

Ultrasound-assistant sodium bicarbonate enhance the curing efficiency and tenderness of chicken breast meat

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Introduction

Curing is a widely used method in processing and preservation of meat and meat products to enhance meat quality, flavor, etc. However, there are a number of problems in the uneven distribution of salt, a long curing times in marinated meat. Therefore, the purpose of this paper is to investigate the effect of ultrasound-assisted curing with sodium bicarbonate on chicken breast.

Methods

Fifteen chicken breast meat (Huaibei hemp chicken, which were slaughtered by and obtained from Liulaoer Fuliji red-cooked chicken Co. Ltd. (Suzhou, Anhui, China), trimmed off all visible connective tissue, fat and skin) were randomly selected and evenly divided into three groups. WC group, chicken breast meat was marinated with solution A (6% salt) at 4 °C for 90 min. NC group, chicken breast meat was marinated with solution B (6% salt and 2% sodium bicarbonate) at 4 °C for 90 min; NUC group, chicken breast meat was marinated with solution B at 4 °C for 10 min, then marinated for 50 min under ultrasound (20 KHz, 300 W), next marinated for 30 min without ultrasound at 4 °C.

Results

The marinade absorptivity and chloride content of chicken breast meat using different curing methods were shown in Fig. 1. Compared with WC group, chloride content of NC group and NUC group increased by 8.44 % and 30.57 %, respectively. This might be caused by the addition of HCO₃⁻ increased the ionic strength and the interaction between molecules to change the protein network structure, resulting in an increase of mass transfer. Furthermore, the cavitation of the ultrasound produced negative pressure, which promoted the marinade absorptivity increased to 11.10%.

The NC and NUC group significantly increased the myofibrillar fragmentation index (MFI) ($P < 0.05$) (Fig. 2). It was likely that the charge of chicken protein increased after adding alkali solution. Protein was dissociated and degraded, resulting in increase of MFI. Moreover, the ultrasound had a strong physical destructive effect, which could destroy the spatial structure of the protein and further caused partial protein degradation.

Changes of microstructure of chicken breast were shown in Fig. 3. A quite compact fiber structure in WC group was observed in Fig. 3 A. NC group showed there was a clear gap between the adjacent muscle bundles of chicken breast tissue in Fig. 3 B. As for NUC group, the gap further in-

creased by ultrasound (Fig. 3 C). This phenomenon could be explained as that, ultrasound promoted the separation of muscle membrane by changing protein structure, which improved the curing effect.

Conclusion

Ultrasound-assisted curing with sodium bicarbonate can significantly improve the curing efficiency of chicken breast meat.

Notes

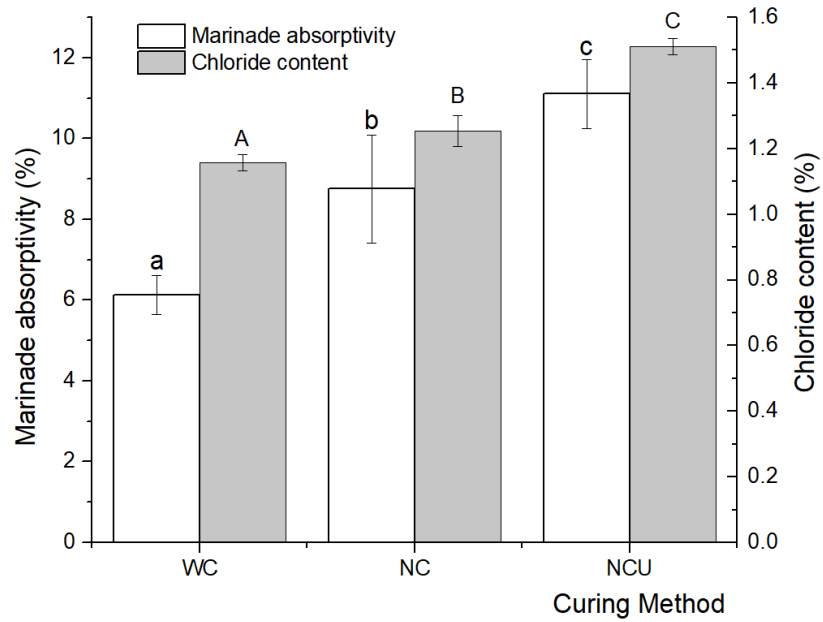


Fig. 1 Effects of different curing methods on marinade absorptivity and chloride of chicken breast

Note: different letters in the same column indicate significant differences ($P < 0.05$), the same below.

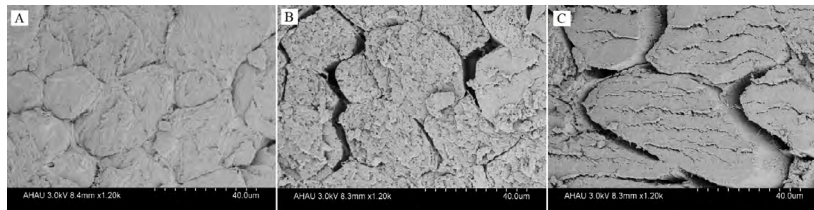


Fig.3 Effects of different curing methods on microstructure of chicken breast

Note: A showed the WC, B showed the NC, and C showed the NUC with a magnification of 1200 times.

Notes

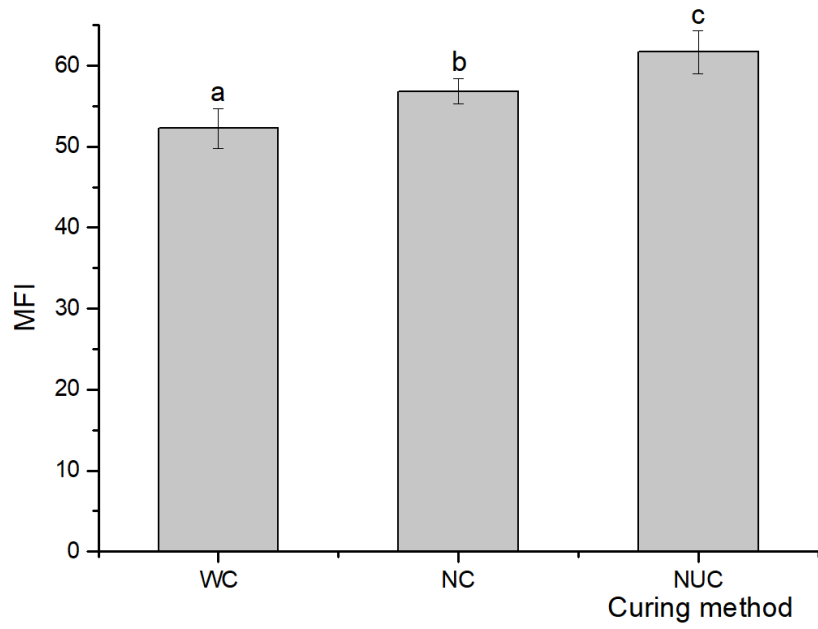


Fig 2: Effects of different curing methods on MFI of chicken breast

Notes