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Effect of Cilantro Extract (*Coriandrum Sativum*) Application on Color and Oxidative Stability of Ground Pork under Different Packaging Conditions

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Objectives

Prevention of oxidation-related quality defects, such as discoloration and/or rancidity, is crucial to extend shelf-life of fresh meat products during retail display. Ground meat is more susceptible to oxidation than whole muscle/meat due to increased contact surface with oxygen. As one possible mitigating strategy, plant extracts are often applied as natural antioxidants in meat products. Given cilantro is known for high levels of natural antioxidants, such as phenolic acids and flavonoids, it can be hypothesized that cilantro could be utilized to minimize oxidation-related quality defects in ground meat products. The objective of the present study was to evaluate the antioxidant property of cilantro extract (CE) on the color and oxidative stability of pork patties packaged in high-oxygen modified atmosphere (HIOX) and polyvinylchloride (PVC) film during display.

Materials and Methods

Pork hams were trimmed of any visible adipose and connective tissues and minced through a 5-mm meat mincer. Ground pork were divided into 4 groups and 4 different CE concentrations (Kalsec, Kalamazoo, Michigan) were applied reaching a final concentration of 0% (CON), 0.5% (CE05), 1.0% (CE10) and 1.5% (CE15). 25 patties (80 g/patty) were prepared for each treatment. Patties were placed on polystyrene trays with soaker pads, and were subdivided into 2 groups assigned to HIOX (90% O₂, 10% N₂) and PVC-overwrap packaging. Instrumental color, trained panel sensory evaluation (color, rancidity and herb aroma), 2-thiobarbituric acid reactive substances (TBARS) and carbonyl content were measured on the manufacture day (d 0), 7 d of storage under dark and further display under light for additional 7 d at 4°C. Experimental design was a

4 × 2 factorial design; 3 independent batches were performed. Data were analyzed using ANOVA and Tukey test at 95% confidence level utilizing XLStat.

Results

Packaging types significantly affected the color of patties, where patties under HIOX showed more discoloration, indicated by lesser a* values and sensory discoloration scores compared to the patties under PVC at d 14 ($P < 0.05$). In general, no substantial CE impacts on color and color stability of patties were found in patties under HIOX. Conversely, CE10 patties in PVC maintained the greatest a* value throughout the storage and display periods compared to other treatments ($P < 0.05$). Following the similar trend, CE treatment did not affect lipid oxidation of HIOX-patties; while CE10 patties in PVC showed the least TBARS values among treatments at Dday 14 ($P < 0.05$). In terms of protein oxidation, CE05-HIOX and CE10-HIOX exhibited lesser ($P < 0.05$) carbonyls values than CON-HIOX and CE15-HIOX at d 14; while for PVC-patties, only CE10-PVC exhibited lesser ($P < 0.05$) carbonyls values than CON-PVC at the end of display. At d 14, CE patties under HIOX showed lesser rancidity scores ($P < 0.05$) compared to other treatments, which was likely related to the stronger herb aroma presented in CE patties ($P < 0.05$).

Conclusion

CE did not provide positive impacts on surface color of patties during refrigerated storage and retail display. However, inclusion of 1.0% of CE has a potential to reduce lipid and protein oxidation and mask rancidity odor development under HIOX conditions.