Thesis Title	Tofu powder production and its application in fish emulsion
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ABSTRACT

Soy protein is incorporated in meat emulsion products to improve product quality through its emulsifying and structure forming. However, soy protein is imported from oversea and costly**,** while tofu powder is the soy protein product that could be substituted for soy protein isolate in meat emulsion products. The qualities of tofu powder are influenced by the processing which includes soybean quality and processing conditions such as the coagulants and drying process. Therefore, in the present study, the effect of soybean varieties and tofu powder processing on the quality of tofu powder was determined. Soybean varieties (CM 60, SJ 5 and ST 2), the commercial coagulants (2.2% $CaSO_4$, 3.0% $CaCl_2$, 2.2% $MgSO_4$ and 3.0% $MgCl_2$) and drying methods (tray dryer, drum dryer and freeze dryer) were studied with respect to their effects on the quality of tofu powder. Soybean varieties influenced the quality of soybean and soymilk, and also affected the functional properties of tofu powder, whereas tofu powder obtained from CM 60 had high yield and good functional properties. Calcium ion coagulant inducing tofu powder resulted in a high solubility while magnesium ion inducing tofu powder gave a high emulsion activity. The tofu powder obtained from freeze drying method had a high solubility and high emulsion activity but it had low emulsion stability.

Tofu powder and carrageenan have been used as texture modifying agents in meat emulsion. Tofu powder (20, 40, 60 and 80%), a protein replacement for surimi in form of a pre-emulsion to formulate emulsion gels affected on the functionalities, textural parameters, and microstructure of the gels. The addition of tofu powder increased the emulsion stability, water holding capacity (WHC) and hardness of the gels. Microstructural observations supported the texture profile analysis (TPA) and functionality results. Evaluation was carried out on the addition

of carrageenan at various concentrations (0.25, 0.5 and 0.75%) to the gel that was replaced by 80% of the surimi with tofu powder. Increasing the concentration of carrageenan also improved the stability of the emulsion, WHC and hardness of the gels. Microstructural observations showed that the addition of carrageenan resulting in a smoother and more compact gel network. The selected gel product was formed by incorporating 60% tofu powder for more consumers.

The response surface methodology (RSM) was used for the experimental design to determine the optimal soybean oil and carrageenan level in producing the gel. Significant regression models explained the effects of different soybean oil and carrageenan concentrations on sensory qualities (preference test and quantitative descriptive analysis) and TPA. The coefficients of determination, R^2 of those response variables were higher than 80%. Peak in RSM plots were extrapolated the optimum levels ingredient. The optimum gel formula was 9.36% soybean oil and 0.44% carrageenan which gave desirability of 0.92. Consumer acceptance testing indicated that the gel was well accepted.