Quality Analysis of Yoghurt from Goat's Milk Using Starter Lactic Acid Bacteria

Azwar¹*, Hisbullah², Ahmad Irgi³, Wari Julyadi⁴, Adisalamun⁵, Mukhlishien⁶, R. Nasrullah⁷, Abubakar⁸, M.F. Zanil⁹, J.M. Ali¹⁰

¹,²,³,⁴,⁵,⁶,⁷,⁸ Chemical Engineering Department, University of Syiah Kuala, 23111 Banda Aceh, Indonesia
⁹Chemical and Petroleum Engineering, Faculty of Engineering & Built Environment, UCSI University, 56000 Kuala Lumpur, Malaysia
¹⁰Chemical and Process Engineering Department, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

*Koresponden email: azwar.yahya@unsyiah.ac.id

Diterima: 18 November 2021 Disetujui: 22 Desember 2021

Abstract
Yoghurt is a pro-biotic beverage produced from the fermentation process of milk, namely from vegetable milk (soy milk) or animal milk (goat's milk and cow's milk). During the fermentation process, the chemical reactions that occur will turn milk into yogurt with the help of lactic acid bacteria. In the health sector, yogurt plays a role in increasing the body's immunity, digestive tract health and can prevent osteoporosis. In general, yogurt circulating in the community still has low nutritional content, so a more in-depth study needs to be done. The goal of this research is to examine the quality of yogurt by manipulating certain variables and adding other components to increase the yogurt's quality. Streptococcus thermophilus and Lactobacillus bulgaricus were used as starter as much as 12.5 mL each (10% of 500 mL of cream milk). The fixed variables in this study were the volume of goat's milk 500 ml, cream concentration 6%, pasteurization temperature 85°C, pasteurization time 15 minutes and fermentation temperature 45°C, while the independent variables were varying the length of the fermentation process for 3, 4, 5, 6, 7, 8 and 9 hours. From this study, it was concluded that yogurt with optimum results was obtained at a fermentation time of 6 hours, the pH value was 3.8, lactic acid content was 1.305%, protein content was 5.54%, fat content was 4.98%, and moisture content was 84.10%.

Keywords: yogurt, goat's milk, lactic acid bacteria, Stevia sweetener

Abstrak
Yoghurt adalah minuman probiotik yang dihasilkan dari proses fermentasi susu, yaitu dari susu nabati (susu kedelai) atau susu hewani (susu kambing dan susu sapi). Selama proses fermentasi, reaksi kimia yang terjadi akan mengubah susu menjadi yoghurt dengan bantuan bakteri asam laktat. Dalam bidang kesehatan, yoghurt berperan dalam meningkatkan kekebalan tubuh, kesehatan saluran pencernaan dan dapat mencegah osteoporosis. Secara umum yoghurt yang beredar di masyarakat masih memiliki kandungan gizi yang rendah, sehingga perlu dilakukan kajian yang lebih mendalam. Tujuan penelitian ini untuk menguji kualitas yoghurt dengan memanipulasi variabel tertentu dan menambahkan komponen lain untuk meningkatkan kualitas yoghurt. Streptococcus thermophilus dan Lactobacillus bulgaricus digunakan sebagai starter masing-masing sebanyak 12,5 mL (10% dari 500 mL susu krim). Variabel tetap dalam penelitian ini adalah volume susu kambing 500 ml, konsentrasi krim 6%, suhu pasteurisasi 85°C, waktu pasteurisasi 15 menit, dan suhu fermentasi 45°C, sedangkan variabel bebasnya adalah pemilihan waktu fermentasi untuk 3, 4, 5, 6, 7, 8, dan 9 jam. Dari penelitian ini disimpulkan bahwa yoghurt dengan hasil optimum diperoleh pada waktu fermentasi 6 jam, nilai pH 3,8, kadar asam laktat 1,305%, kadar protein 5,54%, kadar lemak 4,98%, dan kadar air 84,10%.

Kata Kunci: yoghurt, susu kambing, bakteri asam laktat, pemanis Stevia

1. Introduction
The demand for healthy foods and beverages increases as public awareness of health and healthy lifestyles grows. As we enter the era of modern society, industrial 4.0, the demand for nutritious food and beverages continues to rise as public awareness improves, resulting in a favorable impact on improving public health. Yogurt is a popular alternative meal these days because it has numerous health benefits for the human body [1] [2].
Fermentation technology is defined as the utilization of microbial enzymes for the manufacture of chemicals that have uses in energy production, pharmaceutical manufacturing, chemical manufacturing, and food manufacturing. The majority of fermented foods are made from nutrient-dense ingredients such as milk, beef, rice, soy, and wheat. Fermented foods have long been linked with higher nutritional value, despite the fact that the scientific basis for many nutritional claims has yet to be proven. The availability of a large range of fermented food products on the market is proof that fermentation can improve nutritional characteristics. Milk is one of the foodstuffs that humans really need because it contains various kinds of high nutritional content such as protein, fat, protein, vitamins and various other types of minerals [4] [5].

A probiotic drink prepared from cow's milk and goat's milk is currently one of the most popular dairy products in the community. Pro-biotic bacteria are bacteria that have a favorable impact on the cultivation of organisms. They can affect microbial communities and improve host responses to certain diseases. Another benefit of probiotic bacteria is that they can help with nutrition, immunity, and maintaining and improving environmental quality. Probiotic drinks are one of the products of probiotic bacteria [6]. Yogurt, also known as a probiotic drink, is one of the products of LAB fermentation that has a favorable impact on health by balancing microorganisms in the gastrointestinal system and removing non-functioning microbes [7]. Furthermore, probiotic beverages can help prevent osteoporosis by increasing calcium absorption. This fermentation will convert 30-40 percent of the protein in milk into lactic acid [8].

Pro-biotic drinks have several advantages over other drinks, including the ability to maintain the microorganism ecology in the body, enhance digestion, maintain endurance, avoid gut inflammation, and fight bad bacteria in the intestines. Pro-biotic drinks can also help you lose weight, conquer respiratory infections, maintain digestive health, enhance skin health, lower bad cholesterol, lower blood pressure, avoid depression, and treat eczema and diarrhea. People who cannot tolerate milk drinks (lactase intolerance) will benefit greatly from probiotic drinks [9]. Yoghurt is a probiotic beverage made from milk fermentation with the addition of lactic acid bacteria (LAB) as a starter. Milk is a high-nutrient food item obtained from the milking of mammary glands in mammals such as goats and cows. Lactose, enzymes, vitamins, lipids, minerals, proteins, and many types of microorganisms are all found in milk and have a good impact on health. When comparing goat's milk to cow's milk, goat's milk yogurt has a nutritional value that is significantly superior to yogurt made from cow's milk [10].

When compared to whole milk, the chemical process that occurs during fermentation increases the nutritional value of yogurt [11]. Yogurt made from goat's milk is easier to digest because of the fat and protein content, and it contains higher Vitamin B1 [12]. Yogurt is a pasteurized dairy product that has gone through a fermentation process with bacteria. Because yogurt on the market generally still has a low calcium content, causing the quality to decrease. One of the goals of this study is to improve the taste of yogurt while increasing the calcium content. In this investigation, goat's milk was used as the raw material, with stevia sugar added as an adjuvant. Because commercial yogurt has a low calcium content, it is believed that utilizing goat's milk and stevia as a sweetener will result in a higher-quality probiotic drink with a superior taste.

2. Material and Methods

Materials and equipment

This research was conducted for four months at the Chemical Engineering Basic Chemistry Laboratory, Faculty of Engineering, Syiah Kuala University. The tools used are Erlenmeyer, aluminum foil, porcelain cup, hot plate, oven, measuring cup, pan, pH meter (Hanna Instrumets-001), spatula, analytical balance, thermometer, yogurt maker (Vitaclay-10131427). The ingredients used are distilled water, NaOH, PP indicator, pure goat's milk, BAL starter (Streptococcus thermophilus and Lactobacillus bulgaricus), and cream milk. The process of creating goat's milk yogurt is divided into three stages: starter culture cultivation, raw material preparation, yogurt production, and yogurt quality testing. Figure 1 shows a quick overview of the yogurt-making process.

To eradicate undesired bacteria during the fermentation process, goat's milk that has been added to cream milk will be pasteurized at 85°C for 15 minutes. Pasteurization also denatures protein in milk, increasing the density of yogurt [13]. To avoid clumping, the mixture was heated to 45°C and then stirred. Milk that has been pasteurized is put in a yogurt starter in the form of BAL each as much as 12.5 ml (5% of the volume of goat's milk) then stirred slowly until homogeneous. Then the fermentation process was carried out at a temperature of 45°C with a fermentation time of 3, 4, 5, 6, 7 hours, 8, and 9 hours using a tool called a yogurt maker (Vitaclay-10131427). For each hour variable, sampling was carried out, so that the sample consisted of 7 samples. Each sample will be tested for fat content, protein content, moisture, pH value and lactic acid content.
**Figur e 1.** Chart of the process of making yogurt from goat's milk

*Source: Data research, 2021*

**Yogurt Quality Test**

*Test pH Value*

In the pH value test, the test was carried out using a pH meter (Hanna Instruments-001). The pH meter is first calibrated, so the accuracy of the tool is guaranteed. In the measurement, the tip of the pH meter in the form of a pH sensor will be dipped into the sample that has been provided and the pH value that is read on the pH meter is recorded.

*Test Moisture*

In the moisture test, the test is carried out by weighing an empty porcelain dish first, then measuring 5 mL of the yogurt sample and placing it in a porcelain dish. Then the porcelain cup containing 5 mL of yogurt was put in the oven at a temperature of 105°C for 24 hours. After 24 hours, the porcelain cup containing the dry yogurt was cooled in a desiccator for 15 minutes. Then the porcelain cup containing yogurt was weighed (SNI 2981:2009). The moisture calculation uses the following formula:

\[
Moisture = \frac{A-B}{A-C} \times 100 \% \quad \text{(SNI 2981:2009)}
\]

Information:

A : Porcelain cup + a wet sample
B : Porcelain cup + a dry sample
C : Empty porcelain cup

*Lactic Acid Level Test*

In the lactic acid level test, the test was carried out using the titration method. The sample will be titrated using a 0.1N NaOH solution. A sample of 5 mL of yogurt was taken and then put into an Erlenmeyer then diluted with the addition of 16 mL of distilled water. Five drops of phenolphthalein indicator were
added and titrated with 0.1 N NaOH solution until the sample turned pink. Calculate the amount of lactic acid using the following formula:

$$Lactic \ acid = \frac{V_{\text{titration}} \times N_{NaOH} \times FP \times BM_{lactic \ acid}}{V_{\text{sample}} \times 1000} \times 100 \% \quad (SNI \ 2981:2009)$$

**Protein Level Test**

The Research and Industrial Standardization Center was in charge of the protein content test (BARISTAND). In a Kjeldahl flask, 1 gram of yogurt is inserted, followed by 15 grams of K$_2$SO$_4$ and 1 mL of CuSO$_4$. In an electric heater, combine a 5H$_2$O catalyst, 8 boiling stones, and 25 mL of concentrated H$_2$SO$_4$. Allow it to boil for a few minutes, and the solution will turn greenish. The mixture was then chilled and diluted with distilled water. 75 mL of a 30 percent NaOH solution is added (and the mixture is checked for alkalinity with a PP indicator). After that, the displate solution is distilled for 5-10 minutes, or until it reaches 150 mL with 50 mL of 4% H$_3$BO$_3$ solution. Use the formulas below to figure out how much protein is in your food.

$$Protein = \frac{V_1 \times V_1 \times 14,007 \times 6.38}{w} \times 100 \% \quad (SNI \ 2981:2009)$$

Information:

- V1: Volume of HCl 0.1000 N for sample titration (mL)
- V2: Volume of HCl 0.1000 N for blank titration (mL)
- N: Normality of HCl solution
- w: Sample weight
- 14.007: Atomic weight of nitrogen
- 6.38: Protein factor for milk

**Fat Level Test**

In the fat content test, the test is carried out by the Research and Industrial Standardization Center (BARISTAND). Enter the sample of yogurt, 5 grams, into the extraction flask and add 10 mL of distilled water, stirring to form a paste. Then 1 mL of concentrated ammonium hydroxide was added and heated in a water bath at a temperature of 70°C for 15 minutes and stirred. After that, 3 drops of phenolphthalein indicator and 10 mL 95% alcohol were added, then the extraction flask was closed and stirred using a magnetic stirrer for ± 15 seconds. In the first extraction, 25 mL of ethyl ether and 25 mL of petroleum ether were added to the extraction flask and stirred for one minute.

The aqueous and ether phases were separated for 30 seconds using a centrifuge process at a speed of 600 rpm. Repeat the process for the second and third extractions. The solvent was then evaporated in a water bath, and the fat extract was dried in an aluminum dish at 100°C for 30 minutes and cooled in a desiccator and then weighed. Use the formula below to calculate the protein content:

$$Fat = \frac{w_1 - w_2}{w} \times 100 \% \quad (SNI \ 2981:2009)$$

Information:

- w: Sample weight (grams)
- w1: Weight of empty aluminum dish (grams)
- w2: Weight of empty aluminum dish + fat (grams)

**Calcium Level Test**

In the calcium level test, the test was carried out by the Research and Industrial Standardization Institute (BARISTAND). Prepare a sample of 1 gram of yogurt into an Erlenmeyer and add 10 mL of distilled water and then take a 20µ sample solution using a micro pipette. Then put it into a test tube and add 1 mL of o-cresolphthalein-complexon reagent. Incubated at 37°C for 10 minutes. The absorbance wavelength was measured at 546 nm.
3. Results and Discussion

In this study, several tests were conducted to determine the quality of yogurt from raw goat's milk. The analysis of the tests carried out included the pH value test, moisture test, lactic acid level test, protein content test, fat content test and calcium content test.

**pH Value Analysis**

The SNI 2981:2009 quality standard is used to assess the quality of sour yogurt drinks. The pH value is used to determine the degree of acidity in yogurt. A pH meter is usually used (Hanna Instruments-001). The degree of acidity at pH generally ranges from 3.8 to 4.5 based on the normal SNI value. The total concentration of H+ (hydrogen ion) for the level of acidity and alkalinity in a solution is represented by pH (hydrogen power). As a general guideline, pH 7 is considered neutral, and pH > 7 is considered alkaline. Figure 2 shows the value of the degree of acidity of yogurt.

Figure 2 shows that the pH value of yogurt at the 3rd hour was 4.9, at the 4th hour it was 4.5, at the 5th hour it was 4.2, at the 6th hour it was 3.8, at the 7th hour it was 3.6, at the 8th hour it was 3.4, and at the 9th hour it was 3.3. The pH value continues to decrease every hour. This is due to the occurrence of carbohydrate metabolism processes during fermentation. The process of carbohydrate metabolism will increase lactic acid levels so that the pH value will decrease. The higher the lactic acid level, the lower the pH value [11]. From the pH values obtained, only 4 hours to 6 hours meet the standards.

![Figure 2. Observation data on yogurt pH from 3 to 10 hours](source)

This shows that the longer the incubation time, the lower the resulting pH value. This is because the longer the activity of LAB lasts, the more lactic acid it produces, which affects the pH value. These results are in accordance with research conducted by [14] which states that the higher the lactic acid level, the lower the pH value of yogurt. According to [15] research, the pH was lower at the longest time variation. This happens when microbial activity and the quantity of microorganisms increase, leading the pH value to drop. This demonstrates that chemical changes in the sugar component cause it to become acid.

**Moisture Analysis**

Moisture analysis is one of the test parameters used to determine the moisture content of a product. To ensure a quality product, it is necessary to measure the moisture in the yogurt solution. Yogurt moisture analysis obtained from this study can be seen in Figure 3. Figure 3 shows that at the 3rd hour the moisture content of the yogurt was 91.34%, at the 4th hour the moisture content was 98.67%, at the 5th hour it was 87.97%, at the 6th hour it was 84.1%, at the 7th hour it was 80.9%, at the 8th hour it was 76.82%, and at the 9th hour it was 76.92%. Moisture analysis in yogurt was carried out to determine the percentage of water content in yogurt. The higher the moisture, the more the yogurt solution will look watery, whereas if the moisture content is lower, the yogurt will look thick. Referring to the standard value of SNI 2981 (2009), the quality of good yogurt has a moisture value of 85%.
Analysis of Lactic Acid Levels

To meet the SNI standard on yogurt, it is necessary to test the levels of lactic acid to determine the value of lactic acid contained in yogurt. Lactic acid is one of the metabolites produced during the fermentation process. Lactic acid is the result of bacterial metabolism in yoghurt starter (Lactobacillus bulgaricus and Streptococcus thermophilus) where lactose is an energy source for bacteria. Yogurt lactic acid levels obtained from this study can be seen in Figure 4. From Figure 4, it can be seen that the lactic acid in yogurt at the 3rd hour was 0.45%, at the 4th hour it was 0.56%, at the 5th hour it was 0.83%, at the 6th hour it was 1.04%, at the 7th hour it was 1.31%, at the 8th hour it was 1.44%, and at the 9th hour it was 1.71%. Lactic acid levels continue to increase over time. This is due to the carbohydrate metabolism process that produces lactic acid during fermentation [7]. According to SNI 2981 (2009), the standard level of lactic acid is in the range of 0.5-2.0%. From the results of the lactic acid levels obtained, it can be seen that the levels of lactic acid that meet the standards occur at 4 to 9 hours.

![Figure 3](image_url)  
*Figure 3. Processing results of moisture test data*  
*Source: Data research, 2021*

![Figure 4](image_url)  
*Figure 4. Results of data processing lactic acid levels*  
*Source: Data research, 2021*

The longer the fermentation time, the more lactic acid will be produced. This is because during the fermentation process, lactose compounds are converted by the bacteria S. thermophilus and L. bulgaricus into lactic acid. The longer the time given, the lactic acid bacteria will continue to work so that they produce more lactic acid. The presence of lactic acid gives yogurt its sour taste. The result of fermentation changes the texture of the milk to become thick. This is because the milk protein coagulates in an acidic environment, so that clots form. Lactic acid produced by these bacteria can convert milk into yogurt through a fermentation process [15]. In the pH range of 4.2-4.4, S. thermophilus bacteria can produce more lactic acid, causing a decrease in the pH of yogurt. On the other hand, in the pH range of 3.5-3.8, the growth of L. bulgaricus bacteria occurs which will produce more lactic acid. As a result, S. thermophilus and L. bulgaricus combine to ferment lactose in milk into lactic acid, causing protein denatured and milk to become semi-solid and sour. Apart from that, L. bulgaricus decomposes fatty acids into different chemicals.
that give yogurt its flavor. As a result, skim milk is used in the production of yogurt to reduce the lactose content in goat’s milk. *Bulgaricus* is reported to play a part in the development of the aroma of yogurt, in contrast to *S. thermophilus* is thought to be involved in the development of yogurt’s sour flavor.

**Protein Level Analysis**

Protein is a mineral found in milk and yogurt. The higher the protein contained in a product, the product is said to have good nutritional value, as humans need protein as an energy source. Protein is a compound that is very important in the preparation of the structure and function of living cells as a whole. Proteins also act as antibodies, hormone-forming, nutrient-storing, and transport components. Yogurt protein content obtained from this study can be seen in Figure 5.

![Figure 5. Results of protein content data processing](image)

Source: Data research, 2021

From Figure 5, it can be seen that the protein content in yogurt at the 3rd hour was 8.24%, at the 4th hour it was 7.54%, at the 5th hour it was 6.37%, at the 6th hour it was 5.45%, at the 7th hour it was 5.01%, at the 8th hour it was 4.63%, and at the 9th hour it was 4.21%. Protein levels continue to decrease every hour. The decrease occurred consistently; this was caused by the decrease in the concentration of goat’s milk during the fermentation process. During the fermentation process, the protein in goat's milk will be hydrolyzed by lactic acid bacteria into a soluble component that is used for protein formation [8]. Referring to SNI 2981 (2009), the standard protein content is 2.7% min. According to ref. [16], an increase in protein levels can occur due to proteolytic activity and protease enzymes that hydrolyze proteins into soluble amino acids with smaller molecular weights so that they affect protein levels.

The more protein is dissolved in the material, the higher the protein content. The results of the research also explain that the protein content in yogurt is largely determined by the quality of the basic ingredients, namely milk. The higher the protein content of milk, the better the quality of the yogurt it produces. Hence, it can be concluded that the variation in the length of fermentation in yogurt has no significant effect on the increase in protein, but the protein content can increase due to the good quality of milk raw materials.

**Fat Content Analysis**

Fats are organic compounds belonging to the lipid group that are insoluble in water. Fat is contained in many types of food ingredients with different amounts of content. In this study, yogurt needs to be tested for fat content to determine its fat content. Value Good fat content: a minimum of 3% for the use of raw materials for yogurt in the form of whole milk. Yogurt fat content obtained from this study can be seen in Figure 6. From Figure 6, it can be seen that the fat in yogurt at the 3rd hour was 6.64%, at the 4th hour it was 5.76%, at the 5th hour it was 5.11%, at the 6th hour it was 4.98%, at the 7th hour by 5.28%, at the 8th hour by 5.6%, and at the 9th hour by 6.23%. Fat content in this study decreased at 3 hours, 4 hours, 5 hours, and 6 hours. Then it increased to 7 hours, 8 hours, and 9 hours. This is caused by the proliferation of lactic acid bacteria.

Lactic acid bacteria experienced strong proliferation from 3 to 5 hours, and then reproduction slowed after 6 hours. Reproduction was significantly reduced between the hours of 7 and at the 9th hour. The higher the level of lactic acid bacteria proliferation, the lower the fat content will be [16]. The standard fat level is 3.0 percent min, according to SNI 2981 (2009). From the results of the fat content obtained, every hour meets the standard.
The lower the fat concentration, the longer the fermentation time. This is because lactic acid bacteria utilize the fat in milk as a source of nutrition during the fermentation process [9]. At the 9th hour, the fat level of the yogurt rose owing to over-fermentation, causing the texture to become thicker, causing clots or thickening.

However, because raw milk raw materials were used, the amount of fat obtained was rather large. Based on ref. [17], clumping or thickening is one of the typical properties of milk. The total density of yogurt is related to nutritional content such as fat, namely the denser the yogurt, the higher the fat content. Ref. [14] also said that Lactic acid bacteria will produce lipase enzymes that will break down fats into fatty acids. These fatty acids will be broken down into compounds that have a distinctive yogurt aroma.

**Calcium Level Analysis**

Calcium is the main mineral needed for the process of forming teeth and bones and also functions to prevent osteoporosis. From Figure 7, we can see the comparison of calcium content values from the addition of stevia sweetener to yogurt, where in the treatment, the addition of stevia sweetener was 0 grams; 0.05 grams; 0.15 grams; and 0.25 grams in a row, 41.34 mg; 46.11 mg; 47.17 mg; and 49.29 mg. The calcium content in pure goat's milk is 134 mg/100 ml. This value decreased to 49.29 mg for yogurt with the addition of 0.25 gram of stevia sweetener. This is because the sample analyzed was 50 ml, so there is a difference in the results of the calcium content due to the amount of milk volume. And also the factor of fermentation time on the calcium content produced, where fermentation for 48 hours can increase calcium in yogurt. However, in this study, yogurt was fermented for only 6 hours.

**Figure 7** also shows that before the addition of stevia sweetener at 0 grams and at the addition of 0.05 grams of stevia, there was a slightly larger increase in ratio. This is because the calcium content in stevia sugar is very high, namely 464.6 mg/100 grams, and also because the sweetness level of stevia sugar is 300 times that of granulated sugar, so stevia sugar is healthier to consume than granulated sugar. These results are in accordance with [18] research that found the highest calcium content in the addition of 0.60 gram stevia sweetener is 76.30 mg, an increase in calcium levels because the more stevia sweetener is added, the greater the calcium content produced.
Therefore, yogurt produced with the addition of stevia sugar can not only increase the calcium content but also increase the nutritional value of the yogurt itself [19]. The addition of sucrose must be done after the fermentation process so that the lactose in the milk is digested by bacteria. This is also to keep the dominant lactic acid bacteria from growing in the yogurt. If milk is given a lot of sucrose, the bacteria that are better able to chew the sugar grow in the yogurt and can produce CO2 gas and alcohol. As a result, the yogurt will smell like tape and have bubbles of gas [18].

4. Conclusion
Fermentation time affects the quality of yogurt. The longer the yogurt ferments, the lower the quality of the yogurt. Of the 7-time variables (3, 4, 5, 6, 7, 8 and 9 hours), yogurt with optimum results was obtained at 6 hours, where the pH value was 3.8, the lactic acid content was 1.305%, the protein content was 5.54%, the 4.98% fat content, and the 84.1% moisture. It takes a longer time (up to 48 hours) to produce higher calcium levels. The more stevia sweetener is added, the higher the calcium content. The highest calcium content was obtained from the addition of 0.25 gram of stevia sweetener, at 49.29 mg. Based on the results of the research that has been done, there are several things that are suggested for further research, namely that it is necessary to study other variables that affect the quality of goat’s milk yogurt.

5. Acknowledgments
This research was supported by the “Penelitian Lektor No. 270 / UN11 / SPK / PNBP / 2020” program, University of Syiah Kuala, Banda Aceh - Indonesia.

6. References


