

Pornpisa Prasertthaijaroen 2012: Improvements Quality of Frozen Cooked Rice (*Oryza sativa* L.) cv. Khao Dawk Mali 105. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Sanguansri Charoenrein, Ph.D. 146 pages.

The objective in this study was to improve the textural quality of frozen cooked rice cultivar Khao Dawk Mali 105 (KDML 105) after subjecting to multiple freeze-thaw cycles up to 5 cycles. This research divided into three experiments. In the first experiment, the correlate of the instrumental of the texture measurement (compression and extrusion test) with the sensory evaluation of frozen cooked rice was studied. The results showed that higher linear correlations from extrusion test with sensory evaluation than compression test for hardness and stickiness. In addition, compression test did not represent overall texture of frozen cooked rice because only a few grains were used in measurement. In the second experiment, the effect of waxy rice (RD 6), waxy rice flour (WRF) and konjac glucomannan (KGM) addition to frozen cooked rice were investigated. The results showed that the freeze-thaw cooked rice had a tendency of increased hardness and decreased stickiness with subsequent freeze-thaw cycles, most notably after three such freeze-thaw cycles. The frozen cooked rice containing 10% RD 6 had the lowest hardness and the frozen cooked rice containing 0.8% WRF had the highest stickiness subsequent to four and five freeze-thaw cycles, respectively. Analysis by scanning electron micrographs revealed that the addition of 0.8% WRF reduced the size of ice cell cavities and spongy structure after five freeze-thaw cycles. It is possible that the WRF gel coats the surface and absorbs within the cooked rice which helps to reduce the changes in texture and microstructure of the frozen cooked rice. In the last experiment, the frozen cooked KDML 105 rice without and with 0.8% WRF were frozen at three freezing rate (slow (0.082°C/min), medium (1.821°C/min) and fast (3.227°C/min)). The results showed that the cooked rice with WRF frozen at fast freezing rate was more effective maintained the textural properties, microstructure and reduced starch retrogradation of cooked rice after freezing and thawing than medium and slow freezing rate. It is possible that the fast freezing rate produced numerous homogeneously small ice crystals embedded in a thin rice matrix. The variation in the microstructure appeared to correspond closely to both the increased hardness and decreased stickiness values. It is concluded that the best condition to most effectively improve frozen cooked rice was adding of 0.8% WRF with fast freezing rate.

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Thesis Advisor's signature