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Effect of Different Antimicrobial Applications on Color Stability of Ground Pork

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Objectives

The purpose of the study was to evaluate color changes during dark storage of ground pork following application with one of three different antimicrobial interventions to pork trim.

Materials and Methods

Treatments included a control (no antimicrobial), lactic acid (LA; 3%), PAA+Titon [sulfuric acid and sodium sulfate (pH 1.3) combined with peracetic acid (350 ppm)], PAA+Acetic [peracetic acid (400 ppm) with 2% acetic acid]. Four 22.7-kg batches of pork trim were treated with one intervention, ground [coarse (3/16") followed by a fine (1/8") grind] and packaged in 454-g rollstock vacuum packaging ($n = 40$/treatment). After random assignment to an aging time (0, 7, 14, 21, or 28 d), product was held under dark storage at 2–4°C. On each storage day, samples ($n = 8$/treatment) were opened and L*, a*, and b* values were taken using a HunterLab Miniscan XE spectrophotometer at 0 min, 10 min, and 20 min for bloom color analysis, with hue angle [arctangent (b*/a*)] and chroma [$(a^* + b^*)^{1/2}$] calculated from a* and b* values. For pH, 5 g of sample and 90 mL of distilled water were homogenized and analyzed with a bench top pH probe. Finally, fat, moisture, and protein percentage were determined using a FOSS FoodScan. Statistical analysis was conducted using the GLM procedure of SAS with a means separation using the Tukey adjustment and significance set at $P < 0.05$.

Results

Proximate analysis of the ground pork in this study showed $20.04 \pm 1.13\%$ for fat, $61.15 \pm 1.11\%$ for moisture, and $16.83 \pm 0.39\%$ for protein content. For initial pork color, at 0 min, LA had greater L* values compared to PAA+Titon at 0d, 7d and 14d ($P < 0.05$), but no treatment differences were detected in L* values at 21d and 28d ($P > 0.05$). After 10 min of bloom time, PAA+Titon maintained the highest chroma value throughout all aging days ($P < 0.05$) demonstrating the most color intensity. At 21d PAA+Titon increased blooming properties through 20min ($P < 0.05$), based on a*, while control samples had no bloom development ($P > 0.05$). At 21d and 28d aging LA hue angle was highest ($P < 0.05$) indicating more potential metmyoglobin discoloration. PAA+Titon presented the highest pH values compared to all the other treatments for each day during the storage period except for Day 14, while LA presented lower values compared to all the other treatments for each day ($P < 0.05$).

Conclusion

As an organic acid application on pork trim prior to grinding, PAA+Titon demonstrates positive effects on color of ground pork based on color and pH values, after post-grinding storage.