



High Pressure Processing of Chicken Breast Meat: Effect of β -glucan on the properties of prepared Products

Dileep. A. Omana and M. Betti*

Summary

It is interesting for the industry to know the synergistic effect of temperature and pressure on proteins and its interactions with various ingredients during processing. This study helps to understand the changes in physico-chemical and textural properties of chicken breast meat proteins as affected by various additives, such as NaCl, sodium polyphosphate (STPP) and β -glucan (BG).

Problem

Temperature assisted high pressure processing is having huge potential for the food industry since high pressure can assist in texture modifications of the products. With the synergistic effect of temperature and pressure gel type of products can be prepared at very low temperatures; hence preserving the nutritional quality of the products. There is a need to understand the quality of the products as affected by different ingredients during these temperature - pressure combinations. Addition of β -glucan helps in preparation of functional foods with nutraceutical importance.

Hence the major objectives of the study were:

- To find the effect of various temperature and pressure combinations on the biochemical and textural properties of chicken breast meat proteins
- To investigate the effects of different ingredients like NaCl, STPP and BG on textural and biochemical properties of high pressure processed chicken breast meat products

Our Approach

Chicken breast meat with/without additives was packed in cryovials (2 mL capacity) and was processed at different combinations of pressure and temperature. The prepared products were kept at 4°C overnight for analyses. Oat β -glucan concentrate (product name: Viscofiber®) used in the present study was obtained from Nutraceutical Canada Inc. (Edmonton, AB, Canada). Variables used in the present study are shown in Figure 1.

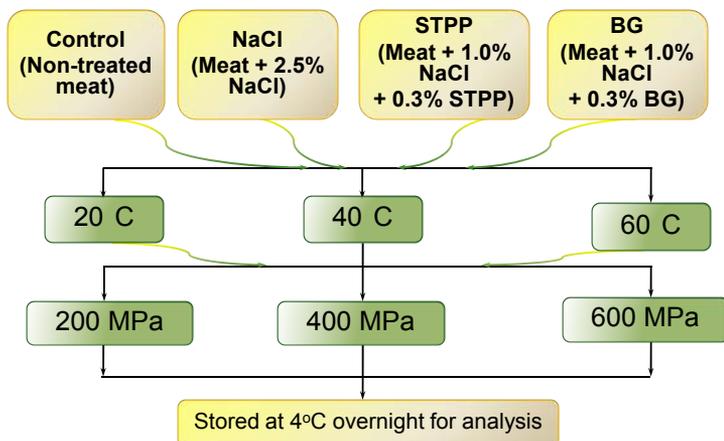


Figure 1. Flow diagram of experimental design



Figure 2. High Pressure Processing Machine (U111, UNIPRESS equipment division, Warsaw, Poland)

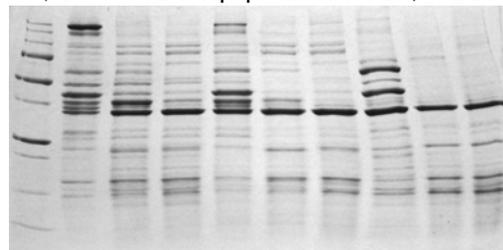


Figure 3. SDS-PAGE profile of proteins as affected by pressure and temperature

Observations

Total solubility and hardness values revealed that 600 MPa pressure and 40°C are critical for gelation of STPP samples. Gel hardness values showed an increasing trend with increase in pressure and temperature; however there was no significant difference between the NaCl and BG samples processed at 40°C/60°C irrespective of the applied pressure indicating that BG can be a better substitute of NaCl. Gel formation as a function of pressure and temperature is further evident from SDS-PAGE profile (Fig. 3). NaCl was found to induce protein oxidation as revealed by carbonyl content. Anti-oxidant property of β -glucan was evident from lipid oxidation analysis of temperature assisted high pressure processed products.

Conclusion

The study revealed the possibility of preparing products with reduced levels of sodium chloride and in the absence of polyphosphate without compromising the functional properties. Enhanced anti-oxidant activity was evident in BG added samples.

Acknowledgements

This study was supported by funds provided by Alberta Livestock Meat Agency (Edmonton, AB, Canada).

Contact Information

*Dr. Mirko Betti, PhD
Assistant Professor
University of Alberta
Phone: (780) 248-1598
E-mail: Mirko.Betti@ales.ualberta.ca