (forming and non-forming films, ROLL), vacuum packaging without retail display (VAC), and traditional overwrap (OW) which remained under vacuum prior to being placed on foam trays and sealed with polyvinyl chloride film. All were stored in darkness an additional 7d prior to display. At 21d postmortem, HIOX, OW, CO, and ROLL packages were removed from dark storage and displayed in retail cases (0 to 2°C) for 48hrs under continuous fluorescent lighting, while VAC steaks remained in dark storage. After 48hrs, all steaks were individually vacuum packaged and frozen (-20°C). Consumer panels ( $n = 5$  panels with 20 consumers/panel; 100 consumers total) were conducted in Lubbock, TX. Cooked steaks (71.6 ± 1.39°C) were evaluated for overall liking (OALL), liking of flavor (LFLAV), tenderness (TEN), and juiciness (JUIC). All attributes were measured on a 100-mm line scale with Not Present/Dislike Extremely representing 0 and Very Present/Like Extremely representing 100. Acceptability was determined by asking a yes or no question for overall acceptability (OACC), flavor (FLAVACC), tenderness

(TENDACC), and juiciness (JUICACC). Each panelist was served one, 1.5 cm × 1.5 cm piece per steak, evaluating a total of 10 steaks representing all possible muscle × packaging combinations. Data were analyzed using GLIMMIX proc in SAS (9.4; SAS Inst. Inc., Cary, NC).

## Results

A muscle × packaging interaction ( $P = 0.02$ ) was determined for OALL, for all other dependent variables only main effects are discussed as no muscle × packaging interactions ( $P \geq 0.08$ ) were found. The GMHIOX and LDHIOX had the lowest ( $P < 0.05$ ) scores for OALL compared with LDROLL, GMROLL, GMCO, LDVAC, GMVAC, and LDOW. However, LDCO and GMOW were considered similar ( $P > 0.05$ ) with the 2 HIOX muscles. In 2 cases OALL differed within packaging types between muscles, LDCO was rated lower ( $P < 0.05$ ) than GMCO. Additionally, LDOW was rated higher ( $P < 0.05$ ) than GMOW. Both, LDVAC and GMVAC did not differ in OALL ( $P > 0.05$ ), were similar ( $P > 0.05$ ) with all other muscle and packaging combinations, but were rated higher than HIOX steaks ( $P < 0.05$ ). The HIOX packaging type influenced LFLAV ( $P < 0.001$ ) and TEND ( $P < 0.001$ ) without interaction with muscle, and ROLL was rated higher ( $P < 0.001$ ) than VAC, CO, OW, and HIOX for LFLAV. The HIOX treatment resulted in a lower ( $P < 0.05$ ) occurrence of OALL ( $P < 0.001$ ), FLAV ( $P < 0.001$ ), and TEND ( $P < 0.030$ ) acceptability. The LD had greater ( $P < 0.05$ ) juiciness compared with the GM.

## Conclusion

The results of this consumer study indicate that high-oxygen package systems have a detrimental effect on palatability. Meanwhile, vacuum type or low oxygen packaging has clear advantages with regards to delivering product with greater flavor liking.