SDS-PAGE characteristics and dynamic rheological behavior of Chinese-style dried seasoned shredded pork as affected by injection, tumbling and curing time

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Background

Chinese-style dried seasoned shredded pork meats belong to traditional dried meat products. With the traditional processing methods, if we first choose pre-rigor mortis pork to boil directly, heat to shape, cut pieces to cook and dry, it will make it easily that make the myofibril and the connective tissue like endomysium, perimysium and epimysium denature because of the characteristics and heat temperature. Therefore, it will make the tissues of products hard, uneasy to chew and effect the reception of the consumers.

We plan to make the material meats tender by injecting sugar content pickle solution and using the vacuum-tumbling, different curing time to extend the ATPase activity (Lin et al., 1999), to increase the solubility of the myofibril proteins, to raise the functional characteristics of contractible proteins and then enhance the tenderness of products. Generally speaking we hope to use the method to improve the quality of traditional meat products and to elevate the consuming reception of dried-pork meats and apply it to meat processing industry.

Objective

The objective of this study was to elucidate the methods by using the sugar content pickle solution, the processes of injection, tumbling and curing to improve the myofibril protein activity, raise the functional properties of the contracitble proteins and enhance the products tenderness.

Methods

Pre-rigor mortis pork ham muscles were mchanically injected 20% sugar content pickle solution and vacuumed tumbled for 40 min, then cure it in the 0-4 ℃ refrigerator for 1,3,5,7 days. Not injected and tumbled in-tact pre-rigor muscle was used as a control sample. Brine pickle solutiion contain 6% sugar, 6% salt, 1.8% STPP, 0.3% Na-erythorbate, 0.12% $NaNO_2$, 85.78% ice water. In different cured days samples, the SDS-PAGE characteristics were determined according to Laemmli (1970) and Lin et al (1999); and dynamic rheologecal behavior (G' & G") were measured by Rheolograph Sol (Model S-1C, Toyoseiki, Tokyo, Japan)

Results and discussion

Results from SDS gel electrophoresis (Fig.1) showed that the degradation of myofibrillar proteins during curing periods after injected and tumbled treatments of raw materials of Chinese-style dried seasoned shredded pork (CDSSP) compared to control samples.

The sol-to-gel transition of raw materials of cured 1, 3, 5 and 7 days of CDSSP was monitored by changes in dynamic rheological behaviors (storage modulus, G'; loss modulus, G"), which results were shown in Fig. 2, 3 ,4 & 5. In all cases higher G' than G" values were observed except chilled 1 day of control sample, overall changes in G' of injected, tumbled and cured samples during heating to 80℃ were similar to changes in rigidity modulus of chicken surimi and myofibrillar proteins with soybean proteins reported by Smyth & O'Neill (1997) and Hayashi et al. (1995).

Conclusions

The application of injection, tumbling and curing treatments to Chinese-style dried seasoned pork was a successful means of improving the myofibril protein activity, raising the functional properties of the contracitble proteins and enhancing the products tenderness. Furthermore we need to compare the physicochemical properties of CDSSP to ensure this study.

References

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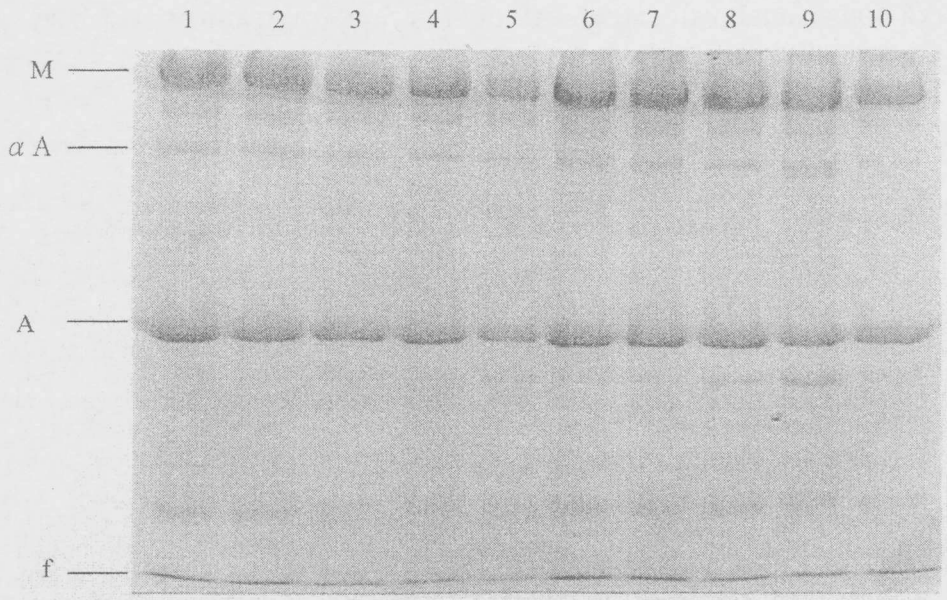

Fig. 1-Changes in myofibrillar proteins of Chinese-style dried seasoned shredded pork by injection and tumbling for curing 7-day at 4℃. Lane 1 to 5 were control samples, lane 6 to 10 were injection and tumbling samples（0-d=lane 1 and 6; 1-d=lane 2 and 7; 3-d=lane 3 and 8; 5-d=lane 4 and 9; 7-d=lane 5 and 10）. Abbreviations: M, myosin heavy chain; α A, α-actinin; A, actin; f, dye front.

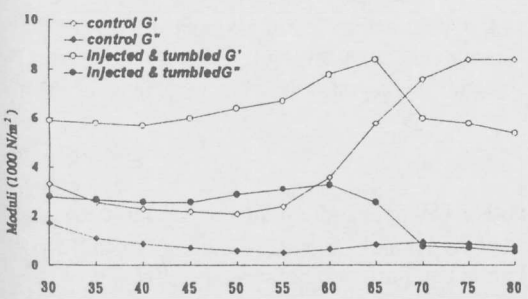

Fig.2-Storage (G') and loss (G") moduli measured from raw material samples of cured (0-5℃) 1 day Chinese-style dried seasoned shredded pork when heated from 30 to 80℃ at 1℃/min and held at 80℃ for 10 min

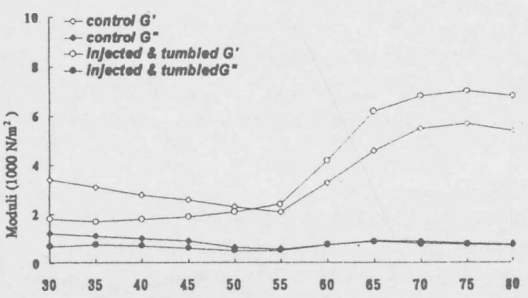

Fig.3-Storage (G') and loss (G") moduli measured from raw material samples of cured (0-5℃) 3 day Chinese-style dried seasoned shredded pork when heated from 30 to 80℃ at 1℃/min and held at 80℃ for 10 min

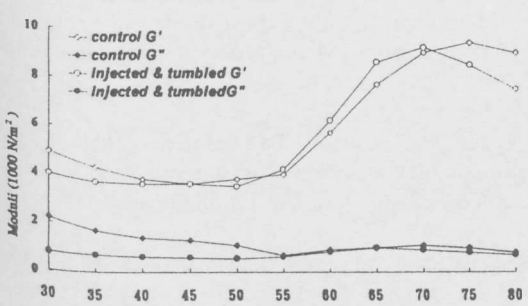

Fig.4-Storage (G') and loss (G") moduli measured from raw material samples of cured (0-5℃) 5 day Chinese-style dried seasoned shredded pork when heated from 30 to 80℃ at 1℃/min and held at 80℃ for 10 min

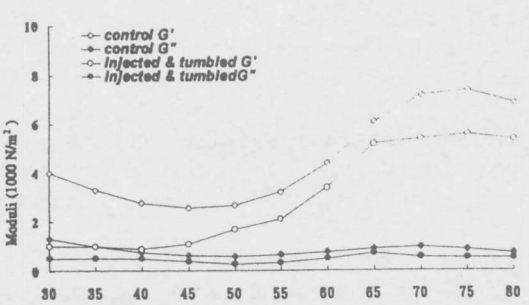

Fig.5-Storage (G') and loss (G") moduli measured from raw material samples of cured (0-5℃) 7 day Chinese-style dried seasoned shredded pork when heated from 30 to 80℃ at 1℃/min and held at 80℃ for 10 min