2016 Reciprocal Meat Conference – Meat and Poultry Processing, Ingredient Technology and Packaging

Meat and Muscle Biology™

The Effect of Salt Reduction on the Microbial Composition and Quality Characteristics of Sliced Roast Beef and Turkey Breast

C. G. Bower*, R. E. Stanley, H. A. Paz, S. C. Fernando, and G. A. Sullivan

Animal Science, University of Nebraska, Lincoln, NE, USA

Keywords: beef, microbiota, quality, salt, turkey
Meat and Muscle Biology 1(2):26 **doi:10.221751/rmc2016.025**

Objectives

The objective of this study was to determine the effects of salt reduction on microbiological composition and quality characteristics of deli-style turkey breast and roast beef.

Materials and Methods

Sectioned and formed turkey breast and roast beef were manufactured with four different salt concentrations: 1.0, 1.5, 2.0, and 2.5% on a meat block basis. For three replicates, each treatment was vacuum tumbled for 1.5 h with the designated salt content plus 1.0% sugar and 0.35% sodium phosphate with the balance as water to achieve 25% extension. Turkey and beef samples were cooked to an internal temperature of 71°C, stabilized overnight, sliced, and vacuum packaged. On the day of slicing (wk 0), samples were evaluated for water activity, cook yield, proximate composition and percent salt. Starting on wk 0, samples were evaluated every 2 wk for pH, texture profile analysis (TPA), aerobic plate count (APC), and anaerobic plate count through 18 wk. From week 0 through 14, bacterial communities were analyzed by 16S rRNA gene sequencing using the Illumina Miseq system. Data were analyzed using the PROC GLIMMIX procedure of SAS (SAS Inst. Inc., Cary. NC). Means were separated using the LSMEANS PDIFF option with Tukey's adjustment.

Results

There was a species by salt interaction for APC ($p = 0.009$) where beef with 2.5% salt had the lowest counts, but was only different from beef with 2.0, 1.5, 1.0% and turkey with 2.5% salt. Aerobic plate count ($p < 0.001$) increased until wk 6 but did not significantly increase beyond. Family *Pseudomonadaceae* was the dominant flora on all samples, regardless of treatment or storage time. Relative abundance of *Pseudomonadaceae* was 46.4% of all sequences in beef samples and 36.0% in turkey samples at wk 0, followed by an increase at wk 2, and was statistically similar for the remainder of shelf life in both beef and turkey. Salt reduction negatively impacted cook yield ($p < 0.001$) and increased water activity ($p < 0.001$). Decreasing salt content reduced moisture ($p = 0.026$) and ash ($p = 0.021$), and increased protein ($p < 0.001$). Beef samples had a lower pH compared to turkey ($p < 0.001$), and 1.5% salt had a lower pH than all other treatments, regardless of species ($p = 0.003$). For all TPA measures except springiness, a salt by species interaction was identified ($p < 0.002$). In both beef and turkey, decreasing salt concentration increased hardness ($p < 0.001$). In beef, gumminess and cohesiveness increased as salt decreased. In turkey samples, the greatest gumminess and cohesiveness was observed with 1.5% salt, while 1.0 and 2.0% were less, and turkey with 2.5% salt had the least gumminess and cohesiveness. Beef samples with 1.0% salt had the greatest chewiness, followed by beef with 1.5% salt. Turkey samples with 2.5, 2.0, and 1.0% had the lowest chewiness values. As salt decreased, so did springiness ($p < 0.001$), and turkey samples had lower values than did beef samples ($p < 0.001$).

Conclusion

Our results show that bacterial population dynamics of cooked deli meat may be more dependent on initial population than parameters controlling growth such as salt concentration. Furthermore, reducing salt alters the textural properties of cooked deli meats and reduces cooking yields. At low salt concentrations, these negative effects are amplified in beef products compared to turkey.

