

MICROBIAL GROWTH AND SHELF LIFE STUDY ON PORK LOINS BY THE APPLICATION OF DIFFERENT ANTIMICROBIALS

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I. OBJECTIVES

The objective of the study was to determine the impact of antimicrobials on the microbial growth of indicator bacteria on pork loins under dark storage conditions and determine the shelf life of pork chops under display cooler conditions.

II. MATERIALS AND METHODS

Fresh boneless loins ($n = 36$), with no more than 48 h of aging, were split in 5 sections, and each section was treated with any of the antimicrobials (Water, Bovibrom 225 ppm [1,3-Dibromo-5,5-dimethyl hydantoin] [BB225], Bovibrom 500 ppm [BB500], Fit Fresh 3 ppm [Chlorine dioxide] [FF3], or Washing Solution 750 ppm [Rhamnolipid] [WS750]). Sections were packed in boxes and then distributed to any of the 4 dark storage times (1 d, 14 d, 28 d, or 42 d) at refrigerated conditions (2°C–4°C). Then, sections were cut into chops and displayed in a retail case for 96 h at refrigerated conditions (2°C–4 °C). Mesophilic and psychrotrophic aerobic plate counts (APC-M, APC-P), mesophilic lactic acid bacteria, and coliforms counts were performed before and after treatment application, at the end of each dark storage time, and at 0 h, 48 h, and 96 h of retail case display. Instrumental and visual color analyses were performed every 12 h during the retail case display time. All bacterial enumeration data were converted into \log_{10} for statistical analysis, and the PROC GLIMMIX procedure of SAS was used to determine differences between least-squares means. All color data were analyzed using the PROC MIXED procedure of SAS to determine differences between least-squares means (version 9.4; SAS Institute Inc., Cary, NC).

III. RESULTS

A treatment by sampling point interaction was found for coliforms, APC-M, and APC-P ($P < 0.01$) before and after treatment application. Initial counts (before treatment intervention) did not differ between treatments, whereas after treatment interventions, treatment WS750 did not effectively reduce counts for APC-M, APC-P, and coliforms ($P < 0.01$). BB500, FF3, and WS750 performed better inhibiting the growth of indicator bacteria under 6 logs until 42 d of dark storage, both for sections and chops. For a^* , b^* , hue angle, and chroma, a treatment by dark storage time interaction was found ($P < 0.01$). Dark storage time progression did not influence any of the analyzed variables for most treatments, except for treatment WS750 in which the storage time progression decreased redness (a^*), increased yellowness (b^*), and promoted discoloration (hue angles) and loss of vividness (chroma). For attribute lean color, fat color, and percentage discoloration, a treatment by dark storage time interaction was found ($P < 0.01$). BB225, BB500 due to its high oxidative capacity, fat color percentage, and the percentage discoloration were the worst at 28 d of storage when compared with other antimicrobial treatments. FF3 presented the best stability for color during storage. Principal component analysis clustered initial dark storage days with a^* and chroma, while percentage discoloration, hue, b^* , and microorganisms were clustered with longer dark storage times.

IV. CONCLUSION

In general, treatment FF3 presented the best performance, both in inhibiting microbial growth and maintaining the stability of color, thus increasing the shelf life of pork loins.

Keywords: Bovibrom, indicator bacteria, instrumental color, interventions, shelf life