Nantarat Na Nakornpanom 2009: Influences of Food Matrix on Protein Digestibility and Oil Release of High-Caloric Emulsion under *In Vitro* Gastrointestinal Conditions. Doctor of Philosophy (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Parichat Hongsprabhas, Ph.D. 120 pages.

This study investigated the effects of heat treatment sequence, calcium lactate concentration (0, 25, and 100 mM), and soy residue (okara) addition on the fabrication of protein matrix at the oil-water interface of the liquid food emulsion. The modeled pasteurized oil-in-water liquid emulsion contained 3.75% (w/v) protein from sodium caseinate and soy protein isolate, 2.0 % (w/v) cassava starch, 11.75 % (w/v) cassava maltodextrin and 3.33 % (v/v) rice bran oil. The MW of proteins and peptides, % oil released and microstructure of liquid emulsion subjected to peptic and tryptic digestion over time, in the absence or presence of bile acid, were investigated. The *two-stage heating process* applied during emulsion preparation led to the slower release of free fat under stomach condition compared with the *one-stage heating process* ($p<0.05$) due to the longer lag phase prior to oil release. Calcium lactate-induced protein aggregation led to the formation of large MW (>250 kDa) at the interface. Increasing calcium lactate concentration did not have significant effect on free oil released after peptic digestion ($p\geq0.05$). Nevertheless, at 100 mM calcium lactate, the proteins at the interface was increased, compared with those at the lower calcium lactate and there was no oil separated after 30 min tryptic digestion, particularly when bile acid was also present. The presence of pectinase-hydrolyzed okara in the emulsion subjected to the *two-stage heating process* prolonged the lag phase required before the release of oil. However, the oil released to the high extent after tryptic digestion for 30 min. This study has demonstrated that the protein matrix at the interface and in the bulk phase influenced the release of oil by prolonging the lag phase or shortening the lag phase during peptic digestion. From industrial standpoints, the production of healthy foods with controlled digestion and nutrient releases can be facilitated by controlling the preferential adsorption of protein types at the oil-water interface, induction of protein or peptide re-adsorption at the interface and/or changing the matrix composition at the oil-water interface. These approaches can be manipulated by protein choices and emulsification procedure.

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