Ornpicha Jongsutjarittam 2014: Influence of Extrusion on Physicochemical Properties of Waxy Rice Flour and Its Application. Doctor of Philosophy (Food Science), Major Field: Food Science, Department of Food Science and Technology.Thesis Advisor: Associate Professor Sanguansri Charoenrein, Ph.D. 119 pages.

The main objective of this study was to investigate the potential of waxy rice flour (WRF) substitution for wheat flour (WF) in order to reduce the amount of imported wheat as well as add the value of the waxy rice by using frozen cake as a model for studying. This research was divided into 3 parts: firstly, the effect of WRF substitution for WF on the properties of freeze-thawed cake was studied; secondly, the physical modification of WRF with different water feeding material in extrusion process was applied to modify the properties of WRF; lastly, the extruded waxy rice flour (exWRF) was substituted for WF to improve the properties, especially moisture loss, of freeze-thawed cake. In the second and third parts, rice flour was also studied in order to compare with WRF. The result indicated that repeated freeze-thaw cycles led to an increase in firmness and amylopectin retrogradation, and a denser matrix surrounding the air pores of WF cake, compared to those of fresh-baked cake. Sensory evaluation showed an increase in firmness and a decrease in firmness acceptability of freeze-thawed cakes. However, freeze-thawed cake with 10% w/w WRF substitution had significantly less firmness, less dense matrix and more acceptability than freeze-thawed WF cake. Although, native WRF could delay an increase in firmness, the moisture content of freeze-thawed cake continuously decreased after repeated freezing and thawing. Therefore, extrusion process was applied to modify the properties of WRF for improving the water absorption ability. As expected, the extruded flour had higher water absorption index than native flour. The result also indicated that extrusion caused molecular degradation, as observed by lower glass transition temperature and higher water solubility index, disruption of crystallinity and gelatinization. After that, extruded WRF was used to substitute for WF in frozen cake. Freeze-thawed cake with exWRF substitution had less moisture loss, firmness and dense matrix, and consequently obtained higher acceptance score than freeze-thawed WF cake. Substitution of exWRF had more pronounce effect on improvement of freeze-thawed cake than native WRF. Thus, exWRF could be used for WF substitution to improve the quality of freeze-thawed cake.

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