
In-package ozonation is an antimicrobial packaging system that uses atmospheric cold plasma technology to generate ozone and other gases inside a sealed package to inhibit microbial growth on packaged food. Previous unpublished research has shown that in-package ozonation effectively kills and inhibits microbes on raw chicken breast meat. However, ozone has a high oxidation potential and may influence meat color and lipid stability (oxidation). There is a lack of information about the effect of in-package ozonation on meat quality during refrigerated storage. The objective of this study was to investigate the effect of in-package ozonation on quality attributes of raw broiler breast meat. Boneless skinless broiler fillets were placed in Cryovac rigid trays sealed in air with a barrier film and exposed to ozonation treatment (70 kV for 120 s). Similarly packaged samples served as non-treated controls. Samples were stored at 4°C for 8 d. Headspace gas composition, meat surface pH, color, lipid oxidation, and drip loss were evaluated on d 1, 5, and 8. There were no treatment differences in the O2 and CO2 contents of the packages, meat color, or lipid oxidation by d 1 and d 5 of storage. By d 8 of storage, however, differences were observed for headspace composition, muscle surface pH, and color lightness. With storage from d 1 to 8, headspace O2 content decreased more in controls (21% to 3%) than treated packages (21% to 12%); CO2 content increased more in controls (0% to 18%) than treated packages (0% to 11%). With storage, color lightness (L* value) of the meat changed by more than 6 units and surface pH increased by 0.8 units in the control samples; however, they remained unchanged in treated meat. There were no differences between the control and ozonation treatments for lipid oxidation or drip loss. These results demonstrate that under our experimental conditions in-package ozonation does not have any negative effects on the quality of raw chicken breast meat during refrigerated storage.

Key Words: broiler breast meat, ozonation, cold plasma, refrigerated storage, quality

Withdrawn

Muscle exudate protein composition and Warner-Bratzler shear force in broiler breast fillets. B. C. Bowker*, USDA-ARS, Athens, GA.

Muscle exudate is often associated with pale color and poor water-holding capacity in broiler breast meat. The relationship between exudate protein composition and breast meat tenderness is unknown. The objective of this study was to determine the relationship between exudate protein composition and Warner-Bratzler shear force (WBS) in broiler breast fillets deboned at 2 and 24 h postmortem. Broilers (n = 85) were slaughtered and breast fillets were deboned at either 2 or 24 h postmortem. One fillet per carcass was used for meat quality measurements at 24 h postmortem and the other fillet was stored until 6 d postmortem for the collection of muscle exudate and subsequent meat quality measurements. Protein content and composition of muscle exudates were determined by the biuret assay and SDS-PAGE. Fillets deboned at 2 h exhibited higher (P < 0.0001) WBS than fillets deboned at 24 h at both 1 d (7.43 vs. 3.11 kgf) and 6 d (4.07 vs. 2.50 kgf) post-mortem. Deboning time did not influence meat color or ultimate pH, however, fillets deboned at 24 h had lower (P < 0.01) drip loss and lower (P < 0.001) cook loss at 1 and 6 d postmortem. Protein concentrations of the exudates were not influenced by deboning times. The relative abundance of 15 protein bands (24–220 kDa) was quantified from the SDS-PAGE profiles of muscle exudates and found to be similar between fillets deboned at 2 and 24 h. In fillets deboned at 24 h, 3 protein bands were correlated to WBS at d 1, 2 protein bands were correlated to WBS at d 6, and 5 protein bands were correlated to the WBS decrease from d 1 to 6 postmortem. In fillets deboned at 2 h, 2 protein bands were correlated to WBS at d 1 and one protein band was correlated to WBS at d 6. Overall, data indicated that exudate protein composition was more closely related to tenderness differences due to postmortem aging rather than tenderness differences due to deboning time. These results suggest that muscle exudates may be a potential source of protein markers for breast fillet tenderness differences related to postmortem proteolysis.

Key Words: breast muscle, broiler, deboning, exudate, tenderness

The reduction of Salmonella Typhimurium on chicken broiler skin utilizing sodium metasilicate in prechill and postchill applications. S. K. Williams*, S. Mart, and C. S. Sharma, University of Florida, Gainesville, Mississippi State University, Mississippi State.

The objective of this study was to determine the efficacy of sodium metasilicate (SMS) on the reduction of Salmonella Typhimurium and total aerobic counts (APCs) on chicken skin when used at USDA approved level of 2%. Chicken skin was cut into 5-cm² pieces, inoculated with Salmonella Typhimurium and allowed to set at 22°C for 20 min to facilitate bacterial attachment. The inoculated skin was treated with 0% SMS (positive control), 2% SMS solution (SMSS) only, 50 ppm chlorine solution (CLS, simulated conventional chill tank) only, 2% SMSS (prechill) followed by 50 ppm SMS, or 50 ppm CLS followed by 2% SMSS (postchill) and stored at 2°C for 0 and 24 h. A negative control (no treatment) was also prepared. The APCs for all skin samples treated with 2% SMSS were lower (P < 0.05) than the positive control and samples treated with SMS only on Day 0. Chicken skin treated with SMS alone, and CLS followed by SMSS (postchill) and stored for 24 h at 2°C had lower (P < 0.05) APCs than the positive control, samples treated with CLS alone, and samples treated with SMSS (prechill) followed by CLS. Salmonella counts were lower (P < 0.05) for all treatments when compared with the positive control on d 0, and lower for all SMS treatments after 24 h storage when compared with the positive control and the samples treated with CLS only. This study suggested that using SMS alone or in post chill will result in at least 4 and 5 log reductions in APCs and Salmonella, respectively.

Key Words: sodium metasilicate, microbiology, antimicrobial, poultry, Salmonella Typhimurium

Tenderness of non-marinated and marinated breast fillets from commercial broilers reared to 60 d of age. V. B. Brewer-Gunsaulis* and C. M. Owens, University of Arkansas, Fayetteville.

Commercial broilers are commonly reared to around 8 weeks of age to meet the market demands for boneless breast meat. Research has indicated that birds reared to this age could potentially be tougher than younger broilers. Marination is commonly used to alleviate toughness.

Key Words: sodium metasilicate, microbiology, antimicrobial, poultry, Salmonella Typhimurium
that could result from early deboning. A study was conducted to evaluate the effect of debone hour and marination on the texture of breast fillets from broilers reared to 60d of age. A total of 210 male broilers were slaughtered and deboned at 0.25, 2, 3, 4, 6, 8, or 24h PM in 2 replicates. Samples were collected for pH analysis from all breast fillets. One fillet from each broiler was tumble marinated (0.75% NaCl and 0.45% phosphate, final concentration). Fillets were cooked on raised wire racks in covered pans. Shear force analysis was completed using Meullenet Owens Razor Shear (MORS) method on all fillets. There was a significant decline in pH at all debone hours except between 8 and 24h PM. Marination uptake and cook loss were evaluated in the current study however, both were unaffected by debone time. The 2h PM debone time had the highest MORS energy of all of the fillets evaluated, however, the only significant decrease in MORS energy was between the 2 and 4h PM debone times. From 3h to 24h PM, there was not a significant decrease in MORS energy for non-marinated fillets. Even at 24h PM, the non-marinated fillets had high MORS energy values (206.3 N.mm) that would be considered moderately tough by consumers according to previous literature. Marination significantly improved breast fillet tenderness at all debone hours indicated by significantly lower MORS energy in marinated fillets compared with non-marinated fillets. For the marinated fillets, there were significant differences in tenderness between 0.25 and 2, and 3 and 4h PM. These data indicate toughness could be an issue for non-marinated fillets from large broilers even at when deboned at 24h PM. However, tumble marination can alleviate toughness associated with large broilers though shear values of marinated fillets can still be affected by deboning time.

**Key Words:** shear energy, broiler breast fillet, early deboning, marination

Commercial broilers are commonly reared to various ages to target the demands of multiple markets. Broilers weighing greater than 6 lbs. now represent slightly over 50% of the market, a significant increase from over 10 years ago. Research has indicated that birds reared to 8 wk will have greater shear energy than birds reared to 6 wk; however, the cause of this textural difference is not known. Commercial broilers reared to 40 and 60 d of age were processed and deboned at 2 or 4 h postmortem (PM) (n = 25/age/debone hour). Meullenet Owens Razor Shear (MORS), myofibrillar fragmentation index (MFI), pectoralis pH, myofibrillar fiber diameter (MFD), and sarcomere length (SL) were evaluated. Birds reared to 60 d had greater (P < 0.05) live weight and fillet yield than birds reared to 40 d. Deboning at 2h PM resulted in higher (P < 0.05) MORS energy compared with deboning at 4h in both age groups. Birds reared to 60 d had fillets with higher (P < 0.05) MORS energy when deboned at 2h PM compared with those reared to 40 d. Also, 40 d old birds deboned at 2h PM had equivalent (P > 0.05) tenderness with 60 d old birds deboned at 4 h PM. Pectoralis pH decreased (P < 0.05) between 2 and 4h in each age treatment. Between ages, there was no difference (P > 0.05) in pH at 2h PM; however, at 4h PM, pH for 40 d old birds was lower (P < 0.05) than 60 d old birds. At both debone hours, fillets from 60 d old birds had greater (P < 0.05) MFD than 40 d old birds, and MFD was greater (P < 0.05) at 2h PM than at 4h PM. For both ages, SL was higher (P < 0.05) at 2h than at 4h PM. Interestingly, SL for 60d old birds were greater (P < 0.05) than 40 d old birds at both debone hours. Fragmentation increased (MFI decreased; P < 0.05) between 2 and 4h PM for both ages. Within debone hour, MFI was not affected (P > 0.05) by age, however, 40 d 2h samples were similar (P > 0.05) to 60 d 4h samples. These data indicate several factors could be contributing to increased toughness between 40 and 60 d old broilers including differences in fiber diameter and rigor development. Results also suggest that overall increased shear energy in older broilers is not attributed to sarcomere shortening.

**Key Words:** breast fillet, shear force, pH, myofibrillar fiber diameter, sarcomere length

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147 Physical and biochemical properties associated with broiler breast fillet texture at two market ages. V. B. Brewer-Gunsaulis* and C. M. Owens, University of Arkansas, Fayetteville.