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学 位 論 文 題 目	<b>INVESTIGATION OF CHANGES IN COOKED RICE ATTRIBUTES  BY ADDING VARIOUS MANIPULATIONS AND SUPPLEMENTS</b> 各種操作や物質の添加による米飯の特性変化の調査		
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## 論 文 内 容 の 要 旨

This study investigated the physicochemical modifications of cooked rice caused by adding various supplements with various manipulations. Firstly, rapeseed oil, dried chili pepper, and mustard powder were added into cooked rice. The physicochemical and digestive properties were examined by applying multiple analysis techniques and how they affected cooked rice quality, including starch digestibility. All samples adding supplements showed an increase in surface firmness (0.77-0.95 N) and a decrease in thickness (2.23-2.35 mm) and surface adhesiveness (1.43-7.22 N). Cooked rice adding rapeseed oil showed the opposite trend for the overall firmness against others and retard the starch hydrolysis rate. That could be considered due to its reinforced structure and the presence of a lipid layer, which inhibits the penetration of enzymes as physical barriers. A decrease in hydrolysis rate was also observed in the samples adding dried chili pepper and mustard powders. This might be attributed to the effects of inhibiting enzymes by releasing substances. The content of resistant starch (RS) and slowly digested starch (SDS) was increased in all samples by adding supplements. These results suggested the formation of amylose-guest molecule complexes, potentially enhancing functional starch. Lipid has crucial applications for improving the quality of starchy products. Herein, the influence of lipid modification and thermal treatment on the physicochemical properties and starch digestibility of cooked rice prepared with varied addition manipulations was investigated. Rice bran oil (RO) and medium chain triglyceride (MCT) oil manipulations were performed either before (RO\_BC, MO\_BC) or after (RO\_AC, MO\_AC) cooking. Gas Chromatography-Mass Spectrometry (GC-MS) was applied to determine the fatty acid (FA) profiles. Nutritional quality was analyzed by quantifying total phenolics, atherogenic (AI), and thrombogenic (TI) indices. All complexes exhibited higher surface firmness, a soft core, and less adhesive. FTIR spectrum demonstrated that the guest chemistry component affected some of the dense structural attributes of V-amylose. The kinetic constant (k) was in the range between 0.47 and 0.86 min<sup>-1</sup> wherein before mode presented a higher value. The lowest glucose release was observed in the RO\_BC sample, whereas the highest complexing index (CI) was observed in the RO\_AC sample,

indicating that the dense molecular configuration of complexes that could resist enzymatic digestion was more critical than the quantity of complex formation. Despite the damage caused by mass and heat transfer, physical barrier, intact granule forms, and strengthened dense structure were the central contributors affecting the digestion characteristics of lipid-starch complexes.