



Quality Characteristics of Normal and Woody Breast Meat

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Objectives

Woody breast meat has become prevalent in the United States meat industry since 2013. Recent publications have described the meat quality characteristics of woody breast meat. However, there was minimal research on the proximate composition and the whole muscle proteome of woody breast meat. This study investigated the meat quality (pH, color, cooking loss, and shear force), protein quality characteristics (protein and salt-soluble protein content) and the interrelation between them. In addition this study characterized the differences in the muscle proteome between woody and normal breast meat.

Materials and Methods

Normal breast (NB) and Woody breast (WB; 12 reps/trt) chicken breast meat samples were collected based on finger pressure in commercial processing plant on 2 separate occasions by plant personnel in response to their inquiries for assistance at characterizing this quality defect. NB samples were characterized by researchers in our laboratory as fillets without hardened areas on the surface. WB samples were characterized by fillets with hardened areas and pale ridge-like bulges at the caudal end.

Meat cuts sampled from the caudal part of fillets were used to measure ultimate pH and instrumental color (CIE L*, a*, b*). Approximately 50 to 60 g was excised from the cranial part of each fillet and utilized to determine cooking loss and shear force. The proximate composition (fat, protein, collagen, and moisture) of breast fillets was assayed using a FOSS Near Infrared Spectrometer. Salt-soluble protein percentage was the percentage of protein solubilized in extraction buffer (0.07 mM PBS, 0.5

M NaCl, pH 6.5) with respect to the total protein content of the meat. The whole muscle proteome was also determined for both woody and normal breast samples.

A randomized complete block design with 2 replications (trials/block) and 12 subsamples was utilized to test the treatment effects on pH, color, cook loss, shear force, proximate and salt-soluble protein composition, and whole muscle proteome of breast meat of broilers, and the Fisher's Protected LSD was utilized to separate means when a significant effect was observed. Partial correlation between parameters was determined using Pearson Correlation analysis. All data were analyzed using the GLM procedure of SAS 9.4 (SAS Inst. Inc., Cary NC).

Results

WB breasts had a greater average pH ($p < 0.0001$) and greater cooking loss ($p = 0.001$) than NB breast meat but did not differ in shear force ($p > 0.05$) from NB samples. The L*, a* and b* values of WB fillets were greater than NB fillets ($p < 0.0001$ to L*; $p = 0.002$ to a*; $p = 0.016$ to b*). The WB treatment had more fat ($p < 0.0001$) and moisture ($p = 0.021$) and less protein ($p < 0.0001$) and salt-soluble protein ($p < 0.0001$) when compared with NB. Whole muscle proteome analysis indicated that there were 8 proteins that were differentially expressed ($p < 0.05$) between NB and WB samples. Partial correlation analyses showed that the proportion of fat, protein and moisture are significantly correlated with the meat quality characteristics (pH, CIE L* and b*, Shear force).

Conclusion

Results suggest that proximate composition may be useful as indicators of woody breast meat and meat quality.