

Influence of Freeze-Thaw Cycles on Protein Integrity and Quality of Chicken Meat

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Abstract : Meat quality is always subject to consumer scrutiny when purchasing from retail markets on mislabeling as fresh meat. Various physiological and biochemical changes influence the quality of meat. As a major component of muscle tissue, proteins play a major role in muscle foods. In meat industry, freezing is the most common form of storage of meat products. Repeated cycles of freezing and thawing are common in restaurants, kitchen, and retail outlets and can also occur during transportation or storage. Temperature fluctuation is responsible for physical, chemical, and biochemical changes. Repeated cycles of 'freeze-thaw' degrade the quality of meat by stimulating the lipid oxidation and surface discoloration. The shelf life of meat is usually determined by its appearance, texture, color, flavor, microbial activity, and nutritive value and is influenced by frozen storage and subsequent thawing. The main deterioration of frozen meat during storage is due to protein. Due to the large price differences between fresh and frozen-thawed meat, it is of great interest to consumer to know whether a meat product is truly fresh or not. Researchers have mainly focused on the reduction of moisture loss due to freezing and thawing cycles of meat. The water holding capacity (WHC) of muscle proteins and reduced water content are key quality parameters of meat that ultimately changes color and texture. However, there has been limited progress towards understanding the actual mechanisms behind the meat quality changes under the freeze-thaw cycles. Furthermore, effect of freeze-thaw process on integrity of proteins is ignored. In this paper, we have studied the effect of 'freeze-thawing' on physicochemical changes of chicken meat protein. We have assessed the quality of meat by pH, spectroscopic measurements, Western Blot. Our results showed that increase in freeze-thaw cycles causes changes in pH. Measurements of absorbance (UV-visible and IR) indicated the degradation of proteins. The expression of various proteins (CREB, AKT, MAPK, GAPDH, and phosphorylated forms) were performed using Western Blot. These results indicated the repeated cycles of freeze-thaw is responsible for deterioration of protein, thus causing decrease in nutritious value of meat. It damages the use of these products in Islamic Sharia.

Keywords : chicken meat, freeze-thaw, halal, protein, western blot

Conference Title : ICHR 2015 : International Conference on Halal Research

Conference Location : Istanbul, Türkiye

Conference Dates : October 26-27, 2015