



## A Proposed Mechanism for Texture Property of Woody Breast in Broilers

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### Objectives

Woody breast is a myopathy observed in chicken breast meat (*Pectoralis major*) characterized by its tough and rubbery texture. However, the exact causation of woody breast texture is still unknown. We hypothesize that sarcoplasmic reticulum (SR) dysfunctionality early postmortem results in rapid leakage of intracellular calcium may partially contribute to the abnormal meat texture observed in woody breast meat. The objective of this preliminary study was to investigate this hypothesis.

### Materials and Methods

Fourteen Ross line broiler breast fillets (7 severe woody breast and 7 normal) were collected at 3 h postmortem from a commercial processing plant located in the southeast United States. The 7 woody breast samples also exhibited moderate to severe white striping. The 7 normal samples did not exhibit any signs of white striping or woody breast. Each sample was trimmed, weighed, vacuum packaged and frozen at  $-20^{\circ}\text{C}$  at approximately 8 h postmortem. One 1.9 cm strip across the cranial end of each fillet was fabricated and pulverized in liquid nitrogen to measure sarcomere length (Laser Scan Confocal Microscope with a 100x/NA 1.4 objective), calpain activity (immunoblotting for  $\mu$ -calpain autolysis), proteolysis (immunoblotting for troponin-T degradation) and collagen content (hydroxyproline content). Purge was also collected from each sample to evaluate protein (bicinchoninic acid assay) and free calcium concentration (atomic absorption).

### Results

Woody breast fillets were heavier than normal chicken breast fillets (522.9 vs. 446.9g;  $P < 0.05$ ). Woody breast samples tended to have shorter sarcomeres (1.70 vs. 2.02  $\mu\text{m}$ ;  $P = 0.0543$ ) and less intact troponin-T compared to normal breast samples (relative intact troponin-T band density: 49.98 vs. 56.97%;  $P = 0.0515$ ) at 8 h postmortem. It was interesting to note that no  $\mu$ -calpain band was detected through immunoblotting for both the woody breast and normal samples at 8 h postmortem. Other studies have found similar results as poultry  $\mu$ -calpain autolyzed at a much rapid rate than  $\mu$ -calpain in mammalian species. In addition, the purge from woody breast samples also had higher levels of free calcium compared to normal samples (6.2 vs. 4.2 nmol calcium/mg protein;  $P < 0.05$ ). Lastly, there was more collagen present in the woody breast samples compared to normal chicken breast samples (3.89 vs. 2.08 mg collagen/g muscle tissue;  $P < 0.05$ ).

### Conclusion

The results indicated that the cause of texture abnormality of woody breast may be the combined effects of more calcium being released from the SR early postmortem resulting in shorter sarcomere length and more collagen being deposited in the chicken breast meat. Additional research with the focus on SR integrity and functionality as well as collagen crosslinks are needed to further elucidate the basic mechanism of woody breast texture formation.