

# Study of Making Yogurt From Peanut (*Arachis hypogaea* L.) With The Addition of Coconut Water and Skim Milk

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**Abstract-** Plant-based functional foods has been highly developed in recent years. Peanut (*Arachis hypogaea* L.) can be used as functional drink that substitute for cow's milk. This study aimed to determine the effect of ratio (peanut milk and coconut water) and skim milk concentration on the quality of peanut yogurt. Yogurt was made by mixing peanut milk with coconut water and adding skim milk. The ratio of peanut milk and coconut water (50% : 50% and 75% : 25% v/v) and skim milk concentration (0%, 1% and 2% w/v). Fermentation was carried out at room temperature for 12 hours using commercial yogurt starter culture. Peanut yogurt analysis included of total LAB, pH, total acid and organoleptic. The data obtained were tabulated and presented descriptively. The best peanut yogurt was obtained in the ratio of peanut milk and coconut water (75%: 25%) and the addition of 2% skim milk which showed total LAB, pH and total acid were  $9.2 \times 10^9$  CFU/mL, 2.8 and 0.37% respectively.

**Keywords**—Coconut water; Lactic acid bacteria; Peanut; Skim milk; Yoghurt;

## I. INTRODUCTION

Functional drinks are drinks that have a specific effect on health because there are certain chemical compounds contained in the drink [1]. One of these functional drinks is a probiotic drink. Probiotic drinks are lactic acid fermented drinks that contain live lactic acid bacteria. Probiotics are living organisms that are capable of providing beneficial effects on health when consumed in sufficient quantities [2].

The ingredients for making probiotic drinks are peanuts, young coconut water and skim milk which are very easy to get. However, the selling value is not high and often young coconut water is thrown away and becomes waste in the market. Peanut (*Arachis hypogaea* L.) is a legume or legume [3]. According to Stella (2019) [4] peanuts contain 20.0 – 30.0% protein, fat content 40.0 – 50.0%, mineral content between 2.0 – 5.0% varies according to the type and variety of peanuts. Young coconut water is a by-product of coconuts with a total production in Indonesia of 3,750 tons/year [5]. According to Mendai, et al (2019) [6] Young coconut water contains various types of nutrients such as 0.10% protein, less than 0.10% fat, 4.00% carbohydrates, 0.40% ash, vitamins and minerals. Skim

milk is milk whose fat content has been reduced to below the minimum limit that has been set [7].

Based on the description that has been explained, it is important to conduct research on the manufacture of probiotic drinks made from peanuts, young coconut water and skim milk. Because the research on peanut milk used as an ingredient for making probiotic drinks is still small, the utilization of coconut water is still not optimal and helps people with cow's milk allergy to enjoy probiotic drinks.

## II. INGREDIENTS AND METHODS

### A. Ingredients

The materials used in this study were young coconut water, peanuts, skim milk, yogurt culture (greenfields brand) containing *Lactobacillus delbrueckii* sbsp *bulgaricus*, *Streptococcus thermophiles*, *Lactobacillus paracasei*, and *Lactobacillus rhamnosus* indicators, NaOH indicators, PP indicators, deMann Rogosa Sharpe Agar (MRSA), aquades and NaCl.

### B. Methods

#### 1. Preparation sample

Split the young coconut and take the young coconut water and then filter it. Boil young coconut water, wait until the temperature is warm. Then put it in a sterile glass bottle. Set aside to room temperature

Selected peanuts with good conditions. Peeled peanut skin, weighed 500 grams of peanuts and soaked in 1.5 liters of water for 12 hours. Then the skin of the peanuts is peeled and washed thoroughly. Peanuts that have been cleaned are mashed by means of a blender with added 1.5 liters of water. Then filtered and the filtrate was taken. Bring the peanut milk to a boil, then let it sit at room temperature

#### 2. Making probiotic drink

The probiotic drink is made in 150 ml. Comparison of media composition and variation of skim milk concentration can be seen in Table I.

TABLE I  
COMPARASION OF MEDIA AND VARIATIONS IN CONCENTRATION OF SKIM MILK

Comparison of Peanut Milk and Coconut Water	Concentration of Skim Milk
50 : 50	0%
	1%
	2%
75 : 25	0%
	1%
	2%

After the ingredients are mixed, the sample bottle is heated with boiling water to a temperature of 80°C for 10 minutes. Wait for warm temperatures between 40-43°C. Then added with 10% bacterial culture, then homogenized. Then incubated at 37°C and fermented for 12 hours

### C. Analysis

#### 1. Total Lactic Acid Bacteria Test

The sample was diluted by taking 5 ml, put in a test tube containing 45 ml of sterile NaCl solution (10-1 dilution). Take 1 ml of the solution from the 10-1 dilution, put it in a test tube containing 9 ml of sterile NaCl solution (10-2 dilution), and so on until the 10-8 dilution. Take 1 ml of each of the 10-5 to 10-8 dilutions and pour it into a sterile petri dish, then pour the MRS Agar medium evenly until the bottom of the cup is covered with the media. After the media solidified, it was incubated at 37°C for 48 hours. Colony growth was recorded on each plate containing colonies

#### 2. Test Total pH

Samples that have been homogenized are taken approximately 30 ml and placed in a 50 ml glass beaker. The pH meter was calibrated using pH 7 buffer, then cleaned with distilled water. Measurement of sample pH.

#### 3. Total Acid Test

The total acid test was carried out by taking 10 ml of the sample, put it in a 100 ml volumetric flask, then adding distilled water to the mark, then homogenized and filtered. 10 ml of the filtrate was taken and put into an Erlenmeyer. Added 2 drops of PP indicator. Titrate with 0.1 N NaOH solution until the color of the solution turns pink and the color does not change again for 30 seconds. At the end of the titration, the amount of NaOH used was calculated.

$$\text{Total Acid (\%)} = (V \times N \times 0.09 \times fp) / (\text{Sample weight}) \times 100 \quad (1)$$

Information :

V = Volume of titrant

N = Normality of NaOH

0.09 = lactic acid equivalent weight (g/mEq)

#### 4. Organoleptic Analysis

The panelists' preference test was carried out with the parameters of taste, texture, aroma, and color. Samples of

probiotic drinks that had been made were given to 20 panelists. Then make a scale about the opinion of the panelists

### 5. Data Analysis

The data obtained from this study include the total lactic acid bacteria, pH, and total acid are the result of three repetitions of the experiment. The data is presented descriptively by providing an interpretation according to the data obtained. The product acceptance by the panelists was processed using the Hedonic Scaling Score data.

## III. RESEARCH RESULT

### A. Probiotic Beverage Manufacturing

The probiotic drink was made using the ratio of peanut milk and coconut water, namely 50%: 50% and 75%: 25%. After the ingredients are mixed, skim milk is added with variations of 0%, 1% and 2%. After that, the sample was heated to a temperature of 80°C for 10 minutes by immersing it in boiling water until the entire surface of the sample was submerged and stirring occasionally. This is so that all the ingredients can be mixed evenly. Then added skim milk with variations of 0%, 1% and 2%. The addition of skim milk can help the growth of lactic acid bacteria [7]. The sample is cooled first before adding the bacterial culture so that the bacteria do not die because the temperature is too high. Cooling is carried out until the temperature reaches 40 - 43 C. This temperature is the optimum temperature that can be used for bacterial growth [8]. Then the sample was incubated for yogurt fermentation for 24 hours to obtain a distinctive texture, with a thick appearance.

### B. Total Lactic Acid Bacteria Test

Total LAB testing using the *Total Plate Count* (TPC) method. The average total BAL value can be seen in Fig 1.

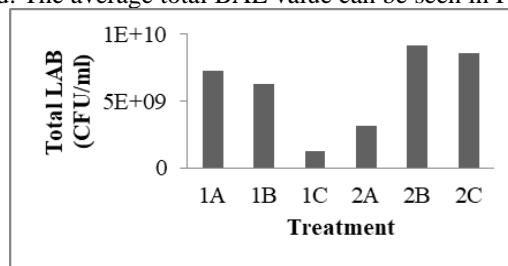


Fig 1. Average score of Total LAB

Information :

1A = Peanut milk 50% : coconut water 50% and skim milk 1%

1B = Peanut milk 50% : coconut water 50% and skim milk 2%

1C = Peanut milk 50% : coconut water 50% and skim milk 0%

2A = Peanut milk 75% : coconut water 25% and skim milk 1%

2B = Peanut milk 75% : coconut water 25% and skim milk 2%

2C = Peanut milk 75% : coconut water 25% and skim milk 0%

The result of the highest total LAB value was found in treatment 2B and the lowest total LAB score was found in treatment 1C. Treatment 2B had a high average total LAB value due to the addition of more skim milk. This is because skim

milk contains lactose. The more skim milk you add, the more lactose it contains. So that LAB production will increase. The higher composition of peanut milk can also affect the total LAB production. Because the carbohydrates contained in peanut milk. While the 1C treatment had a low average total LAB value because there was no addition of skim milk and the composition of peanut milk was little.

### C. pH test

The pH test was carried out to determine the degree of acidity of probiotic drinks. The average pH value can be seen in Fig 2.

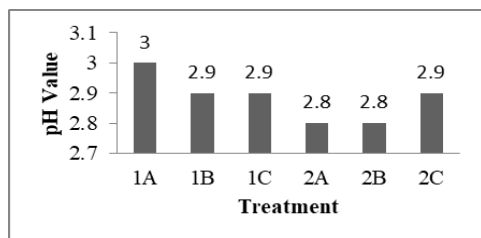


Figure 2. Average pH value

Information :

1A = Peanut milk 50% : coconut water 50% and skim milk 1%

1B = Peanut milk 50% : coconut water 50% and skim milk 2%

1C = Peanut milk 50% : coconut water 50% and skim milk 0%

2A = Peanut milk 75% : coconut water 25% and skim milk 1%

2B = Peanut milk 75% : coconut water 25% and skim milk 2%

2C = Peanut milk 75% : coconut water 25% and skim milk 0%

Based on Figure 4.2 shows the pH value ranging from 2.8-3.0. The highest pH value was found in treatment 1A and the lowest pH was found in treatment 2A and 2B. The decrease in pH is one result of the fermentation process that occurs due to the accumulation of lactic acid as the main product of the metabolism of sugar compounds by LAB. According to Yanuar and Sutrisno, [2] the higher the addition of skim milk, the more fulfilled the nutritional needs for bacterial growth. So that bacteria grow more and these bacteria will remodel the lactose present in skim milk into lactic acid.

### D. Total Acid Test

This total acid analysis shows the amount of lactic acid contained in probiotic drinks. Total acid test using the titration method. Lactic acid will be neutralized with NaOH which acts as the titrant. The achievement of the equivalence point is assisted by the addition of PP indicator so that the color changes from clear to pink. The average results of the total acid test can be seen in Figure 3.

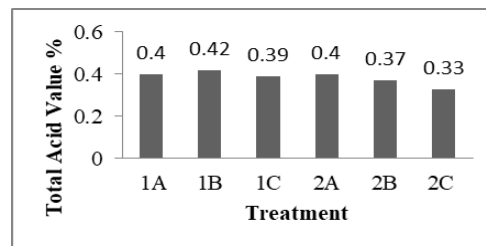


Figure 3. Average Value of Total Acid

Information :

1A = Peanut milk 50% : coconut water 50% and skim milk 1%

1B = Peanut milk 50% : coconut water 50% and skim milk 2%

1C = Peanut milk 50% : coconut water 50% and skim milk 0%

2A = Peanut milk 75% : coconut water 25% and skim milk 1%

2B = Peanut milk 75% : coconut water 25% and skim milk 2%

2C = Peanut milk 75% : coconut water 25% and skim milk 0%

The highest total acid value was found in treatment 1B and the lowest total acid value was found in treatment 2C. According to Herawati and Wibawa, [7] the higher the concentration of skim milk, the higher the total lactic acid level. This is because the higher the concentration of skim milk will increase the amount of lactose in the mixture and increase the activity of bacteria to convert lactose into lactic acid. Young coconut water also has nutrients that can increase the growth of lactic acid bacteria. So with the addition of coconut water should be more acidic.

### E. Organoleptic Test

#### 1. Flavor

The most preferred taste according to the panelists was in treatment 2B with the highest value of 91. The composition of treatment 2B was the ratio of peanut milk and coconut water, namely 75%: 25% with the addition of 2% skim milk. It is suspected that the more addition of skim milk, the formation of lactic acid also increases

#### 2. Texture

The most preferred texture by the panelists is the 2C treatment. The probiotic drink that has been made has a distinctive texture that is thick. However, in the 2C treatment it had a slightly runny texture. The thickest texture among all probiotic drinks was in treatment 2B.

#### 3. Aroma

The aroma that dominates this probiotic drink is the aroma of peanut milk. Based on Figure 4.4, the most preferred aroma by the panelists was in treatment 2B.

#### 4. Color

The color that was most favored by the panelists was in treatment 2A. This is presumably because the composition of peanut milk added was more. Peanut milk has a white color. So that in the probiotic drink sample treatment 2A the white color was more concentrated.

#### 5. Products

All of the panelists' probiotic drink products liked the sample with 2B treatment. According to Basuki., et al, [9] quality yogurt is a smooth and good texture, not foamy, distinctive flavor and

aroma, no bitter taste, and the acidity level does not exceed the limit.

#### IV. CONCLUSIONS

Based on the results of the study, the best results were obtained in the comparison of peanut milk: coconut water (75%: 25%) and the addition of 2% skim milk. The results of the total LAB test value are  $9.2 \times 10^9$  CFU/ml, the pH test value is 2.8, the total acid test value is 0.37 and the best results are organoleptic tests on taste, aroma and overall product.

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