EFFECT OF HIGH PRESSURE ON THE WATER HOLDING CAPACITY OF MYOFIBRILLAR PROTEINS GEL

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Myofibrillar proteins accounts for 50%~55% of the total protein content in muscle, mainly composed of myosin and actin, which is soluble in high ionic strength solution (> 0.3 M), it is determine to the gel properties, such as water holding capacity, texture, shelf life, and so on. The high pressure processing is an emerging technology in the area of meat science, and myofibrillar proteins is sensitive to high pressure processing, especially the solubility and proteins conformation. The changes of myofibrillar proteins conformation is corrected with gel properties, because the β-sheet structure is based to form gel. The higher β-sheet structure content, the better gel structur was formed, which has a higher water holding capacity. The water holding capacity is a key factor of gel properties, in turn it could reflect the quality of the gel. Thus, the purpose of this work was to study the effect of high pressure on the water holding capacity of myofibrillar proteins gel.

Myofibrillar proteins was extracted from the chilled pork *longissimus dorsi.* The solutions at 40 mg/mL, pH 6.5 were treated under 100, 200, 300, 400, 500, 600 and 700 MPa for 5 min at 10 ± 2 ℃. During the processing, the high pressure was increased at a speed of 10 MPa/s to required values for 5 min and released to 0.1 MPa within 15 s. After high pressure, all samples were heated in a water bath at 80℃ for 20 min (internal temperature 72 ℃), then cooled immediately with running water and the water holding capacity was measured.

The result showed that at 100~300 MPa, the water holding capacity was significantly ($P < 0.05$) increased with the pressure levels increasing, the reason was possible that the pressure levels could induce the depolymerisation of myofibrillar proteins with a consequence of increasing solubility, the quaternary structure of myofibrillar proteins was dissociated and form a better gel structure during thermal, then the water holding capacity was improved. When the pressure levels at 400~700 MPa, the water holding capacity was significantly ($P < 0.05$) decreased with the pressure levels increasing. Because of the tertiary structure was completely destroyed and the secondary structure was partial changed during the high pressure processing from 400 MPa to 700 MPa, the solubility was decreasing, and α-helix and β-sheet structures changed into random coil and β-turn structures as the pressure levels increased, these reasons caused the gel structure deterioration.

Therefore, the high pressure has an important commercial and health benefit of the altered properties of myofibrillar proteins, which is their ability to form gels that have very high cook yields at 100~300 MPa.