



Effects of Pomegranate Rind Extract on Ground Beef Color

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Objectives

Ground beef is the most widely purchased beef product at the retail counter. However, ground beef patties have a shorter shelf-life than any other beef product resulting in loss of profit for the retailer. Grinding leads to release of prooxidant from cell matrix resulting in more lipid- and myoglobin oxidation. Antioxidants have shown to reduce lipid oxidation and surface discoloration. Pomegranate rind is rich in antioxidants; however, limited studies have utilized its antioxidant property to improve shelf-life of patties. The objectives were to quantify the antioxidant levels in pomegranate rind extract (Exp. 1), to determine the antioxidant effect in a liposome sarcoplasm model (Exp. 2), and to evaluate the effects of pomegranate rind extract on color and lipid oxidation of ground beef (Exp. 3).

Materials and Methods

Ground pomegranate rind powder was extracted in boiling water. For Exp. 1, antioxidant level was determined by 2,2-diphenyl-1-picrylhydrazyl- (DPPH) and Folin-Ciocalteu assay. Liposome-sarcoplasm mixture was mixed with rind extract at different levels. For Exp. 2, liposome-sarcoplasm mixture was incubated at 25°C for 2 h. At specific time points, lipid oxidation was determined by thiobarbituric acid reactive substances (TBARS) assay. For Exp. 3, ground beef (85% lean) was purchased from a local grocer on the day of preparation 100 g of coarse ground beef was enhanced with pomegranate rind extract at levels of 0, 0.5,

1.0, and 1.5%. Patties were then formed and placed on styrofoam trays and overwrapped with polyvinylchloride film. Patties were stored in dark conditions for 24 h to equilibrate the antioxidants. After dark storage, patties were displayed under retail conditions. Surface color was determined daily using a HunterLab spectrophotometer. Lipid oxidation was measured on d 0 and 4 using TBARS method as indicated by absorbance 532 nm. Data were analyzed using the Mixed Procedure of SAS (SAS Inst. Inc., Cary, NC) and were considered significant at $P < 0.05$ ($n = 4$ replications).

Results

Antioxidant levels in the rind extract as determined in by DPPH- and FC assay were 60 μ M trolox equivalent per mL and 58 μ M gallic acid equivalent per mL, respectively. Addition of rind extract decreased lipid oxidation in sarcoplasm-liposome mixture (control > 0.5% = 1%; $P < 0.05$). On d 4, patties enhanced with pomegranate extract had greater ($P < 0.05$) redness (control = 10.05, 0.5% = 15.67, 1% = 15.11, and 1.5% = 16.38). Additionally, on d 4 lipid oxidation was lower ($P < 0.05$) in enhanced patties than control patties (control = 0.4236, 0.5% = 0.1965, 1% = 0.1709, and 1.5% = 0.1739).

Conclusion

The results indicate that pomegranate rind extract can limit discoloration and lipid oxidation in ground beef patties. Pomegranate rind is a by-product and hence effective utilization can have a beneficial effect in the meat industry.