Preparation of Surimi-like Materials Using Spent Hen

Geun Ho Kang, Sang Ho Kim, Jae Chun Na, Byoung Gui Jang, Ji Hyuk Kim, Dong Jo Yu, Duk Soo Lee, Sang Jin Lee, Seon Tea Joo[1] and Gu Boo Park[1]
Poultry Research Division, National Livestock Research Institute, RDA,
[1]Division of Applied Life Science and Technology, Graduate School,
Gyeonsang National University

Abstract

To investigate the manufacturing methods of surimi-like materials (SLM) from breast muscle of spent hen, the muscles were diced, chopped and washed with distilled water or sodium chloride solution at 0.1, 0.5 and 1% level and then washed with distilled water to extract myofibrillar protein. When used only distilled water to extract myofibrillar protein, washing was repeated 3 times followed by homogenization and centrifugation of breast muscle after each washing (CM; conventional method). Whereas, to extract myofibrillar protein using sodium chloride solution had sufficient to do 2 times washing by distilled water after 1 time washing by sodium chloride followed by homogenization and centrifugation of breast muscle after each washing (NM; new method). The both batter and cooked SLM gel from NM had significantly ($p<0.05$) lower redness compared with CM. Again, SDS-PAGE with sarcoplasmic protein fractions showed that the bands of phosphorylase had increased staining intensity in NM compared with CM. These results indicated that the brightness was related to sarcoplasmic protein fractions. SDS-PAGE with myofibrillar protein showed that the bands of myosin had increased staining intensity in NM compared with CM. Data implied that myofibrillar protein extraction with sodium chloride solution had the better adaptability for the breast muscle of spent hen then the commonly used distilled water method.

Introduction

It was determined that myofibrillar protein extracts from spent hen meat may be usedto improve the functional properties of whole muscle processed meats (Li, 2006). Nowsad et al. (2000) reported the thermal gelatin characteristics of breast and thigh muscles of spent hen and broiler and their surimi. Spent hen, another potential source of mince meat, and used as low priced mince products in Korea. Normally, spent hen is using until 75 to100 weeks of age for egg production, then these birds become available for using further processed products. The spent hen meat was know very tough, the toughness prevents its use in whole meat food and reduces the market value (Nurmahmudi & Sams, 1997). Xiong and Brekke (1991) found that spent hen myofibril gel was weaker than broiler myofibril gel under similar gelation conditions. Nowsad et al. (1999) investigated the gelation property of hen surimi and determined the optimum temperature/time schedule for heating of the

paste to obtain best textured gel. Therefore, the objective of this study was to investigate the effective of myofibrillar protein extraction method for manufacture surimi-like materials from spent hen.

Materials and Methods

Breast muscle of spent hen was obtained from a local meat plant in Korea. The conventional method for SLM manufacture procedure was used following the method of Kang et al. (2004) and the new method for SLM manufacture procedure in this study was doneusing sodium chloride solution (Sol) at different levels (0.1, 0.5 and 1%). All minced muscles were chopped in a homogenizer with water or Sol. The resulting slurry was filtered through a metal screen to remove connective tissues. The filtrate was centrifuged and the supernatant containing fat and water-soluble proteins was discarded. The sediment was remixed with water or Sol. When used only distilled water to extract myofibrillar protein, washing was repeated 3 times followed by homogenization and centrifugation of breast muscle after each washing procedure (CM; conventional method). Whereas, to extract myofibrillar protein using sodium chloride solution had sufficient to do 2 times washing by distilled water after 1 time washing by sodium chloride. The characteristics of myofibrillar protein were determined by color and SDS-PAGE.

Results and Discussion

There was significant difference in color measurements of batter and cooked SLM gel (Fig1, 2). The cooked SLM gel from NM was brighter than those from CM. Gel from NM had significantly ($p<0.05$) higher hue values, and lower redness values compared to gel from CM. Results suggested that some of sarcoplasmic proteins which phosphorylsae and some other enzymes in CM would not be excluded enough by water-washing procedure, responsible for color differences in SLM. SDS-PAGE with sarcoplasmic protein fractions showed that the bands of phosphorylase had increased staining intensity in NM compared with CM (Fig3). It was speculated that the sarcoplasmic proteins remained in SLM would affect on color. However, gel color of SLM was affected by protein extraction method also.SDS-PAGE with myofibrillar protein showed that the bands of myosin had increased staining intensity in NM compared with CM. Myofibrillar proteins play the most critical role during meat processing as they are responsible for cohesive structure and the firm textureof meat products (Xiong, 1997). It was suggested that myofibrillar protein extraction with sodium chloride solution might be the better method than commonly used distilled water for breast muscle of spent hen.

References

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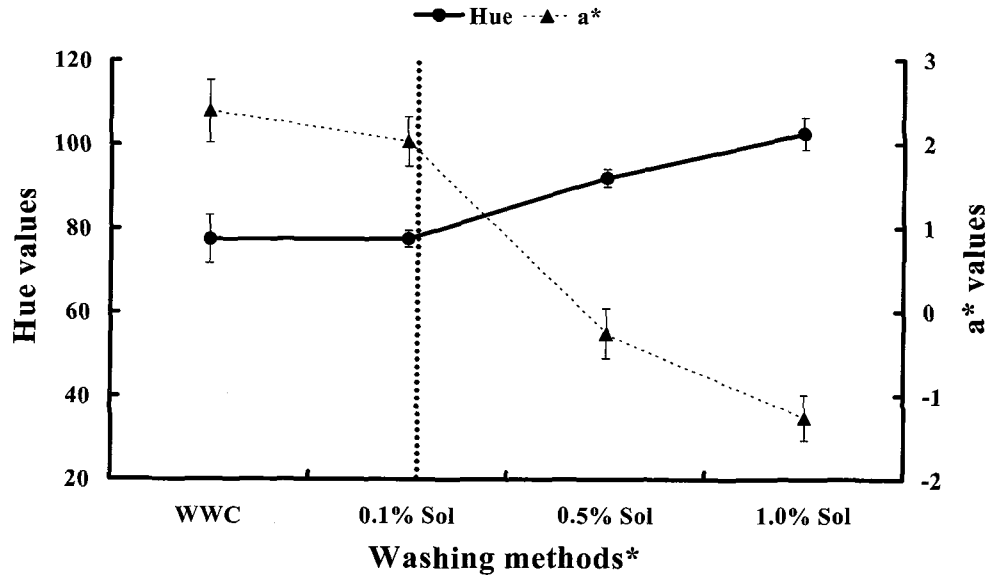

Fig1. Effect of myofibrillar protein extraction method on the color of washed chicken batter from spent hen breast meat. *WWC; water-washed chicken. *Sol; washed chicken by sodium chloride solution.

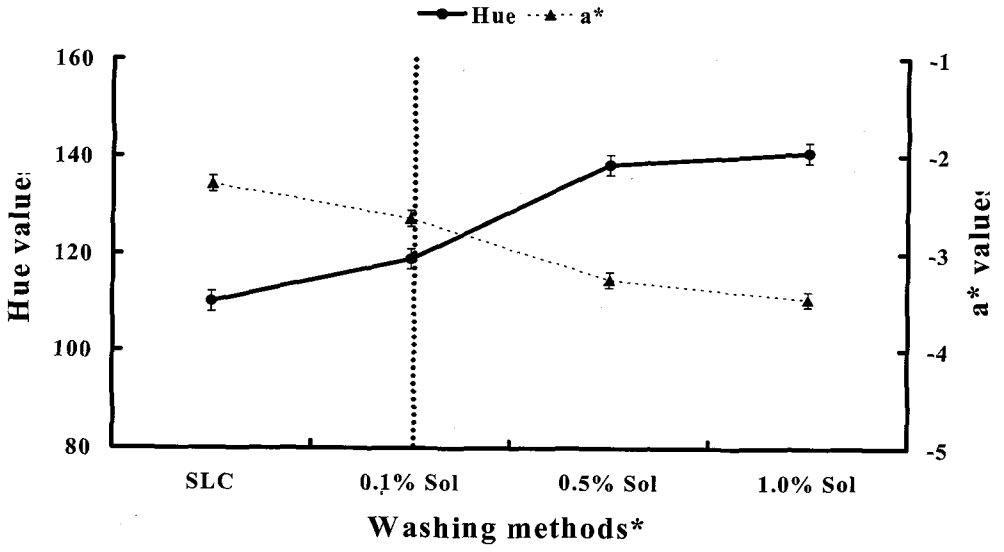

Fig2. Effect of myofibrillar protein extraction method on the color of cooked SLC gel from spent hen breast meat. *SLC; chicken-surimi by washed water, *Sol; chicken-surimi by washed sodium chloride solution.

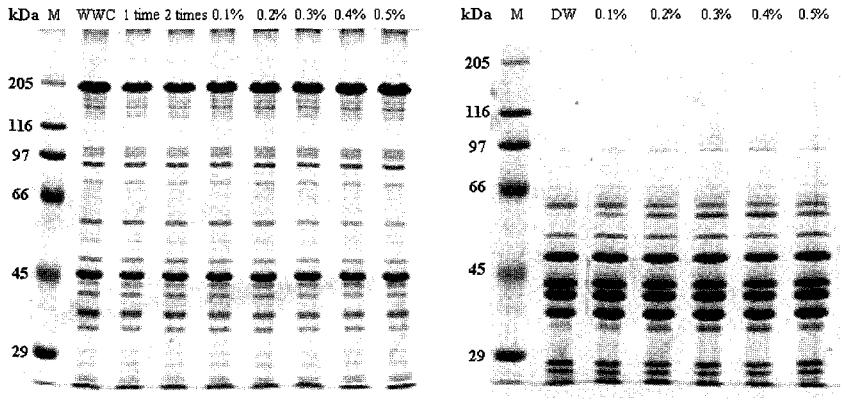

Fig3. SDS-PAGE patterns of myofibrillar (left) and sarcoplasmic (right) protein from breast muscle of spent hen. The myofibrillar (lanes 2-9) and sarcoplasmic (lanes 2-7) protein fractions, which were defined as the sediment and supernatant after the first water-washing and centrifugation. M denote protein molecular mass standards. WWC; water-washed chicken, times; 1st or 2nd wash by water, washing levels, %; concentration of sodium chloride for washing.