

Sopida Panyanuan 2013: Application of Crude Proteolytic Enzyme Extract from Duck Intestine and Pancreas for Production of Egg White Protein Hydrolysate. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Wunwiboon Garnjanagoonchorn, Ph.D. 122 pages.

In this study, proteolytic enzyme from duck intestine and pancreas were extracted and used to hydrolyze chicken egg white protein. The hydrolysis results were compared with commercial papain. The crude enzyme powder showing high proteolytic activity and stability at pH 8.0 and 50°C with activity of 0.20 ± 0.01 unit/mg enzyme. Therefore, this condition was used for egg white proteins digestion. Moreover, pH 7.0 and 40°C was provided for papain digestion. Heating time (5, 10, 15, 20, 25, 30, 35 and 40 minutes) at 75°C were studied to unfold egg white proteins concentration of 5.5% prior to digestion. Significant increases ($P \leq 0.05$) in viscosity of protein solutions with increasing heating time and gel formation were observed after 25 minutes. Therefore, heating at 75°C for 20 minutes was carried then the solution was diluted to a protein concentration of 2%. Hydrolysis of egg white proteins with crude enzyme and papain (1unit/50mg egg white proteins) at various hydrolysis times of 1, 2, 4, 6 and 8 hours were carried out at optimum conditions of individual enzyme. The results showed that yield (%) and nitrogen recovery (%) of crude enzyme digested hydrolysate were higher than those from papain digestion ($p \leq 0.05$). Moreover, both crude enzyme and papain could produce hydrolysates containing small peptides. Hydrolysis of egg white protein with crude enzyme produced a decrease in high molecular weight peptides (45-200 kDa) composition with an increase in low molecular weight peptides (14-21 kDa) when increasing hydrolysis time (1-8 hours). Papain digestion produced hydrolysate containing peptides with molecular weight less than 31 kDa and showed no change with time of hydrolysis. Molecular weight pattern of egg white hydrolysate prepared either with crude enzyme or papain showed reduction of protein bands intensity at 14.3, 28, 45 and 78 kDa (presuming lysozyme, ovomucoid, ovalbumin and ovotransferrin, respectively) which indicated the reduction of allergenic proteins. Hydrolysis of egg white proteins using crude enzyme followed by papain showed difference of degree of hydrolysis (DH) when compared with either crude enzyme or papain (9.52% crude enzyme followed by papain; 3.06% crude enzyme; 18.77% papain). Produced hydrolysates, which composed of small amount of allergenic egg white proteins, could be used as a food ingredient for hypersensitive consumer. Thus papain showed high efficiency in reducing molecular weight of egg white protein in to small peptides. However, crude enzyme from duck intestine and pancreas could also be used but required further study.

Student's signature

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