EXTENDING THE SHELF LIFE OF BEEF CHUCK ROLL STEAKS USING ACEROLA CHERRY POWDER AND ROSEMARY EXTRACT

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I. OBJECTIVES

Exported beef is aged for an extended period and therefore has a shorter shelf life. Improving the shelf life of steaks from beef chuck rolls, which are commonly exported, will increase demand and producer profits. The objective of Experiment 1 (Exp 1) was to determine the effect of the topical application of acerola cherry powder and rosemary extract from various suppliers—as efficacy can differ—on beef chuck roll shelf life, including color stability and lipid oxidation. The objective of Experiment 2 (Exp 2) was to determine the effect of applying a combination of the top-performing acerola cherry powder and rosemary extract from Exp 1 on beef chuck roll shelf life.

II. MATERIALS AND METHODS

In both Exp 1 and Exp 2, beef chuck rolls (Institutional Meat Purchase Specifications 116A) ($n = 8$, Exp 1; $n = 9$, Exp 2) from USDA Choice carcasses were purchased from Washington Beef in Toppenish, Washington, and aged (0°C) for 28 d post-fabrication at Vandal Brand Meats, Moscow, Idaho. Following aging, steaks—1.02 cm thick—were cut and systematically assigned to their respective treatment based on location. Exp 1 treatments included the following: untreated control, topically sprayed (~2 mL) with an acerola cherry powder solution (0.05%) from one of 3 suppliers (C1, C2, C3), or topically sprayed (~2 mL) with a rosemary extract solution (0.10%) from one of 3 suppliers (R1, R2, R3). Exp 2 treatments included the following: untreated control or topically sprayed (~2 mL) with a treatment of an acerola cherry powder solution (0.05% C1), rosemary extract solution (0.10% R3), or a mixture of the acerola cherry powder and rosemary extract (M1 = 0.05% C1 + 0.1% R3; M2 = 0.1% C1 + 0.1% R3; M3 = 0.05% C1 + 0.2% R3; and M4 = 0.1% C1 + 0.2% R3). In both Exp 1 and Exp 2, steaks were assigned to either day 0 thiobarbituric acid reactive substances (TBARS) to measure lipid oxidation or to 4 d of retail display followed by day-4 TBARS analysis. Throughout retail display, color was measured twice daily. Objective color measurements (L^*, a^*, b^*) were taken using a Nix Pro 2 Color Sensor. Subjective color—including lean color, browning, discoloration, surface discoloration, and uniformity—was evaluated by a team following the American Meat Science Association guidelines. Data were analyzed using the Mixed Model procedure of SAS (SAS Institute Inc., Cary, NC). Significance was determined at $P < 0.05$ and tendencies at $P < 0.10$.

III. RESULTS

In Exp 1, antioxidants differed in a^* ($P < 0.03$), but not L^* ($P = 0.31$) or b^* ($P = 0.19$). R3 had the highest a^* value. Additionally, antioxidants influenced lean color ($P < 0.01$), surface discoloration ($P < 0.01$), and uniformity ($P < 0.02$). C1 and R3 had less surface discoloration than the control, which led to the use of C1 and R3 in Exp 2. In Exp 2, antioxidants did not impact TBARS values on day 0 ($P = 0.16$) but did on day 4 ($P < 0.01$). After 4 d of retail display, steaks treated with M3 and M4 had less lipid oxidation than the control. Additionally, antioxidants affected L^* ($P < 0.02$) and a^* ($P < 0.01$), but not b^* ($P = 0.15$). C1, M2, and M3

were redder than the control. Antioxidant treatments differed in lean color ($P < 0.03$), browning ($P < 0.02$), discoloration ($P < 0.02$), and uniformity ($P < 0.02$) but not in surface discoloration ($P = 0.43$). Interestingly, M4 had a brighter colored lean than that of the control.

IV. CONCLUSION

Applying topical antioxidants individually or in combination can improve shelf life stability of beef chuck rolls aged for an extended period.

Keywords: antioxidants, extended aging, shelf life