THERMAL STABILITY OF PALM OLEIN ENRICHED WITH FULLY HYDROGENATED RAPESEED OIL DURING HEATING AND DEEP-FRYING

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Bogor, December 2025

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SUMMARY

FADHIL BAYU PRATAMA. Thermal Stability of Palm Olein Enriched with Fully Hydrogenated Rapeseed Oil during Heating and Deep-Frying. Supervised by PURWIYATNO HARIYADI and DIAS INDRASTI.

The thermal stability of palm olein enriched with fully hydrogenated rapeseed oil (FHR) a material rich in very-long-chain saturated fatty acids (VLCSFA) was evaluated based on its physicochemical changes during heating and frying treatments. FHR was used as a source of VLCSFA, mainly contributing to behenic and other long-chain saturated fatty acids. Profiling was performed using solid fat content (SFC), oxidative stability (OSI), and iodine value (IV) parameters. Thermo-oxidative parameters, including peroxide value, anisidine value, total oxidation (Totox), total polar compound (TPC), free fatty acid, color, and fatty acid composition, were evaluated during heating and frying treatments. TPC was used as a key parameter in assessing the thermal stability of frying oil. The result showed that the addition of 7.5% FHR gave the longest OSI (10.93 hours at 120°C). On the other hand, its TPC in continuous heating treatment at 175±5°C for five consecutive days required 18.65% longer time to reach 25% TPC than the control, followed by its color. In terms of fry life, 7.5% FHR enhanced the fry life of palm olein by about 18% at 165±5°C in chicken nugget frying applications. FHR addition also resulted in the lowest reduction of polyunsaturated fatty acid (PUFA) during heating and frying treatments, respectively (38.60% and 11.5%), compared to the control (76.14% and 17.5%). In conclusion, enriching palm olein with FHR as a VLCSFA source enhanced thermal stability. Indicated by improved oxidative stability, slower TPC increase, lower PUFA decrease and color retention ability.

Keywords: *palm oil, fully hydrogenated rapeseed oil, very-long-chain saturated fatty acids, fry life, oxidative stability, total polar compounds*

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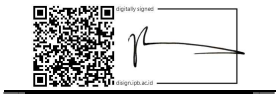

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PREFACE

The author thanks Allah SWT for His mercy and guidance, which made it possible to complete this thesis titled "Thermal Stability of Enriched Palm Olein with Fully Hydrogenated Rapeseed Oil during Heating and Deep-Frying" as a requirement for a degree at IPB University. This research was part of the academic journey in the Master of Food Technology, Faculty of Agricultural Engineering and Technology, IPB University. Completing this thesis has been a valuable learning experience, both academically and personally.

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Hopefully this research will be useful for the future of food science and technology development.

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