Quantity and functionality of protein fractions in chicken breast fillets affected by white striping

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ABSTRACT Recently, white striations parallel to muscle fibers direction have been observed on the surface of chicken breast, which could be ascribed to intensive growth selection. The aim of this study was to evaluate the effects of white striping on chemical composition with special emphasis on myofibrillar and sarcoplasmic protein fractions that are relevant to the processing features of chicken breast meat. During this study, a total of 12 pectoralis major muscles from both normal and white striped fillets were used to evaluate chemical composition, protein solubility (sarcoplasmic, myofibrillar, and total protein solubility), protein quantity (sarcoplasmic, myofibrillar, and stromal proteins), water holding capacity, and protein profile by SDS-PAGE analysis. White-striped fillets exhibited a higher percentage of moisture (75.4 vs. 73.8%; $P < 0.01$), intramuscular fat (2.15 vs. 0.98%; $P < 0.01$), and collagen (1.36 vs. 1.22%; $P < 0.01$), and lower content of protein (18.7 vs. 22.8%; $P < 0.01$) and ash (1.14 vs. 1.34%; $P < 0.01$), in comparison with normal fillets. There was a great decline in myofibrillar (14.0 vs. 8.7%; $P < 0.01$) and sarcoplasmic (3.2 vs. 2.6%; $P < 0.01$) content and solubility as well as an increase in cooking loss (33.7 vs. 27.4%; $P < 0.05$) due to white striping defects. Moreover, gel electrophoresis showed that the concentration of 3 myofibrillar proteins corresponding to actin (42 kDa); LC1, slow-twitch light chain myosin (27.5 kDa); and LC3, fast-twitch light chain myosin (16 kDa), and almost all sarcoplasmic proteins were lower than normal. In conclusion, the findings of this study revealed that chicken breast meat with white striping defect had different chemical composition (more fat and less protein) and protein quality and quantity (low content of myofibrillar proteins and high content of stromal proteins) with respect to normal meat. Furthermore, white striped fillets had lower protein functionality (higher cooking loss). All the former changes indicate that white striping has great impact on quality characteristics of chicken breast meat.

Key words: chicken breast meat, white striping, myofibrillar protein, sarcoplasmic protein, protein solubility

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