

**FORTIFIKASI MINYAK SAWIT MERAH SEBAGAI SUMBER  
PROVITAMIN A PADA SUSU REKOMBINASI : KAJIAN PENGARUH  
NILAI HLB, KONSENTRASI *EMULSIFIER*, DAN JENIS  
HOMOGENISASI TERHADAP STABILITAS EMULSI**

**INTISARI**

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Minyak sawit merah berpotensi sebagai fortifikan provitamin A pada susu rekombinasi minyak sawit merah karena memiliki kandungan karotenoid yang tinggi. Pembuatan susu rekombinasi minyak sawit merah memiliki prinsip yang sama dengan pembuatan emulsi minyak dalam air yang memiliki berbagai mekanisme ketidakstabilan emulsi. Untuk menciptakan emulsi yang stabil, perlu dilakukan pengkajian lebih lanjut terhadap faktor-faktor yang mempengaruhi stabilitas emulsi seperti pengaruh jenis *emulsifier* (berdasarkan nilai HLB), konsentrasi *stabilizer*, konsentrasi *emulsifier*, perlakuan *aging* dan proses homogenisasi. Stabilitas emulsi di evaluasi menggunakan uji stabilitas emulsi, viskositas emulsi, kenampakan visual dan mikroskopis emulsi, serta ukuran dan distribusi droplet emulsi.

Hasil penelitian menunjukkan bahwa emulsi susu rekombinasi minyak sawit merah dengan *emulsifier* bernilai HLB 9 memiliki intensitas *creaming* yang paling rendah dibandingkan emulsi dengan *emulsifier* bernilai HLB 8 sampai 15. Penambahan konsentrasi *stabilizer* berupa gum arab hingga konsentrasi 0,25% tidak memberikan efek penghambatan laju pembentukan *creaming* pada emulsi karena peningkatan viskositas yang dihasilkan tidak terlalu besar. Pada variasi konsentrasi *emulsifier* serta perlakuan *aging* dan tanpa *aging* menunjukkan bahwa peningkatan konsentrasi *emulsifier* memberikan peningkatan stabilitas emulsi yang terlihat dari hasil pengamatan visual emulsi dan uji stabilitas emulsi. Perlakuan *aging* pada pembuatan emulsi menunjukkan mekanisme penghambatan laju pembentukan *creaming* karena adanya peningkatan viskositas yang terjadi selama proses *aging*. Selain itu, adanya perbedaan proses homogenisasi dengan menggunakan *homogenizer* yang berbeda (*ultra-turrax* dan ultrasonik) menunjukkan perbedaan ukuran, distribusi droplet serta kenampakan mikroskopis pada emulsi yang dihasilkan. Kenampakan mikroskopis emulsi yang dihasilkan hanya menggunakan *homogenizer* ultra-turrax menunjukkan ketidakstabilan emulsi berupa peristiwa koalesen dan flokulasi dalam jumlah yang besar.

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Kata Kunci : *Emulsifier*, HLB, *homogenizer*, karotenoid, stabilitas emulsi, minyak sawit merah, susu rekombinasi, *stabilizer*.

**RED PALM OIL FORTIFICATION AS SOURCE OF PROVITAMIN A IN  
RECOMBINED MILK: STUDY THE EFFECT OF HLB VALUE,  
EMULSIFIER CONCENTRATION, AND TYPES OF  
HOMOGENIZATION ON EMULSION STABILITY**

**ABSTRACT**

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Red palm oil has the potential usage to fortify or provide provitamin A in recombined milk because of its high carotenoid content. Making recombined milk with red palm oil is similar to the procedure of making oil-in-water emulsions that have various emulsion instability mechanisms. It is necessary to conduct further studies on the factors that affect emulsion stability such as the effect of the emulsifier type (based on its HLB value), emulsifier concentration, stabilizer concentration, aging treatment, and homogenization types. Then, emulsion stability was evaluated using emulsion stability test, emulsion viscosity, visual and microscopic appearance, and the size and distribution of emulsion droplets.

Results showed that red palm oil recombined milk produced from emulsifier with HLB 9 had the lowest creaming intensity in compared to emulsions that produced from emulsifier between HLB 8 until 15. However, the addition of stabilizer (gum arabic) until 0,25% concentration did not give an effect on inhibition of creaming formation because the viscosity enhancement was not high enough. The variance of emulsifier concentration and with-or-without aging treatment in emulsion showed that the increasing of emulsifier concentration gave an improvement in the stability of emulsion as observed from the visual appearance and emulsion stability test. Conducting aging treatment in emulsion showed suppression mechanism on creaming rate due to increasing of viscosity during the aging treatment. Furthermore, different homogenization process using homogenizer ultra-turrax and ultrasonic produced differences in size, droplet distribution, and microscopic appearance of emulsion. The emulsion produced using ultra-turrax homogenizer showed the instability mechanism such as massive coalescence and flocculation that observed in the microscopic appearance of the emulsion.

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Keywords: Emulsifier, HLB, homogenizer, carotenoids, emulsion stability, red palm oil, recombined milk, stabilizer.