



# Evaluation of pH Quality and Water Capacity of Yogurt from Etawa Goat Milk with the Addition of Mangga Golek Fruit Juice

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**Abstract.** Milk is the product of livestock in the form of white liquid contains nutrients that are very good for humans. This study aims to determine the quality of pH (Hydrogen Potential) and moisture content of Peranakan Etawa (PE) goat milk yogurt with the addition of golek mango juice at different levels. The research was conducted at the Laboratory of the Faculty of Agriculture and Animal Husbandry, Tjut Nyak Dhien University. The research method used a completely randomized design (CRD) with 4 treatments and 5 replications, namely P0, P1, P2 and P3 by testing the pH and moisture content of yogurt. The results showed that the addition of golek mango juice to yogurt gave the same effect on yogurt pH and water content. The optimal pH value, water content and dry matter of etawa peranakan goat milk yogurt in treatment P0 without the addition of golek mango juice with an average pH value of 3.98, water content of 84.4% and dry matter of yogurt of 15.6%. Yogurt dry matter is better in the P0 treatment.

**Keywords:** Etawa Peranakan Goat Milk, Golek Mango, yogurt, pH, water content, dry ingredients

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## 1. Introduction

Milk is a special food that contains all the substances needed by the body that are easily digested and utilized by the body. Milk is a type of animal food in the form of white liquid produced by mammalian livestock such as cows, buffaloes or goats and obtained by milking [1]. The main milk-producing cattle in Indonesia are Peranakan Friesian Holstein (PFH) dairy cows whose milk production is relatively low. The low milk production of PFH dairy cows cannot meet the needs of animal protein needed by the community. Alternative dairy cattle that are suitable for development and acceptable to the community are peranakan etawa (PE) goats [2]. PE goats are one of the providers of animal protein from livestock in the form of meat or milk. One of the advantages of goat milk is its nutritional content is relatively more complete and balanced [3].

Mango (*Mangifera indica*) is one of the potential horticultural commodities in Indonesia. The

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level of mango fruit production in Indonesia in 2012 reached 2,362,039 tons, and in 2013 reached 2,058,607 tons, while in 2014 there was an increase in production to 2,464,234 tons [4]. However, as with other horticultural products, the problem with manga fruit is at the post-harvest stage, namely the lack of information on the physical quality of the fruit, such as total soluble solids, hardness, and acidity.

Post-harvest activities are one of the activities to maintain the quality of golek mango quality. Post-harvest handling activities require evaluation of the physical quality of the fruit. The physical characteristics of the fruit observed in the field are only limited to size and color, without paying attention to total soluble solids, fruit hardness, and acidity. Whereas these variables are variables in determining fruit quality and determining the maturity level of mango fruit.

According to research by [5], mango fruit has food fiber content, namely cellulose ( $1.12 \pm 0.2$  g%) and has a pectin content of  $0.3 \pm 0.19$  g%). The maturity level of the mango fruit used is using golek mangoes that are 70% ripe. The characteristics of ripe golek mangoes are marked by the appearance of a reddish color on the skin. Fruit that has reached the ripe level, the green color is shiny like oily on a dim shadow.

Yogurt is milk made through acidic bacterial fermentation. The bacteria used for yogurt fermentation is a mixed culture of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. Various types of milk can be used to make yogurt, such as fresh cow or goat milk, skim milk (non-fat milk), soy milk, and a combination of these milks. In the market yogurt is divided into two types, the first is plain yogurt, which is yogurt without additional flavors and the second is drink yogurt, which is plain yogurt that the manufacturer has added additional fruit flavors such as mango golek.

The advantages of yogurt that pure milk does not have include: yogurt is suitable for consumption by people who are sensitive to milk (which is characterized by diarrhea). If consumed regularly, it can even inhibit cholesterol levels in the blood because yogurt contains lactobasillus bacteria. Lactobasillus functions to inhibit the formation of cholesterol in the blood that comes from foods such as offal or meat. Yogurt can increase endurance because it contains a lot of good bacteria so that it can automatically balance the bad bacteria found in milk. In addition, yogurt contains nutrients that are good for health. Yogurt is rich in protein, calcium, riboflavin, vitamin B6 and vitamin B12 [6].

## **2. Material and Methods**

### **2.1. Time and Place**

This research was conducted at the Laboratory of the Faculty of Agriculture and Animal Husbandry of Tjut Nyak Dhien University Medan from May to June 2023. Testing of pH and moisture content of peranakan etawa (PE) goat milk yogurt was conducted at the Laboratory of the Faculty of Agriculture and Animal Husbandry of Tjut Nyak Dhien University Medan.

## 2.2. Tools and Materials

### a. Materials

The materials used are: Peranakan Etawa Goat Milk, Golek Mango Fruit Juice, Biokul Bacteria and Clean Water.

### b. Tools

The tools used are: Scales, Baker's Cup, Erlenmayer, Autoclave, Incubator, Thermometer, Glass Jar Bottle, Fermentation Container, Label Paper, Plastic Wrap, Tissue, Wipe Cloth, Sunlight, Alcohol, Hekter, Paper, Name Label, Marker, Pen and Notebook.

## 2.3 Research Methods

This research is an experimental study using a completely randomized design (CRD). The treatment used was testing 4 concentrations with mango juice. After that, the pH and moisture content of yogurt were tested.

With treatment:

P0 = Goat Milk (PE) 250 ml without Mango Golek Fruit Juice

P1 = 250 ml Goat Milk (PE) with 6 gr Golek Mango Fruit Juice

P2 = Goat Milk (PE) 250 ml with 8 g Golek Mango Fruit Juice

P3 = Goat Milk (PE) 250 ml with 10 g Golek Mango Fruit Juice

## Yogurt Preparation Procedure

### 1. Preparation of Golek Mango Fruit Juice

A total of 600 g of unblemished Golek Mango fruit was washed and cut after which it was blended, The extracted mixture was separated into 50 g. The mixture was then put into a sterile container and the mouth of the container was closed using a clean cloth.

### 2. Yogurt Preparation Process with the Addition of Golek Mango Fruit Juice

A total of 1 liter of whole milk was heated at 800C for 30 minutes while stirring gently. The milk was then cooled to room temperature. Then divided into four measuring cups as much as 250ml / glass, added 10 ml of biocule and incubated at 430C for 24 hours, then added golek mango juice according to the treatment, namely P0 without treatment, P1 (6 gr), P2 (8 gr), P3 (10 gr) and incubated again at 430C for 24 hours and put in the refrigerator until it will be used.

Parameters observed:

### 1. pH of Peranakan Etawa (PE) Goat Milk

Measurement of pH (Hydrogen Potential) of each etawa goat milk (PE) yogurt sample was carried out using an electric pH. The pH value was measured after pasteurization (0 hours) [7].

## 2. Water Content

The tools used to determine the water content of yogurt are yogurt samples to be analyzed, analytical balance with a sensitivity of 01 mg, porcelain cup, desiccator, tweezers and oven with a temperature of 60 ° C. and the material used is yogurt.

## 3. Yogurt Dry Ingredients

The tools used to determine the dry matter of yogurt are analytical balance with a sensitivity of 0.1 mg, porcelain cup, desiccator, forceps and oven with a temperature of 60 ° C.

## 3. Results and Discussion

### 3.1. pH of Peranakan Etawa (PE) Goat Milk Yogurt

The average test results of pH value in making yogurt using Biokul plain and the addition of golek mango juice at certain levels are presented in Table 1.

**Table 1.** Average pH value of Peranakan Etawa Goat Milk Yogurt

Treatments	Repetition					Average
	1	2	3	4	5	
P0	3,7	4,5	4,5	3,6	3,6	3,98
P1	3,4	3,7	3,5	4,2	3,6	3,68
P2	3,4	3,3	3,2	3,5	3,4	3,36
P3	4,3	3,8	3,3	3,7	3,7	3,76
Average	3,7	3,825	3,625	3,75	3,575	

Notes: The treatment of the addition of golek mango juice has no significant effect ( $F > 0.05$ ) on total yogurt

The average pH value of yogurt using Biokul plain without the provision of mango juice obtained the highest results from the treatment of yogurt without the addition of mango juice, namely P0 with an average of (3.98). In contrast to the P3 treatment (10 grams of mango juice) with an average of (3.76) and the P1 treatment (6 grams of mango juice) with an average of (3.68) and the P2 treatment (8 grams of mango juice) with an average of (3.36).

The results of research by [8] showed that the longer the fermentation time will increase the acidity value of milk accompanied by a decrease in protein content. This can occur because during fermentation, protein which is a macromolecule is catabolized into a simple form in the form of short-chain peptides consisting of two or more amino acids connected by covalent bonds, resulting in amino acid components that are more easily digested.

The pH value can be interpreted as a condition that is freedom or acidity, the formation of lactic acid in milk is due to bacterial activity that breaks down lactose to form lactic acid high acidity or low pH indicates that a lot of lactose has turned into lactic acid, generally fresh milk has a pH of around 6.5-6.7. This is in accordance with the study of [9] that lactic acid produced in this way will reduce the pH value of the environment and cause a sour taste, the carbohydrate fermentation process can produce lactic acid which can reduce the pH value.

The highest pH value in this study was in the P0 treatment without the provision of golek mango juice with a pH value of 3.98 while the lowest pH value was in the P2 treatment with a concentration of 8 g golek mango juice with a value of 3.36. This is because the more golek mango juice is given, the more the pH value will be. Sugar in the form of fructose contained in fruit juice is utilized by Lactic Acid Bacteria so that it can reduce pH. In this study, yogurt was weighed for each replicate. as much as 5 g in the fermentation container, then each replicate was checked for the pH of the yogurt.

### 3.2. Water Content of Peranakan Etawa Goat Milk Yogurt

The average test results of the water content value in making yogurt using plain Biokul at certain levels are presented in Table. 2.

**Table 2.** Average value of water content of etawa roleakan goat milk yogurt

Treatments	Repetition					Average (%)
	1	2	3	4	5	
P0	82	86	84	86	84	84,4a
P1	80	84	84	82	82	82,4b
P2	82	80	82	82	84	82,0b
P3	74	84	84	80	86	81,6c

Notes: The treatment of adding manga golek juice has a significant effect ( $F > 0.05$ ) on total yogurt

The average value of the water content of yogurt using Biokul plain without giving mango juice obtained the highest very real results from the treatment of yogurt given mango juice, namely P0 (without mango juice) with an average of (84.4) significantly different from the treatment of P1 (6 gr of mango juice) with an average of (82.4). P1 treatment (6 grams of mango juice) with an average of (82.4) was not significantly different from P2 treatment (8 grams of mango juice) with an average of (82.0) but significantly different from P3 treatment (10 grams of mango juice) with an average of (81.6).

The water content in food ingredients determines the acceptability, freshness and resistance of ingredients to microbial attack [10]. The average water content of yogurt with golek mango fruit in this study ranged from 81.6-84.4 and showed significantly different values ( $P > 0.05$ ) (Table 2). Moisture content is a factor that affects golek mango juice when applied to food products. Because a high enough moisture content microbiologically and chemically can determine the shelf life of a product. Bacteria will have the opportunity to multiply rapidly in an environment with high water content. Chemically, the oxygen content in the remaining water during extraction can trigger the fat to hydrolyze to produce glycerol and fatty acids. The hydrolysis process can occur very quickly if the golek mango fruit extract has a high water content. According to [11] that the water content in yougurt is between 83% - 84%. The water content in milk is very high, which is about 87.5%, with milk sugar (lactose) about 5%, protein about 3.5%, and fat about 3-4%.

In this study, yogurt was weighed as much as 5 g of each replicate in a fermentation

container and the calculation of water content was carried out using an oven with a temperature of 600C for 24 hours. After it was in the oven for 24 hours the yogurt was taken and weighed again according to the replication. The low water content in the results of this study is because the manufacture of goat milk yogurt does not use additional ingredients that have high water content such as golek mango fruit already in extract form, and for starters using a type of cream starter. Added by [12] if yogurt is made from milk with low solid material, the water content will increase, otherwise if yogurt is made from high solid material, the water content will be low. The low water content value of the results of this study is also thought to be due to the influence of the low number of bacterial growth in goat milk yogurt with the addition of golek mango juice. [13] states that bacterial growth in food is closely related to the amount of water content. The high water content in yogurt is due to the high bacteria contained in the product, and vice versa.

### 3.3. Dry Ingredients of Peranakan Etawa Goat Milk Yogurt

The average test results of the Dry Yogurt value in making yogurt using Biokul plain at certain levels are presented in Table. 3.

**Table 3.** Average Value of Dry Ingredients of Etawa Peranakan Goat Milk Yogurt

Treatments	Repetition					Average
	1	2	3	4	5	
P0	18	14	16	14	16	15,6a
P1	20	16	16	18	18	17,6b
P2	18	20	18	18	16	18b
P3	26	16	16	20	14	18,4c

Notes: The treatment of adding manga golek juice has a significant effect ( $F>0.05$ ) on total yogurt.

The average dry matter value of yogurt using Biokul plain without the provision of mango juice obtained the highest very real results from the treatment of yogurt given mango juice, namely P0 (without mango juice) with an average of (15.6%) significantly different from the treatment of P1 (6 gr of mango juice) with an average of (17.6%). P1 treatment (6 grams of mango juice) with an average of (18%) was not significantly different from P2 treatment (8 grams of mango juice) with an average of (18%) but significantly different from P3 treatment (10 grams of mango juice) with an average of (18.4%).

Yogurt has a semi-solid texture like soft cheese. The benefits obtained by consuming yogurt are easier to digest than milk, important for intestinal health, helps cure intestinal infections, contains a lot of calcium, an excellent source of protein, can lower cholesterol, and as a food for growth [14].

Yogurt is relatively more durable than fresh milk or rehydrated milk powder, but storage must be cold. To increase the durability, expand the storage temperature range, and expand the marketing range, further treatment is needed. This treatment is expected to maintain or only slightly reduce the nutritional content, physicochemical properties and organoleptic value. One alternative

treatment is drying. The drying process of yogurt will change the viscous form into a dry form and must be rehydrated again when it is consumed [15].

#### 4. Conclusion and Suggestion

##### 4.1. Conclusion

The results showed that the addition of golek mango juice to yogurt gave the same effect on yogurt pH and water content. The optimal pH value, water content and dry matter of etawa peranakan goat milk yogurt were treated with P0 without the addition of golek mango juice with an average pH value of 3.98, water content of 84.4% and dry matter of yogurt of 15.6%. Yogurt dry matter is better in the P0 treatment.

##### 4.2. Suggestion

This research can be continued with other parameters, namely fat content test, sucrose addition and other parameter methods.

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