

# The Effect of Temperature and Reheating Times on Emulsion Stability of Kuah Laksan as Traditional Food from Palembang Indonesia

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# The Effect of Temperature and Reheating Times on Emulsion Stability of Kuah Laksan as Traditional Food from Palembang Indonesia

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## Abstract

Laksan is one of the traditional foods from Palembang. Laksan similar to pempek but eaten with coconut milk. Laksan usually consumed in hot conditions, so there is a recurring warming. Coconut milk as the main ingredient in kuah laksan, an ingredient that is susceptible to physical and chemical changes when heated. The physical changes that occur are changes in the emulsion stability. The purpose of this study to determine the effect of heating on the emulsion stability of kuah laksan after experiencing repeated heating. The results showed that the most stable emulsion in kuah laksan contained on heating at a temperature of 80 OC is indicated by the smallest slope are -0.066. Anova statistical results test showed significant effect of temperature and heating times on the emulsion stability of kuah laksan ( $P < 0,05$ ) as well as Duncan's post hoc test. Conclusion: Emulsion stability of kuah laksan will decrease after reheating, Emulsion stability of kuah laksan after reheating of the most stable at a temperature of 80 OC with the slope value of -0.066, the temperature and heating times significantly affected the emulsion stability of kuah laksan ( $P < 0.05$ ).

**Keywords:** Laksan, Emulsion Stability, Heating, Coconut Milk, Palembang

## I. INTRODUCTION

Laksan is one of the traditional food from Palembang. Laksan similar to pempek but eaten with coconut milk. Laksan usually consumed in hot conditions, so there is a recurring warming. Coconut milk as the main ingredient in kuah laksan, an ingredient that is susceptible to physical and chemical changes when heated. The physical changes that occur are changes in the emulsion stability.

Coconut milk is an oil in water emulsion is white, which can be obtained by squeezing fresh coconut meat that has been shredded or destroyed with or without the addition of water [1][2][3]. Coconut milk is one of the important elements in Asian cuisine and in several other countries. The composition of milk varies according to the age of the coconut, place coconut growing, methods of preparation and the amount and temperature of water used for the extraction of coconut milk [4][5]. The composition of milk without the addition of water is the water content of 50-55%, fat 32-40%, protein 2.8 to 4.4%, and 5.5 carbohydrates, - 9.7% [6][1][7][3].

Emulsions are heterogeneous systems, comprising at least one liquid are mixed and dispersed in another liquid, in the form of droplets which does not exceed the diameter of  $0.1\mu\text{m}$  [8][9]. Coconut milk emulsion is stabilized by a natural protein that is globulin and albumin and phospholipids such as lecithin and cephalin. Coconut milk is physically unstable and prone to phase segregation. Coconut milk will naturally separate into layers of cream and serum within 5 to 10 hours after the manufacturing process [5]. The higher the heating temperature, the particle sizes the greater the resulting milk clotting milk protein. In warm coconut milk  $70^{\circ}\text{C}$  particle size increased from  $10\mu\text{m}$  to  $22.7\mu\text{m}$ , and the heating of  $90^{\circ}\text{C}$  particle size increased from  $12.2\mu\text{m}$  to  $30.5\mu\text{m}$ . This means coconut milk emulsion increasingly unstable [5].

This study aims to determine the effect of temperature and heating times on the stability of emulsion kuah laksan.

## II. MATERIALS AND METHOD

The materials used in this study are skinless and coconut shell purchased in the market 5Km Palembang. The tools used are knives, basins, grater, strainer, pots, water bath and measuring cup.

This study uses a completely randomized design with factorial with two treatments, the heating temperature (T), which consists of three levels (T<sub>1</sub> 60°C, T<sub>2</sub> 70°C and T<sub>3</sub> 80°C and heating times (t) consisting of 4 levels (t<sub>1</sub> 10 minutes, t<sub>2</sub> 20 minutes, t<sub>3</sub> 30 minutes and t<sub>4</sub> 40 minutes), in order to obtain 12 combination of treatments. Each treatment was replicated three times. The data analysis using SPSS program, to estimate the error variance and significance test between treatments with Anova. If the results of ANOVA test showed a significant result will be tested further by posthoc Duncan

**A. Sample Preparation**

Discarded coconut husk and then washed with running water at a temperature of 30°C. Grated coconut plus water at a ratio of 1: 2 and then squeezed by hand and screened to filter oil. Coconut milk is then added seasoning and then heated to boiling (90 °C) for 5 minutes and then cooled to room temperature (30 °C) so becomes a kuah laksan. After that kuah laksan reheated to a temperature of 60, 70 and 80 °C with heating times respectively 10, 20, 30 and 40 minutes<sup>[10]</sup>.

Emulsion stability of kuah laksan was measured by the following procedure: 25 ml of kuah laksan inserted into the measuring cup, and allowed to stand for 10 hours at room temperature (30°C). Then observe a separate piece that is an opaque layer on the top and a transparent aqueous phase at the bottom during storage. High emulsion stability is the top layer (coconut cream) divided by tall coconut milk [5][11]

$$\text{Emulsion stability (\%)} = \frac{\text{high coconut cream separate}}{\text{Total milk}} \times 100\%$$

**III. RESULTS AND DISCUSSION**

The observation of coconut milk emulsion stability before and after heating for 10 hours to show results as shown in Table 1.

Table - 1  
Emulsion stability of kuah laksan before and after heating

Sample	Emulsion Stability (%)
Before cooking (raw)	34.67
After cooking (boiling)	72.00

Table 1 showed that the coconut milk that has been heated more stable than coconut milk that has not been heated. This is because the protein in the coconut milk undergo denaturation and binds fat layer[12]. After reheating the emulsion stability of kuah laksan shown in table 2.

Table - 2  
Emulsion stability of Kuah laksan after reheating

Temperature	Emulsion stability (%)			
	Time heating (minutes)			
	10	20	30	40
60 °C	63.33 ± 1,155 <sup>bc</sup>	65.33 ± 1,155 <sup>cd</sup>	67.33 ± 1,155 <sup>d</sup>	67.47 ± 0,92 <sup>d</sup>
70 °C	60.00 ± 0,000 <sup>a</sup>	61.33 ± 1,155 <sup>ab</sup>	60.67 ± 1,155 <sup>a</sup>	63.47 ± 0,61 <sup>bc</sup>
80 °C	66.67 ± 2,309 <sup>d</sup>	65.33 ± 2,309 <sup>cd</sup>	65.33 ± 1,155 <sup>cd</sup>	67.33 ± 0,23 <sup>d</sup>

Figures by different letters in the same column stating significant influence on each treatment

After reheating the emulsion stability of kuah laksan will decrease from 72% to about 60% as showed in Table 2.

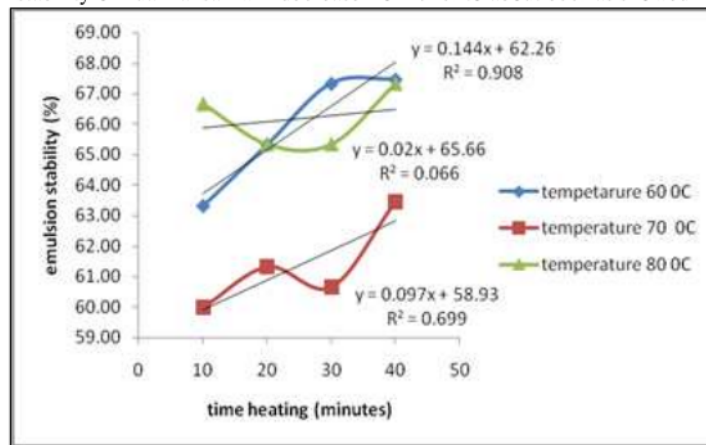


Fig. 1: Emulsion stability of kuah laksan after reheating

Figure 1 known that the emulsion stability of the kuah laksan is reheated at a temperature of 70°C have the best emulsion stability value because it has the smallest slope is -0.097.

The nature of the food emulsion depends on several factors such as temperature, pressure homogenization, the composition of food, the type and concentration of emulsifier and / or stabilizer [12]. The states in coconut milk protein plays an important role in determining the stability of the coconut milk. Some proteins are water soluble and water insoluble will act as an emulsifier with the surrounding surface of the fat globules [6]. Milk protein denaturation generally occurs at a temperature of 80 °C and if it heats the milk at a temperature of 90 – 95 °C for a few minutes will destroy most proteins.

Statistical test results showed that there is a significant effect of temperature and reheating times of stabilitas emulsion of kuah laksan ( $P < 0.05$ ).

Protein will change the nature of coconut milk and thickened on heating 80 °C or more [13]. Denaturation of the protein will affect the oil droplet surface charge. Droplets with a lower surface will interact with each other so that a greater payload. Heating milk above 90°C susceptible to denaturation of most proteins.

#### IV. CONCLUSION

Emulsion stability of kuah laksan will decrease after reheating. Emulsion stability of kuah laksan after reheating of the most stable at a temperature of 70°C with the slope value of 0.097. The temperature and heating times significantly affected the emulsion stability of kuah laksan ( $P < 0.05$ )

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