



Fermentation Process of Making Yogurt from Blondo (Effect of Proportions Coconut Water and Corn Starch Concentrate)

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Abstract

Yogurt is a fermented product made from animal milk, using certain starter bacteria such as *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. This study focuses on making yogurt from blondo which is added with mature coconut water and combined with cornstarch as a stabilizing agent. The treatments in this study were a comparison of coconut water with regular water at proportions of 0%, 50%, and 100%, as well as the addition of cornstarch at 0%, 2%, and 4%. This study is experimental in nature with an experimental design using a factorial Randomized Block Design (RBD). Data analysis was conducted using an ANOVA test at a significance level of $\alpha=0.05$. The analysis results each showed a pH value between 4.21 and 4.32, free fatty acids (FFA) ranging from 1.09% to 1.26%, lactic acid 0.45% to 0.53%, total lactic acid bacteria (LAB) reaching 2.9×10^6 CFU/ml, viscosity between 0.013 g.cm/sec to 0.42 g.cm/sec (poise). Yogurt separation on the first day ranges from 0% to 75%, while on the fifth day it ranges from 0% to 77%. Organoleptic tests for taste showed a liking score between 2.3 (dislike slightly) to 5 (like), aroma liking score between 2.7 (dislike slightly) to 4 (like slightly), and color liking score between 2.5 (dislike slightly) and 5 (like).

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Introduction

Blondo is a byproduct of Virgin Coconut Oil (VCO) processing that still contains many nutrients. The wet method of VCO processing produces 30.97% blondo as a byproduct and 68.84% VCO^[1]. The amount of blondo (a mixture of cream and water) obtained as a byproduct of VCO processing is 82.39% of the total coconut milk^[2]. The amount of blondo obtained from coconut oil processing is approximately 60% of the total coconut milk raw material used^[3].

Blondo contains a lot of protein so it can be processed into concentrate. Blondo concentrate contains protein (78.21-82.76%), oil (0.75-0.85%), water (4.9-4.94%), and ash (2.30-2.38%)^[4]. Blondo contains 30.32% water, 26.59% fat, and 16.38% protein^[5,6]. Blondo contains high levels of globulin and albumin, making it a potential emulsifier^[7].

Blondo contains 14 types of amino acids, namely aspartic acid, glutamine, serine, histidine, glycine, arginine, alanine, tyrosine, methionine, valine, phenylalanine, isoleucine, leucine and lysine^[8].

Besides protein, blondo contains essential fatty acids which are essential for the human body. Type a the fatty acids in blondo include lauric acid, namely 50.45%, caproic acid 0.11%, caprylic acid 5.52%, capric acid 6.46% and myristic acid 17.52%^[9]. Lauric acid (in the form of free fatty acids) can inhibit the growth of *Salmonella* sp., *E. Coli*, *Stafilococcus aureus*, *Micrococcus*, *Bacillus stearothermophilus* and *Pseudomonas* bacteria^[10].

The use of blondo is still limited. Currently, blondo is used as an additive in ice cream^[11], vegetable stir-fries, or chili sauce^[3], processed into cheese^[2], biscuits (cakes)^[12], dry cookies^[13].

Blondo (a by-product of VCO processing) has a white color like coconut milk and a delicious aroma and good nutritional content so it has the potential to be processed into yogurt.

Yogurt is a probiotic drink fermented from milk. After undergoing the fermentation process, yogurt forms a thick, sour-tasting product [14]. Consuming yogurt can help reduce blood cholesterol (LDL) and triglyceride levels [15]. Furthermore, yogurt can modulate the immune system, lower cholesterol, act as an antioxidant, act as an antibacterial, and have a calming effect (like opioids) [16].

Several researchers have previously attempted to make yogurt by adding other ingredients. Yogurt is made by adding strawberries [17], grains, legumes, seeds, and nuts [18], grapes and citrus [19], papaya fruit [20], dates [21].

The addition of coconut milk in yogurt making has also been carried out by several previous researchers. Research on making cow's milk yogurt with the addition of coconut milk (0.25% and 50%) and starter amounts (10% and 15%) was conducted by [22]. Making yogurt from coconut milk and cow's milk with treatments of temperature influence (25, 40, 55°C) and incubation time (4, 8, 12 hours) was conducted by [23]. The addition of skim milk and coconut milk on the characteristics of whey yogurt was studied by [24].

Coconut milk contains fat and protein, is high in essential amino acids, calcium, phosphorus, potassium, vitamins C, E, and B6 [25], and contains medium-chain fatty acids, which have been clinically proven to have preventive effects against hyperlipidemia, fatty liver, and diabetes [26]. Coconut milk contains globulin and albumin as well as phospholipids [27].

There are no reports on the use of blondo for yogurt production. Therefore, this research is needed to increase the economic value of blondo into a product with high economic value.

The problem is that blondo doesn't contain lactose, the compound needed by starter bacteria to convert it into lactic acid. However, coconut water can be fermented by bacteria to produce a probiotic drink.

Old coconut water is rich in nutrients such as potassium, minerals including calcium (Ca), sodium (Na), magnesium (Mg), iron (Fe), copper (Cu), and sulfur (S), sugar and protein [23]. According to research by [28], young coconut water contains 95.50% water, 0.1% fat, 0.2% protein, 3.8% carbohydrates, and 0.4% ash.

Coconut water is processed into a probiotic drink by adding sucrose [29]. Coconut water is processed into a probiotic drink using *Lactobacillus casei* [30]. Probiotic drinks are made from a mixture of coconut and juice [31].

Preliminary research indicates that blondo can be processed into yogurt. However, the resulting yogurt is prone to separation due to its lower viscosity than cow's milk yogurt. This results in an unappealing appearance. The use of stabilizers such as CMC, xanthan gum, gum arabic, cornstarch can help reduce separation in beverage products.

Cornstarch contains amylose and amylopectin, which gelatinize when heated, trapping the ingredients in the gel and thickening the liquid [32]. Adding cornstarch to rice bran edible spoons can improve texture [33]. Adding cornstarch to red guava lempok can improve texture [34]. Therefore, adding coconut water and cornstarch is expected to improve the quality of yogurt made from blondo.

This research aims to study the addition of coconut water and cornstarch to improve the quality of yogurt made from blondo.

Materials And Methods

Research methods

This research was conducted at the Processing Laboratory and Chemistry Laboratory at the Faculty of Agriculture, Widya Gama University, Malang. The materials used in this study included coconuts, mature coconut water, lactose purchased from Makmur Sejati store, Maizenaku brand cornstarch from PT Egafood, and plain yogurt from Super Indo supermarket, Biokul brand produced by PT Diamond.

To make yogurt, tools include Erlenmeyer flasks, glass cups, incubators, measuring cups, thermometers, freezers, filters, analytical scales, pans, electric stoves, basins, bowls, stirrers, plastic spoons.

Experimental Design

The study used two factors: the concentration of mature coconut water (0%, 50%, and 100%), and the addition of cornstarch (0%, 2%, and 4%), arranged in a factorial manner and repeated three times. The research design used a Randomized Block Design (RBD) experiment.

Research Implementation

Blondo Separation

The mature coconut is peeled of its husk, shell, and brown skin, then washed and subsequently grated. The grated coconut is mixed with water in a 1:1 ratio and then squeezed to obtain coconut milk (its volume is measured). The coconut milk is placed in a glass beaker, covered with aluminum foil, and then placed in an incubator at 50°C for 24 hours.

After the coconut milk has been incubated for 24 hours, it will be divided into three parts: VCO, blondo, and water. Each part is separated and its volume measured. Once the VCO and water are separated, the blondo is ready to use.

Making Yogurt from Blondo and Coconut Water

The water mixed with blondo is a mixture of regular water and mature coconut water, each with a percentage of coconut water (0, 50, and 100%). The amount of water added must be the same volume as the water separated from the VCO.

For example: 750 g of grated coconut is added to 750 ml of water. After squeezing, 950 ml of coconut milk is produced. After the coconut milk is incubated, it separates into three parts: 250 ml of VCO, 150 ml of blondo, and 550 ml of water. Therefore, the water mixture (regular water and coconut water) added is 550 ml plus 150 ml of blondo.

After blondo and water are mixed (according to the treatment), cornstarch is added according to the treatment (0, 2, and 4%), then heated at 80°C for 10 minutes. Next, the mixture is transferred to a heat-resistant container and left until the temperature drops to 40°C. Then, lactose is added as much as 3%, and yogurt starter (Biokul brand) 10%, stirred until homogeneous. If the mixture is ready, cover it and put it in an incubator at 40°C for 12 hours. After 12 hours of incubation, the mixture will become thick so that yogurt has formed.

Yogurt was tested for pH [35], free fatty acids (FFA) using the volumetric method [36], total acid (as lactic acid) using the volumetric method [35], viscosity, stability (separation), total lactic acid bacteria (LAB) using the plate count method with MRS agar media (de-Man, Rogosa, Sharpe), and organoleptic (sensory) which includes color, taste, aroma, and texture by panelists through hedonic tests,

Results and Discussion

Lactic Acid Level

The lactic acid content in yogurt using blondo and coconut water ranges from 0.45% to 0.53%. The lowest level was found in the combination of 0% coconut water and 2% cornstarch, while the highest level was detected in the treatment with 2% cornstarch and 100% coconut water. The results of research conducted by [37] found that the average lactic acid content of yogurt ranges from 0.19% to 0.26%. Meanwhile, based on Indonesian National Standard 2981:2009 [38], the lactic acid content in yogurt ranges from 0.5% to 2.0%.

The ANOVA analysis showed that the concentration of coconut water significantly affected the lactic acid content of yogurt. Similarly, the concentration of cornstarch also had a significant effect. The interaction between these two factors also significantly affected the lactic acid content of yogurt. The lactic acid levels in yogurt from treatments with varying concentrations of coconut water and cornstarch are shown in Table 1 and Figure 1.

Table 1. Lactic Acid Content in Yogurt with Different Percentages of Coconut Water and Cornstarch Concentrations.

Table 1:

Cornstarch (%)	Coconut water (%)	Lactic Acid (%)	Notation
0%	0%	0.452	a
0%	50%	0.481	b
0%	100%	0.510	c
2%	0%	0.448	a
2%	50%	0.515	c
2%	100%	0.529	c
4%	0%	0.461	ab
4%	50%	0.477	b
4%	100%	0.481	b

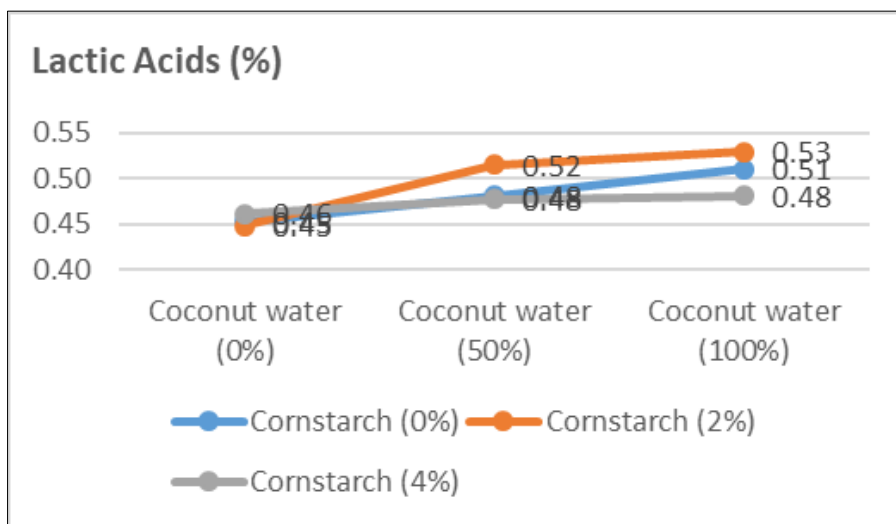


Fig 1: Lactic Acid Content of Yogurt at Different Percentages of Coconut Water and Cornstarch Concentrations

Based on Figure 1, at 0% and 2% cornstarch concentrations, lactic acid levels increased with increasing coconut water concentration. Meanwhile, at 4% cornstarch concentration, lactic acid levels tended to not experience a significant increase compared to 0% and 2% cornstarch concentrations. Lactic acid levels increased when coconut water concentrations of 0% and 50% were added, while at 100% concentration, there was no increase.

At 0% and 2% cornstarch concentrations, the amount of lactic acid increased with increasing coconut water concentration. This is due to the glucose present in coconut water being properly degraded during fermentation. Lactic acid is formed from the breakdown of glucose during fermentation. Mature coconut water has a low acidity (pH), and this composition supports bacterial growth [39].

Meanwhile, at a 4% cornstarch concentration, the graph did not show a significant increase. This is because the high cornstarch concentration inhibits bacterial growth,

which is inhibited by the fluid's viscosity. According to [40], viscosity affects spreadability. The higher the viscosity, the lower the spreadability, and vice versa.

pH

The pH of yogurt made from blondo and coconut water ranges from 4.21 to 4.32. The lowest pH level is found at 100% coconut water concentration and 2% cornstarch concentration. The highest pH is found in the treatment of 0% cornstarch and 0% coconut water. Yogurt made from coconut milk (cocoyogurt) has a pH value ranging from 4.75 to 5.32 [41]. Based on Indonesian National Standard 2981:2009, the pH of yogurt is 2.8-4.6.

Based on the results of the ANOVA analysis (variance test), it was found that the concentration of coconut water had a significant effect on the pH value of yogurt, and the concentration of cornstarch also had a significant effect on pH. However, the interaction between the two factors did not

show a significant effect on yogurt pH. The effect of cornstarch concentration on yogurt pH can be seen in Table 2.

Table 2: pH Value of Yogurt at Different Cornstarch Concentrations

Cornstarch Concentrate	pH	Notation
0%	4.28	b
2%	4.23	a
4%	4.23	a

The higher the cornstarch concentration, the lower the yogurt's pH value. Research from [41] found that the use of cornstarch significantly impacted pH. Increasing cornstarch concentrations increased total dissolved solids, flavor, aroma, and texture, although the pH decreased. The addition of cornstarch can improve the quality of yogurt drinks. The impact of coconut water concentration on yogurt pH is shown in Table 3.

Table 3: Effect of Coconut Water Concentration on Yogurt pH

Coconut Water Concentration	pH	Notation
0%	4.28	B
50%	4.24	A
100%	4.23	A

Table 4: Free Fatty Acid Content of Yogurt at Different Percentages of Coconut Water and Cornstarch Concentrations

Cornstarch (%)	Coconut water (%)	Free Fatty Acids (%)	Notation
0%	0%	1,092	a
0%	50%	1,152	c
0%	100%	1,221	d
2%	0%	1,092	a
2%	50%	1,121	b
2%	100%	1,264	e
4%	0%	1,111	ab
4%	50%	1,154	C
4%	100%	1,168	C

Based on Graph 2, yogurt with a 2% cornstarch concentration had an increasing free fatty acid content as the coconut water concentration increased. Meanwhile, yogurt with a 4% cornstarch concentration did not experience a significant increase in FFA levels, even with a 100% coconut water concentration.

At 2% and 0% cornstarch concentrations, the FFA value of

The higher the concentration of coconut water, the lower the pH value of the yogurt. According to [39] mature coconut water has a low acidity level (pH), and its nutritional content facilitates bacterial growth. Therefore, a higher concentration of coconut water lowers the yogurt's pH. Furthermore, lactic acid bacteria growth increases. Therefore, the higher the pH value, the lower the fermentation process of lactose into lactic acid.

Free Fatty Acid Levels

The free fatty acid (FFA) content in blondo yogurt and coconut water ranges from 1.09% to 1.26%. The lowest FFA levels were recorded in 0% coconut water and 1% cornstarch concentration. The highest FFA levels were found in 2% cornstarch and 100% coconut water. The average FFA value of yogurt made from a mixture of cow's milk and coconut milk ranged from 1.16% to 2.92% [23].

The results of the ANOVA (test of variance) showed that the concentration of coconut water significantly affected the FFA content of yogurt, while the concentration of cornstarch did not. Meanwhile, the interaction between these two factors significantly affected the FFA content of yogurt. The FFA levels resulting from treatments with various concentrations of coconut water and cornstarch can be seen in Table 4 and Figure 2.

yogurt increased with increasing coconut water concentration. This is because the fat/oil in blondo can be effectively broken down during the fermentation process. Meanwhile, in yogurt with a 4% cornstarch concentration, the FFA value did not significantly increase with increasing coconut water concentration.

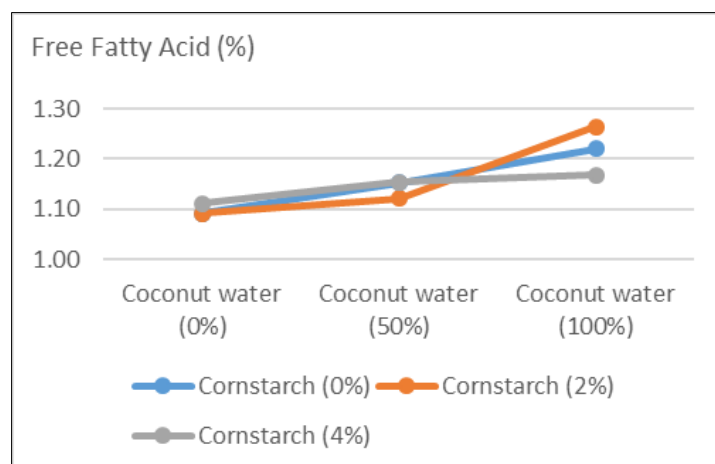


Fig 2: Free Fatty Acid Content of Yogurt at Different Percentages of Coconut Water and Cornstarch Concentrations

This is because high cornstarch levels will affect the activity of bacteria, causing the fat breakdown process in coconut water during the fermentation process to not be optimally decomposed, resulting in a significant increase in the FFA value. According to [40], viscosity affects the dispersion of compounds in a liquid. The higher the viscosity, the lower the dispersion, thus affecting the fat breakdown by bacteria.

Separation Percentage

The percentage of yogurt separation was tested on the first and fourth days. The percentage of yogurt separation on the first day ranged from 0% to 75%. The highest separation percentage occurred in the treatment with 0% coconut water concentration and no starch. Meanwhile, the lowest separation percentage occurred in the treatment with 4% starch concentration and coconut water concentrations of 0%, 50%, and 100%.

The ANOVA results showed that coconut water concentration did not have a significant effect on yogurt separation, whereas starch concentration had a very significant effect. Meanwhile, the interaction of the two factors did not significantly affect yogurt stability. The effect of starch concentration on the yogurt separation that occurred on the first day can be seen in Table 5.

Table 5: Effect of Cornstarch Concentration on Separation of Yogurt on the First Day

Cornstarch Concentrate	Separation (%)	Notation
0%	68.17	b
2%	3.50	a
4%	0	a

The higher the concentration of cornstarch, the lower the percentage of yogurt separation. This is because cornstarch undergoes gelatinization when heated, during which the starch thickens and binds water, resulting in a thicker and more stable liquid. Cornstarch contains amylose and amylopectin, which gelatinize when heated, trapping the ingredients in the gel and thickening the liquid [32].

Meanwhile, the percentage of yogurt separation on the fourth day ranges from 0% to 77%. The highest separation occurs in the treatment with 0% coconut water concentration and 0%

cornstarch, and the lowest percentage of separation occurs in the treatment with 4% cornstarch concentration and 100% coconut water concentration.

Based on the results of anova (variance test), it is known that the concentration of coconut water does not have a significant effect on the percentage of yogurt separation. The concentration of starch has a very significant effect on yogurt separation. Meanwhile, the interaction of the two factors does not have a significant effect on yogurt separation. The effect of starch concentration on yogurt separation on the fourth day can be seen in Table 6.

Table 6: Effect of Cornstarch Concentration on Yogurt Separation on Day 4

Cornstarch Concentrate	Separation (%)	Notation
0%	72.67	b
2%	10.83	a
4%	1.33	a

The higher the cornstarch concentration, the greater the yogurt's stability. This is because cornstarch undergoes gelatinization during heating, where the starch thickens and binds water, resulting in a thicker, more stable liquid. However, on the fourth day, the stability of the coconut water and blondo yogurts decreased significantly, with visible water separation.

Viscosity

The viscosity of the yogurt produced from the combination of blondo and coconut water ranged from 0.013 poise to 0.42 poise. The lowest viscosity was recorded in the treatment with 0% cornstarch and 0% coconut water, while the highest viscosity was seen in the treatment with 4% cornstarch and 0% coconut water.

The analysis of variance (ANOVA) revealed that coconut water concentration significantly affected yogurt viscosity. Similarly, cornstarch concentration significantly affected viscosity. Furthermore, the interaction between these two factors also showed a significant effect on yogurt viscosity. Yogurt viscosity data obtained from varying coconut water and cornstarch concentrations can be seen in Table 7 and Figure 3.

Table 7: Viscosity of Yogurt at Different Percentages of Coconut Water and Cornstarch Concentrations

Cornstarch (%)	Coconut water (%)	Viscosity (poise)	Notation
0%	0%	0.454	a
0%	50%	0.455	a
0%	100%	0.466	a
2%	0%	1,013	b
2%	50%	1,014	b
2%	100%	1,048	b
4%	0%	14,848	e
4%	50%	11,782	d
4%	100%	8,196	c

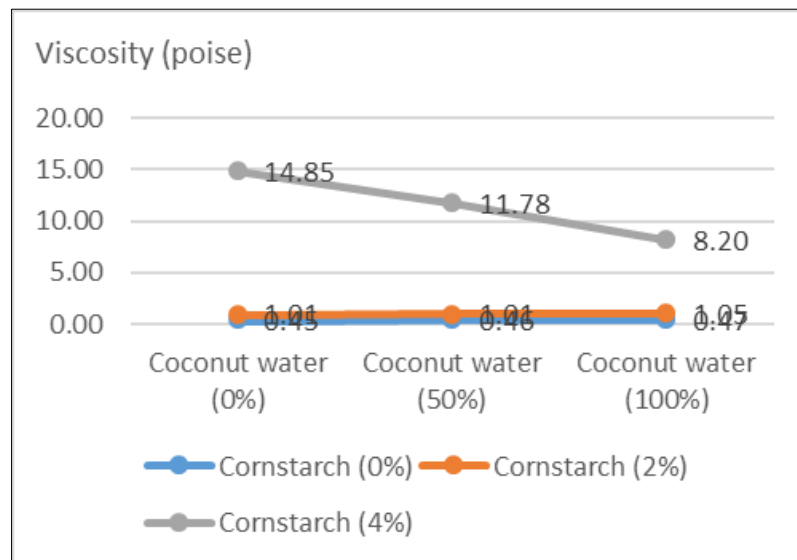


Fig 3: Viscosity of Yogurt at Different Percentages of Coconut Water and Cornstarch Concentrations

Based on the graph in Figure 3, there was no significant difference at 0% and 2% cornstarch concentrations. However, at 4% cornstarch concentration, increasing the coconut water content significantly reduced the viscosity. According to [39], mature coconut water has a relatively low pH. Acid can cause hydrolysis of starch (cornstarch). Hydrolyzed starch reduces its ability to gelatinize, thus reducing its viscosity. Therefore, when cornstarch is added at a concentration of 4%, the acid from coconut water significantly reduces yogurt viscosity. Meanwhile, at cornstarch concentrations of 0% and 2%, the acid does not affect viscosity.

Total LAB (Lactic Acid Bacteria)

The total LAB (lactic acid bacteria) count was performed using the Total Plate Count (TPC) method using MRS Agar media. The sample used to calculate the total LAB count was yogurt containing 2% cornstarch and 50% coconut water. This is because the sample still meets Indonesian National Standard for lactic acid content and pH. The viscosity is not too thick and the separation is relatively low.

The total LAB measured in the yogurt sample made from blondo and coconut water was 2.9×10^6 CFU/ml. This value almost reaches the minimum Indonesian National Standard for yogurt, which is 10^7 . This indicates that the lactic acid bacteria (LAB) in yogurt with 2% cornstarch and 50% coconut water are able to utilize glucose from mature coconut water for their growth process. Bacterial cells can grow to reach maximum numbers in the medium, which is influenced by the availability of nutrients in it.

In accordance with the Indonesian National Standard 2981:2009 regarding yogurt quality criteria, it is stated that the minimum number of total lactic acid bacteria (LAB) in unheated yogurt after the fermentation process must reach a minimum of 10^7 CFU/ml.

Organoleptic Test

Color

Based on the evaluation conducted by the panelists through a hedonic test, yogurt with 50% coconut water and no cornstarch showed the lowest preference level, at around 2.3 (somewhat dislike). Meanwhile, yogurt with 100% coconut water and 4% cornstarch showed the highest color preference

level, at 5 (like).

The results of the ANOVA showed that the use of coconut water significantly affected color, and the concentration of cornstarch also significantly affected color. However, the interaction between the two factors did not show a significant effect on color. The effect of cornstarch concentration on yogurt flavor can be seen in Table 8.

Table 8. Effect of Cornstarch Concentration on the Level of Preference for Yogurt Color

Cornstarch Concentrate	Color (score)	Notation
0%	2.62	a
2%	4.02	b
4%	4.07	b

The higher the concentration of cornstarch, the higher the level of preference for yogurt color. This is because cornstarch gives a shiny color to the liquid it thickens.

The effect of coconut water concentration on the level of yogurt preference can be seen in Table 9.

Table 9: Effect of Coconut Water Concentration on Yogurt Color Preference Value

Coconut Water Concentration	Color (score)	Notation
0%	3.29	a
50%	3.52	b
100%	3.90	c

The more coconut water you add, the more desirable the yogurt's color will be. This is because mature coconut water has a white color that's close to the color of yogurt made from milk.

Aroma

Yogurt using 0% coconut water concentration and 0% cornstarch showed the lowest level of liking, which was around 2.7 (tends to dislike), while yogurt with 100% coconut water concentration and 4% cornstarch obtained the highest level of liking for the aroma, which was 4 (tends to like).

The results of the analysis of variance (ANOVA) showed that coconut water treatment significantly affected aroma, and cornstarch concentration also significantly affected aroma. However, the interaction between the two factors did not

significantly affect aroma. The effect of cornstarch concentration on yogurt aroma can be seen in Table 10.

Table 10: Effect of Cornstarch Concentration on the Level of Yogurt Aroma

Cornstarch Concentrate	Aroma (score)	Notation
0%	3.10	a
2%	3.89	b
4%	4.12	b

The higher the cornstarch concentration, the higher the level of preference for the yogurt aroma. Because cornstarch increases the viscosity of the liquid by forming a gel. The resulting gel acts as a shield against the flavor of the liquid, enhancing the coconut water aroma and imparting a savory flavor to the yogurt.

The effect of coconut water concentration on the level of yogurt preference can be seen in Table 11.

Table 11: Effect of Coconut Water Concentration on the Level of Yogurt Aroma

Coconut Water Concentration	Aroma (score)	Notation
0%	3.29	a
50%	3.52	b
100%	3.90	c

The higher the coconut water content, the higher the level of liking for the yogurt's aroma. This is because mature coconut water has a distinctive, savory and pleasant aroma. Consequently, it enhances the yogurt's aroma.

Taste

Yogurt with a concentration of 0% coconut water and 0% cornstarch showed the lowest level of liking, which was around 2.5 (quite disliked), while yogurt using a concentration of 100% coconut water and 4% cornstarch showed the highest level of liking, which was 5 (liked).

According to the analysis of variance (ANOVA), the coconut water treatment had a very significant effect on flavor, while the cornstarch concentration also had a significant impact. However, the interaction between the two factors did not show a significant effect. The effect of cornstarch concentration on yogurt flavor can be seen in Table 12.

Table 12: Effect of Cornstarch Concentration on the Level of Yogurt Taste Preference

Cornstarch Concentrate	Taste (score)	Notation
0%	2.86	a
2%	3.74	b
4%	4.07	b

The higher the cornstarch concentration, the higher the yogurt's taste preference. This is thought to be because cornstarch increases the yogurt's viscosity, making thicker yogurt more preferred by panelists.

The effect of coconut water concentration on the level of yogurt preference can be seen in Table 13.

Table 13: Effect of Coconut Water Concentration on Yogurt Taste Preference Score

Coconut Water Concentration	Taste (score)	Notation
0%	2.88	a
50%	3.60	b
100%	4.19	c

The higher the proportion of coconut water, the higher the preference for the yogurt flavor. This is because mature coconut water has a mild sweetness and a distinctive savory flavor. Therefore, the more coconut water added, the higher the preference for the yogurt flavor.

Conclusion

The results of the study showed that the combination of treatment of the proportion of old coconut water and cornstarch concentration affected the amount of lactic acid, free fatty acids, and viscosity.

The percentage of mature coconut water affects the pH, flavor, aroma, and taste of yogurt. The concentration of cornstarch also affects the pH, separation, flavor, aroma, and taste of yogurt.

Yogurt made from blondo and mature coconut water showed a pH value between 4.21 and 4.32. The free fatty acid (FFA) value was between 1.09% and 1.26%. The lactic acid value varied between 0.44% and 0.53%. The N-Amino value ranged from 0.03% to 0.06%. The viscosity was in the range of 0.013 g.cm/second to 0.42 g.cm/second (poise). The percentage of yogurt separation on the first day ranged from 0 to 75%, while on the fourth day the separation was at 0 to 77%. Total Lactic Acid Bacteria (LAB) was recorded at 2.9×10^6 CFU/ml.

References

- Wijana S, Perdani CG, Angelina T. Formulation of vegetable seasoning made from raw material of coconut blondo protein hydrolyzate. In: International Conference on Green Agro-industry and Bioeconomy; 2019 Aug 26–27; Malang, East Java, Indonesia. Bristol: Institute of Physics Publishing; 2020.
- Su'i M, Sumaryati E, Anggraeni FD, Indriyani T. The use of blondo (by product from lauric acid production) for cheese fruiters: the study ratio of milk with blondo and citric acid concentration as a coagulant. *Eur J Agric Food Sci.* 2024;6(4):8–13.
- Arifin, Fitriani AN, Angelia IO, Mege RA, Tanor MN, Moko EM, et al. Dissemination and empowerment of soy sauce processing using blondo coconut oil as raw material in Harapan Hamlet, Ilomata Village, Atinggola District, North Gorontalo. *J Appl Innov Sci Technol.* 2023;5(1):107–114.
- Edam M, Kumolontang N, Mandei J. Coconut cream emulsion breakdown method for blondo protein concentrate production. *J Ind Technol Res.* 2019;13(2):173–181. doi:10.26578/jrti.v13i2.5183.
- Ansharullah, Taridala SAA, Natsir M, Nopitasari M, Nopitasari E, Damayanty S, et al. Effect of heating

- treatment of VCO by-product on protein, fat, free fatty acid, emulsification capacity, and fatty acid characteristics. In: 6th International Conference of Food, Agriculture, and Natural Resources (IC-FANRES 2021). *Adv Biol Sci Res.* 2021;16:145–149.
6. Harni M, Putri SK, Gusmalini, Handayani TD. Characteristics of the chemical physical properties of cassava flour modification (Mocaf) with the use of blondo or virgin coconut oil (VCO) dregs. *IOP Conf Ser Earth Environ Sci.* 2022;1059:012065. doi:10.1088/1755-1315/1059/1/012065.
 7. Kurniawati AD, Hidayat C, Setiowati AD. Formation of coconut oil by-product protein concentrate pectin through electrostatic interaction to improve emulsifying properties. *AgriHealth.* 2023;4(1):1–13. doi:10.20961/agrihealth.v4i1.70577.
 8. Susanto T. Study of acidification methods in the coconut oil production process reviewed from product quality and blondo amino acid composition. *J Ind Res Dyn.* 2012;23(2):124–130.
 9. Su'i M, Sumaryati E, Sucahyono D. Utilization of lauric acid-rich fractions from hydrolysis of coconut endosperm using endogenous lipase as a preservative for packaged soy milk. *AgriTECH.* 2016;36(2):154–159.
 10. Su'i M, Sumaryati E, Prasetyo R, Eric DP. Anti-bacterial activities of lauric acid from coconut endosperm: hydrogenized using endogenous lipase. *Adv Environ Biol.* 2015;9(23):45–49.
 11. Kamil RZ, Mulyani S, Nurwantoro. Valorisation of coconut oil dregs (blondo) as an ingredient for fermented plant-based ice cream: a functional and sensory evaluation. *Acta Sci Pol Technol Aliment.* 2025;24(2):217–227. doi:10.17306/J.AFS.001313.
 12. Ramadhani I, Purwayantie S, Hartanti L. Formulation of blondo coconut oil and mocaf flour in making cakes. *Foodtech J Food Technol.* 2021;4(2):64–71. doi:10.26418/jft.v4i2.56922.
 13. Nareswari TL, Aziz S, Septiani W, Muhyi A. Training on processing blondo into cookies for stunting management at CV. Buah Asa Tani, Bangunrejo, Lampung. *J KPM.* 2024;7(5):1980–1989. doi:10.33024/jkpm.v7i5.14169.
 14. Zulaikhah SR, Sidhi AH. Making cow's milk yoghurt as an effort to increase the functional value of milk, community nutrition and household income during the pandemic. *J Community Serv Master Sci Educ.* 2021;4(3):290–294. doi:10.29303/jpmpi.v4i3.924.
 15. Pratiwi IDPK, Nocianitri KA, Aryaanta WR, Ramona Y, Sukrama IDM, Sujaya IN. Effects of consuming bio-yoghurt from *Lactobacillus rhamnosus* on lipid profile in humans. *Arch Community Health.* 2013;2(1):40–49.
 16. Sumarmono J. *Yoghurt and Concentrated Yoghurt (Functional Foods from Milk)*. Semarang: Institute for Research and Community Service, Jenderal Soedirman University; 2016.
 17. Thompson JL, Lopetcharat K, Drake MA. Preferences for commercial strawberry drinkable yogurts among African American, Caucasian, and Hispanic consumers in the United States. *J Dairy Sci.* 2007;90:4974–4987.
 18. Wang S, Naumovski N, Ajlouni S, Ayyash M, Silva R, Balthazar CF, et al. Nonbovine milk and its products as sources of probiotics delivery: an overview of its viability, functionality and product quality characteristics. *Int J Dairy Technol.* 2023;76(3):482–511. doi:10.1111/1471-0307.12976.
 19. Hossain MN, Fakruddin M, Islam MN. Development of fruit dahi (yogurt) fortified with strawberry, orange and grapes juice. *Am J Food Technol.* 2012;7(9):562–570.
 20. Othman N, Hazren AH, Suleiman N. Physicochemical properties and sensory evaluation of yogurt nutritionally enriched with papaya. *Food Res.* 2019;3(6):791–797.
 21. Hartati AI. Lactose and reducing sugar concentrations, pH and the sourness of date flavored yoghurt drink as probiotic beverage. *J Food Technol Appl.* 2012;1(1):1–3.
 22. Su'i M, Sumaryati E, Anggraeni FD, Romadhona FA. Quality test of coconut milk yogurt (study of coconut milk and starter concentration). In: Conference on Innovation and Application of Science and Technology (CIASTECH); 2021. p. 231–240.
 23. Su'i M, Cendia MP, Anggraeni FD. Development of yogurt products from coconut milk and cow's milk (a study on temperature and incubation time). *Agrointek.* 2025;19(1):104–113.
 24. Nurminabari SI, Sumartini, Arifin DPP. Study of the addition of skim and coconut milk to the characteristics of yoghurt from whey. *Pasundan Food Technol J.* 2018;8(1):54–62.
 25. Góral M, Kozłowicz K, Pankiewicz U, Góral D, Kluza F, Wójtowicz A. Impact of stabilizers on the freezing process, and physicochemical and organoleptic properties of coconut milk-based ice cream. *LWT.* 2018;92:516–522. doi:10.1016/j.lwt.2018.03.010.
 26. Narayanankutty A, Illam SP, Raghavamenon AC. Health impacts of different edible oils prepared from coconut (*Cocos nucifera*): a comprehensive review. *Trends Food Sci Technol.* 2018;80:1–7. doi:10.1016/j.tifs.2018.07.025.
 27. Lu X, Su H, Guo J, Tu J, Lei Y, Zeng S, et al. Rheological properties and structural features of coconut milk emulsions stabilized with maize kernels and starch. *Food Hydrocoll.* 2019;96:385–395. doi:10.1016/j.foodhyd.2019.05.027.
 28. Mahmud MK, Hermana, Nazarina S, Marudut, Zulfianto NA, Muhayatun, et al. *Indonesian Food Composition Table 2017*. Jakarta: Ministry of Health of the Republic of Indonesia; 2018.
 29. Pranayanti IAP, Sutrisno A. Making probiotic drinks from young coconut water (*Cocos nucifera* L.) with *Lactobacillus casei* strain Shirota starter. *J Food Agroind.* 2015;3(2):763–772.
 30. Anwar MZ, Pato U. Making young coconut water (*Cocos nucifera* L) probiotic drinks with *Lactobacillus casei* subsp. *casei* R-68 starter. *Online J Fac Agric Stud.* 2018;5(1):1–12.
 31. Mandei JH, Edam M, Assah YF. Mixing ratio of coconut water, carrot juice, and skim milk variations on the quality of probiotic drinks. *J Ind Technol Res.* 2019;13(2):192–205.
 32. Apriliani P, Haryati S, Sudjatinah. Effect of various cornstarch concentrations on the physicochemical and organoleptic properties of shrimp paste. *J Agric Technol Univ Semarang.* 2019:1–9.
 33. Utomo AR, Yulita MM, Setijawaty E. The effect of cornstarch concentration on the physicochemical characteristics of rice bran flour-based edible spoons. *J Food Technol Nutr.* 2023;22(2):143–152.
 34. Gunawan R, Susanto WH, Wijayanti N. The effect of

- heating time and cornstarch concentration on the physical, chemical and organoleptic characteristics of red guava lempok (*Psidium guajava* L.). *J Food Agroind.* 2018;6(1):1–11.
35. Association of Official Analytical Chemists (AOAC). *Official Methods of Analysis of AOAC International*. 18th ed. Gaithersburg (MD): AOAC International; 2005.
 36. Su'i M, Sumaryati E, Anggraeni FD, Suprihana S, Mustika M, Utomo Y. Modification of free fatty acid test for food products containing fat and organic acid. *Food Res.* 2023;7(6):229–234.
 37. Syainah E, Novita S, Yanti R. Study of yogurt making from various types of milk and different incubation times on quality and acceptability. *J Skala Kesehatan.* 2014;5(1):1–8.
 38. Indonesian National Standard. *Yogurt Quality Standards*. Jakarta: Indonesian Standardization Agency; 2009.
 39. Fadillah S, Surhaini S, Suseno R. The effect of the comparison of old coconut water and Pandanus amaryllifolius Roxb. leaf extract on the produced syrup [dissertation]. Jambi: University of Jambi; 2022.
 40. Bhalekar MR, Madgulkar AR, Kadam GJ. Evaluation of gelling agent for clindamycin phosphate gel. *World J Pharm Pharm Sci.* 2015;4(7):2022–2033.
 41. Syaputra A, Pato U, Rossi E. Variation of sucrose addition to cocoghurt quality using *Enterococcus faecalis* UP-11 isolated from tempoyak. *Online Student J Agric.* 2015;2(1):1–11.
 42. Machmudah A. The effect of cornstarch usage level on the quality of yogurt drink [dissertation]. Malang: Brawijaya University; 2016.

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