

# From Coconut to Palm: A Tech-Driven Transformation in Kaya Spread Formulation

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### **Abstract:**

Kaya is a traditional Southeast Asian spread commonly made with coconut milk. However, the environmental limitations of coconut farming have spurred interest in sustainable alternatives such as palm-based milk, which offers higher yield and resource efficiency. This study investigates the substitution of coconut milk with palm-based milk in kaya formulation, supported by the application of innovative analytical technologies to ensure food quality and safety. Three formulations—100% coconut milk (control), 100% palm-based milk, and a 50:50 blend—were developed and assessed through a series of physicochemical and structural analyses. pH monitoring confirmed comparable acidity across all samples, supporting microbiological stability. Rheological profiling using a precision rheometer revealed shear-thinning behaviour in all formulations, with palm-based milk yielding lower shear stress and improved flow characteristics. Particle size analysis via laser diffraction demonstrated a more uniform and finer dispersion in palm milk formulations. Colorimetric assessment showed superior brightness retention (higher L\* values) in the palm-based sample, while texture analysis indicated enhanced stickiness and flexibility, key attributes for consumer-acceptable spreads. These findings highlight the value of integrating advanced instrumentation including rheometer, laser

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diffraction, and texture profiling in evaluating functional and safety aspects of formulation innovation. Palm-based milk proves to be a viable and sustainable ingredient that maintains or enhances key quality parameters in kaya spread, making it suitable for broader adoption in traditional food systems.

### **Keywords:**

palm milk, kaya spread, rheology, food quality, analytical technology, sustainable formulation.