Improvement of gelling properties of dried egg white

Akihiro HANADA
R&D Division, Kewpie Corporation, 5-13-1 Sumiyoshi-cho, Fushu-shi, Tokyo 183-0034, Japan

Egg white (EW) is an important ingredient in food processing because of its variety of functional properties such as gel formation, water-holding property, foaming capacity, and emulsifying ability. Above all, heat-induced gelation and water-holding properties are widely applied in surimi, meat, and noodle products.

Although there are many kinds of dried egg white (DEW) products in the world with different gelling properties, few studies have been conducted to compare the protein structure and the gelling properties of DEW products. This study was conducted to investigate the relationship between protein structure and aggregation, as well as gelling properties, of DEW products.

Seven DEW products with different gelling properties were used for this study. Average molecular weight of DEW soluble protein aggregate was determined by a multiangle laser light scattering photometer. Hydrophobicity was measured using 1-anilino-8-naphthalene-sulrate. The concentration of SH groups was determined using Ellman’s reagent. Heat-induced gels were prepared by heating DEW solutions with 12.5% solid content at 80 °C for 40 min. Breaking strength and breaking strain of the gels were measured using a rheometer.

Strong correlations were found between average molecular weight and hydrophobicity plus surface SH groups of DEW soluble protein aggregate. The average molecular weight of DEW products with alkaline pHs were relatively higher than those with neutral pHs and the same degree of protein unfolding, probably because of more disulfide bond formation between protein molecules. In addition, strong correlations were found between hydrophobicity, surface SH groups plus average molecular weight of DEW proteins, and physical properties of the gels from DEW products. These data indicated that controlling the aggregation of DEW proteins is crucial to gelling properties of DEW.