JAPSI (Journal of Agriprecision and Social Impact)
Volume 2 Issue 2 July 2025
e-ISSN: 3032-7849; p-ISSN: 3046-5397, Page 188-204
DOI: https://doi.org/10.62793/japsi.v2i2.55
Available online at: https://journal.kdp.co.id/index.php/japsi

The Effect of Using Different Types of Honey As Sugar Substitute on the Quality of Milk Jelly Candy

Faradisa Zul Alfi Husna
Faculty of Animal Science, Brawijaya University, Malang, Indonesia

Dedes Amertaningtyas
Faculty of Animal Science, Brawijaya University, Malang, Indonesia

Address: Veteran street, Lowokwaru, Malang 64145, East Java, Indonesia
Corresponding author: dedesfptub@ub.ac.id

Abstract. *This study investigates about the effect of using different types of honey (coffee honey, randu honey and multiflora honey) on the quality of cow's milk jelly candy. Specifically, the resrarch examines the reducing sugar (%), water activity (A_w) and organoleptic (aroma, taste and color). The research method used a laboratory experiment with Completely Randomized Design (CRD) with four treatments and four replications. The treatments included P0 = using sugar 25%, P1 = using coffee honey 25%, P2 = using randu honey 25% and P3 = using multiflora honey 25%. Data analysis was carried out by Analysis of Variance (ANOVA). If different results were obtained between treatments. Duncan's Multiple Range Test (DMRT) was continued. The results of the study showed that the use of different types of honey (coffee honey, randu honey and multiflora honey) gave a very significant effect (P <0.01) on the organoleptic taste and color, and reducing sugar (%) but did not give any effect on the organoleptic aroma and water activity (A_w).Rreducing sugar is 17.44-3.49%; water activity (Aw) is 0.87-0.84; organoleptic aroma 3.42-3.83, taste 4.25-3.6, color 4.50-3.33.*

Keywords: *Bee, Organoleptic, Reducing sugar, Water activity*

Received: February 9, 2025; Accepted: May 8, 2025; Published: July 4, 2025
*Corresponding author, dedesfptub@ub.ac.id

INTRODUCTION

Cows are one of the livestock animals that produce the largest amount of milk in the world, approximately 80% compared to goat, sheep, and horse milk (Sigit, et al., 2021). Based on data from the Badan Pusat Statistika (2024) it was noted that in Indonesia, cow milk production experienced a decline in 2022, amounting to 824.27 thousand tons, but then increased to 837.22 thousand tons in 2023. The increase in milk production is good news, as milk plays an important role in improving community nutrition (Brilianty et al., 2022). The nutritional content of fresh cow's milk includes protein, fat, vitamins, and minerals (Putri et al., 2015). In addition, milk contains essential amino acids that are part of the protein as a biological value needed by humans (Marangoni et al., 2014). The complete composition of milk, such as proteins, amino acids, fats, carbohydrates, minerals, and vitamins, causes milk to be classified as perishable food, which is food that is easily subject to spoilage (Maharani et al., 2020). The damage can be prevented by further processing, such as using milk as the main ingredient in the product. One of them is that it can be processed into jelly candy.

Jelly candy is a food product that is characterized by its sweet taste and soft texture (Silaen and Ginting, 2020). The soft and chewy texture of jelly candy can be obtained from ingredients that can form a reversible gel, such as gelatin (Nuh et al., 2020). Meanwhile, the sweetness of jelly candy generally uses sugar as the main ingredient (Nelwan et al., 2015). The use of sweeteners in the processing of jelly candies needs to be considered because it can affect health. This is because excessive sugar consumption can increase blood sugar levels in the body, leading to dental caries, obesity, and even diabetes (Marda et al., 2023). Therefore, the use of sugar in processed products needs to be monitored. Efforts that can be made include reducing sweeteners in jelly candies or replacing them with natural sweeteners. One of the natural sweeteners that can be used is honey.

Honey is a thick liquid with a sweet taste produced by honey bees. Honey is made from the nectar of flowering plants (floral nectar) secreted by honeybees (Kamboj, et al., 2020). The components of honey include 17.2% water, 79.6% sugar, and the remainder consists of other minor components (Wardhani et al., 2023). Marda et al. (2023) conducted a study using Madurasa brand honey (a combination of randu honey, forest honey, and longan honey) with a concentration of 30% in the production of gandari jelly

candy (Bouea Macrophylla Griffith), which was able to increase gel strength, resulting in a texture preference score of 3.24 (like) from the panelists and affecting vitamin C content, which was 66.88 mg. Ningtyas et al. (2017) stated that the higher the concentration of added honey (5%, 10%, 15%, 20%, 25%) in albeno watermelon jelly can increase vitamin C. Another study was conducted by Silaen and Ginting (2020), where the addition of 20% honey was the best treatment for kolangkaling jelly (Arenga pinnata), with an ash content of 3.848%; water content of 10.905%; reducing sugar content of 9.400%; crude fiber of 1.349%; TSS of 9.250%; and organoleptic properties including color with a value of 3.125 (very brown), texture 3.228 (hard), taste 3.225 (sweet), and aroma 3.138 (pleasant).

The use of honey in cow's milk jelly candy has not been widely used, on average in previous studies, honey was used in jelly candy made from fruit extracts. Additionally, some studies used only one type of honey in their research, while each honey has a different content. Based on these things, a study was conducted on the use of several types of honey in making cow's milk jelly candy. The types of honey used were coffee honey, kapok honey and multiflora honey. This study aims to determine the effect of using several types of honey (coffee honey, kapok honey and multiflora honey) in making cow's milk jelly candy in terms of reducing sugar (%), water activity (Aw) and organoleptic.

LITERATURE REVIEW

Jelly candy is a type of confectionery that generally consists of a mixture of fruit juice and ingredients that can form a gel, which is usually transparent and has a chewy texture (Jariyah, 2023). In addition to being made from fruit juice, jelly candies are now also being developed using fresh milk. Maharani et al. (2020) explain that processing milk into milk jelly can be beneficial for extending the shelf life of milk, as milk is classified as a perishable food. Jelly candy itself is made from gelling agents and sweeteners such as sucrose (Silaen and Ginting, 2020). In line with the research by Majidah et al. (2024) that the production of jelly candy from goat milk is made from a mixture of sugar (sucrose), glucose syrup, and gelatin as thickening agents. Marda et al. (2023) explain that the sweetener in jelly candy production can be replaced with natural sweeteners like honey, because excessive use of sugar can affect health.

Honey is a thick, sweet liquid that has been processed by bees from flower nectar (Kamboj, et al., 2020). The most important nutritional component in honey is

carbohydrates, which make up about 75—80% (Ilia et al., 2021). The carbohydrates in honey contain 38.19% fructose, 31% glucose, and about 1% sucrose (Rosiana and Khoiriyah, 2018). The sweetness in honey is generally often used as an ingredient in processed foods such as in the making of candies (Santana et al., 2023). Honey has several types depending on the source of its nectar. There is monofloral honey, which is obtained from one type of flower nectar, and multifloral honey, which is obtained from several different types of flower nectar. Coffee honey is a monofloral honey produced from the nectar of coffee flowers. Coffee honey has a reducing sugar content of 78.99% (Agrib et al., 2017). The sucrose found in coffee honey is 3.71% (Adalina and Kundati, 2019). Physically, coffee honey has a slightly dark reddish-yellow color, a slightly fragrant aroma, and a sweet taste typical of honey but slightly acidic. Unlike randu honey from the nectar of randu flowers, which has a lighter color but a slightly sour taste. Randu honey has a reducing sugar content of 61.42% (Agrib, et al., 2017). The fructose content in randu honey is 36.98%, glucose 33.91%, and a small amount of sucrose 3.54% (Kamboj, et al., 2029). Besides monofloral honey, there is also multifloral honey produced from several types of flower nectar. The physical form of multifloral honey generally varies according to the types of flower nectar produced.

The use of honey as a sweetener has been documented in several studies. The research by Ginting and Silaen (2020) showed that the addition of honey with a concentration of 25% in kolangkaling jelly (Arenga pinnata) resulted in a high concentration of 12.27%. Ningtyas et al. (2017) showed that in the production of jelly candy from watermelon albedo (Citrullus vurgaris sp), the higher the concentration of honey, the higher the reducing sugars produced. The use of honey in the making of jelly candy can also affect the organoleptic properties of the jelly candy. In the study by Ramdani et al. (2024), the addition of 40% honey and 6% gelatin resulted in an aroma favored by the panelists at 4.00 (liked), a taste favored by the panelists at 4.40 (liked), while the color received a score of 3.47 (somewhat liked) with a yellowish-brown color criterion.

RESEARCH METHODS

Location and Time

The research was conducted at the Livestock Product Technology Laboratory of the Faculty of Animal Husbandry, Brawijaya University, for the production of milk jelly

candies, reducing sugars, and water activity. The research was conducted from August to October 2024.

Materials

The material used in this research is jelly candy made from cow's milk using different types of honey. The main ingredients used for the sample preparation are fresh cow's milk obtained from dairy farmer Kang M in Prambon Nganjuk and coffee honey, randu honey, multiflora honey from PT. Kembang Joyo Sriwijaya. Supporting materials such as Hakiki brand gelatin derived from beef bones, Gulaku brand granulated sugar, and glucose syrup from a chemical store. The tools used for making jelly candy are an analytical scale brand Starco, a pot, a thermometer, a measuring cup, a spoon, a stove, a stopwatch, and silicone molds for the candy. The formulation of the ingredients for making milk jelly candy is presented in Table 1. The formulation used is based on Majidah et al. (2024) research which is slightly modified.

Table 1. Modified milk jelly candy formulation according to Majidah et al. (2024)

No	Ingredients	%	Perlakuan			
			P0	P1	P2	P3
1	Cow's Milk (g)	60	206	206	206	206
2	Sugar (g)	25	86	0	0	0
3	Honey (g)	25	0	86	86	86
4	Glucose Syrup(g)	5	18	18	18	18
5	Gelatin (g)	10	33	33	33	33

Milk Jelly Candy Making Procedure

- Prepare the tools and ingredients for making milk jelly candy
- First, 60% of fresh cow's milk is added to
- The ingredients are put into a pot, for P0 which is 25% sugar, while P1 is 25% coffee honey, P2 is 25% randu honey, and P3 is 25% coffee honey. The other ingredients are glucose syrup at 5% and gelatin at 10%.
- The main pot containing the ingredients is placed into a large pot filled with water, and the cooking is done using the milk pasteurization method.
- The pot filled with ingredients is cooked on the stove for 10 minutes, precisely until the gelatin melts, and the mixture's temperature does not exceed 70ºC.
- The formed solution is poured into molds and then cooled in the refrigerator for 16 hours until the jelly candy hardens.

Research Method

The method used in this study was a laboratory expererimental, the data analyst used Analysis of Variance (ANOVA) based on a Completely Randomized Design (CRD) with four treatment (sugar, coffee honey, randu honey, and multiflora honey)and four repetitions. If the results of the analysis of variance on the treatment show a significant effect ($P<0.05$) or a highly significant effect ($P<0.01$), then it will be followed by the Duncan Test.

Tabel 2. Research modulated data table

Treatment	Repetitions			
	U1	U2	U3	U4
P0	P0U1	P0U2	P0U3	P0U4
P1	P1U1	P1U2	P1U3	P1U4
P2	P2U1	P2U2	P2U3	P2U4
P3	P3U1	P3U2	P3U3	P3U4

Descriptions :
P0 = Milk jelly candy using 25% sugar
P1 = Milk jelly candy using 25% coffee honey
P2 = Milk jelly candy using 25% randu honey
P3 = Milk jelly candy using 25% multiflora honey

Observation Parameters

Reducing Sugar

Reducing sugar test using the Nelson-Somagy method Sudarmadji et al (2007)

- **Preparation of Glucose Standard** : Weigh 10 mg of anhydrous glucose and dissolve it in aquadest until the volume reaches 100 mL, resulting in a concentration of 0.1 mg/mL. Next, prepare the standard series by pipetting a certain volume of the standard glucose solution and adding aquadest until the total volume reaches 1 mL according to the following table:

Tabel 3. Preparation of Glucose Standard

Glukosa (mL)	Aquadest (mL)	Volume (mL)
0	1	1
0,2	0,8	1
0,4	0,6	1
0,6	0,4	1
0,8	0,2	1
1,0	0	1

- **Preparation of Nelson.** Nelson A: Dissolve 12.5 g of anhydrous sodium carbonate, 12.5 g of Rochelle salt (sodium potassium tartrate), 10 g of sodium bicarbonate, and 100 g of anhydrous sodium sulfate in distilled water to a volume of 500 mL. Nelson B: Dissolve 7.5 g of $CuSO_4 \bullet 5H_2O$ in 50 mL of distilled water, add 1 drop of

concentrated sulfuric acid. Mix 25 mL of Nelson A solution with 1 mL of Nelson B solution before use (ratio 25:1).

- Weigh 0.5–1.0 g of sample and dissolve in distilled water to a volume of 100 mL. Centrifuge the sample to obtain a clear filtrate. Pipette 1 mL of sample filtrate and each standard solution into a test tube. Add 1 mL of Nelson's to each tube. Heat the tubes in a boiling water bath for 20 minutes. Cool the tubes to a temperature of 25°C. Add 1 mL of arsenomolybdate solution to each tube, then homogenize. Add 7 mL of distilled water, then homogenize. Measure the absorbance at a wavelength of 540 nm using a spectrophotometer.
- **Calculation:** create a standard curve by plotting absorbance against standard glucose concentration. Determine the concentration of reducing sugar in the sample by interpolating from the standard curve. Calculate the reducing sugar content in the sample using the formula:

$$\text{Reducing Sugar}(\%) = \frac{(\text{mg / ml kurva x fp})}{sample\ weight\ (gr) x\ 1000} \text{ x } 100\%$$

Descriptions :

mg/ml kurva : The sample level is obtained from the connection curve

fp : diluent factor

100 : normalitas Na-thiosulfat

Water Activity

Water activity (Aw) testing using an Aw meter with the AOAC (2005) method involves preparing a sample and weighing 5 grams, and preparing a lat to measure water activity (Aw) using the Aw meter. The sample is cut into small pieces and placed into a plastic container, then the Aw meter is inserted into the sample holder, and the enter button is pressed until the Aw of the sample is identified. The reading of the Aw value is awaited at the second beep, and finally, the Aw value of the sample is recorded.

Organoleptic

The organoleptic test was conducted by 6 semi-trained panelists. The organoleptic test includes the level of preference for the samples, which encompasses aroma, texture, taste, and color. Panelists will be given a questionnaire containing assessments using the hedonic method, namely 5 (very much like), 4 (like), 3 (somewhat like), 2 (dislike), 1 (very much dislike) (Alfiah et al., 2021).

RESULTS AND DISCUSSION

The Effect of Using Different Honey on the Sugar Reduction (%) Milk Jelly Candy

The results of the variance analysis show that the use of different types of honey (coffee honey, randu honey, multiflora honey) has a very significant effect (P<0.01) on the reducing sugar content of milk jelly candy. Based on the calculation of reducing sugars in all treatments, the average reducing sugars still meet the quality standards of SNI 3547.2-2008 for jelly candy, which is reducing sugars not exceeding 25%. The results show that the reducing sugar in milk jelly candy using 25% sugar (P0) has lower reducing sugar compared to the treatment using honey. The calculation results show that the average reducing sugar in milk jelly candy using 25% sugar (P0) has a reducing sugar content of 3.49%. This is because granulated sugar is sucrose, which is not classified as a non-reducing sugar (Ridhani et al., 2021). The main component of granulated sugar is only sucrose, unlike honey which has a complete sugar component consisting of fructose, glucose, and a small amount of sucrose. However, each type of honey has different sugar components (Rosiana and Khoiriyah, 2018).

Tabel 4. The Effect of Using Different Honey on the Sugar Reduction

Treatment	Sugar Reduction (%)	Activity Water (Aw)	Oranoleptic		
			Aroma	Taste	Colour
P0	3,49 ± 0,48[b]	0,84 ± 0,03	3,75 ± 0,29	4,25 ± 0,10[a]	4,50 ± 0,33[a]
P1	16,86 ± 1,33[a]	0,84 ± 0,02	3,46 ± 0,42	3,67 ± 0,27[b]	3,33 ± 0,24[c]
P2	16,71 ± 3,62[a]	0,85 ± 0,01	3,42 ± 0,35	3,67 ± 0,27[b]	3,79 ± 0,21[b]
P3	17,44 ± 0,57[a]	0,87 ± 0,01	3,83 ± 0,00	3,79 ± 0,25[a]	3,83 ± 0,24[b]

[a,b.c] Mean values within a same coloums followed by different letters are highly significantly different at (p<0.01)

P0 : using sugar 25%, P1 : using coffee honey 25%, P2 : using randu honey 25%, P3 : using multiflora honey 25%

Milk jelly candy using different types of honey (P1, P2, P3) with a concentration of 25% has a higher average reducing sugar content compared to those using 25% sugar (P0). The average reducing sugar content of jelly candies using honey is 16.71 - 17.44%. The average still meets the quality standard criteria of SNI 3547.2-2008 jelly candy. The reducing sugar value of jelly candy that uses honey is higher because honey is a reducing sugar that contains a more complete sugar component, namely fructose, glucose, and sucrose. In line with the research by Khoerul et al. (2021), it shows that the higher the concentration of longan honey in the production of soursop jelly (Annona muricata L.), the higher the reducing sugar content, which ranges from 16.94% to 24.19%. Damto et

al., (2023) explain that the high reducing sugar content may be due to honey also having a high reducing sugar content.

The Effect of Using Different Honey on the Water Activity (A_w) Milk Jelly Candy

Based results of the variance analysis, it shows that the use of different types of honey (coffee honey, randu honey, multiflora honey) does not have a significant effect ($P>0.05$) on the water activity (Aw) in milk jelly candy. Water activity (Aw) is a parameter related to microbial growth in a food product. The quality and shelf life of food, because the higher the water activity value, the shorter the food's shelf life, and vice versa (Ismail et al., 2016). In jelly candies, the water activity (Aw) generally ranges between 0.6-0.9 (Sihombing et al., 2024). This is because jelly candies fall into the category of semi-moist foods. Based on the average results of water activity (Aw) values, it shows that the Aw of cow's milk jelly does not exceed the water activity (Aw) range of jelly. In P0 (using 25% sugar), the Aw is 0.84; in P1 (using 25% coffee honey), it is 0.84; in P2 (using 25% randu honey), it is 0.85; and in P3, it is 0.87. Comparable to the research by Rismandari et al. (2017), which shows that jelly candies using the addition of carrageenan from seaweed (Eucheuma spinosum) have a water activity (Aw) range of 0.84 - 0.89.

Based on the average water activity (Aw) value in jelly candy, it is still considered high for product storage. This is because mold can live and grow in products with an Aw value of 0.7 or higher. In line with the statement by Leviana and Paramita (2017) which states that microorganisms have a minimum water activity (Aw) for optimal growth, namely mold at Aw 0.6-0.7; yeast at Aw 0.8-0.9; bacteria at Aw 0.90. Rismandari et al. (2017) explain that the smaller the water activity (Aw) in a product, the longer its shelf life will be because it is less prone to microbial contamination.

The type of gelling agent used in the production of jelly candy can also affect the resulting water activity. In the study by Hutami et al. (2019), the Aw value of cilembu sweet potato jelly (Ipomoea batatas (L). Lam) using carrageenan was 0.87, while the one using gelatin was 0.82. Jelly candy that uses gelatin has a lower water activity of 0.82, while jelly candy that uses carrageenan has a higher water activity of 0.87. The difference may be due to the gel's strength in binding water. Milk jelly candy uses a type of gelatin with the same concentration in each treatment, specifically using authentic gelatin from cow bones with a concentration of 10%. The water activity (Aw) produced is 0.84-0.87.

The Effect of Using Different Honey on the Aroma Milk Jelly Candy

The results of the aroma organoleptic test calculations show that the use of different types of honey (coffee honey, randu honey, multiflora honey) does not have a significant effect (P>0.05) on the aroma organoleptic properties of milk jelly candy. Based on the average organoleptic aroma values, the milk jelly candy using 25% multiflora honey (P3) has a higher average of 3.83 (somewhat liked) compared to the other treatments. This could be because the use of 25% multiflora honey can enhance the aroma of the milk jelly candy. In line with the research by Silaen and Ginting (2020), the addition of 25% honey to kolangkaling jelly (Arenga pinnnata) received the highest aroma rating from the panelists, which was 3.67 (pleasant aroma), indicating that kolangkaling jelly (Arenga pinnnata) provides a pleasant aroma. The aroma that emerges from the jelly candy is the characteristic sweet aroma of honey. The higher the concentration of honey added (10%, 15%, 20%, and 25%), the more the aroma is preferred by the panelists (Silaen and Ginting, 2020). In line with Ramdani et al. (2024), it was shown that the addition of 40% honey resulted in a sweeter and slightly fragrant aroma of mango jelly candy (Mangifera indica) with the addition of honey, and it was more preferred by the panelists (4.00: liked).

Milk jelly candy with treatment P3 (using 25% multifloral honey) produced the highest average aroma score from the panelists, which was 3.83 (somewhat liked). CMilk jelly candy using 25% multiflora honey (P3) has a more fragrant aroma compared to cow's milk jelly candy with different treatments. The fragrant aroma produced may be due to the type of honey used. Multifloral honey has a distinctive aroma, which is sweet with a floral fragrance (Rahayu et al., 2023). Compared to other types of honey, multiflora honey has a more fragrant aroma. The aroma of randu honey and coffee honey is obtained from only one type of nectar, whereas the fragrant floral aroma in multiflora honey is obtained from more than one type of flower nectar (Hasan et al., 2020).

The Effect of Using Different Honey on the Taste Milk Jelly Candy

The results of the variance analysis calculations on the organoleptic taste test show that the use of different types of honey (coffee honey, randu honey, multiflora honey) has a very significant effect (P<0.01) on the organoleptic taste of milk jelly candy. The average in Table 2 shows that the panelists liked the taste of the milk jelly candy using sugar (P0) with a score of 4.25 (liked). Milk jelly candy that uses sugar (P0) has a sweet

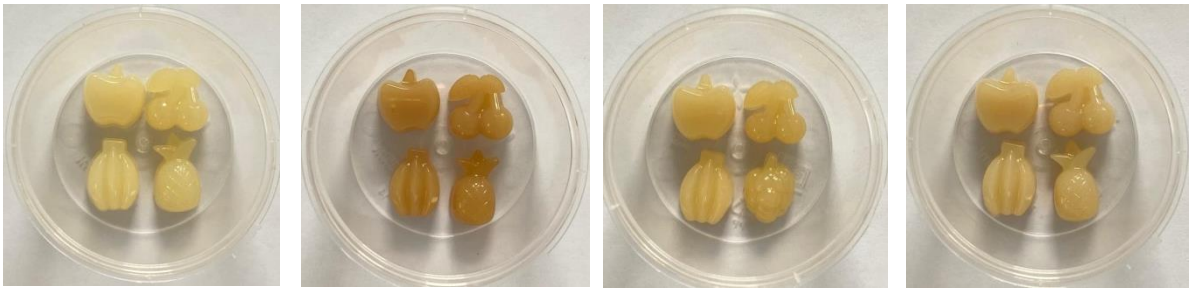
sugar taste and the savory flavor of milk. The sucrose used in the production of milk jelly candy is 25% of the total ingredients. The percentage of sugar resulted in a taste that was favored by the panelists. Simorangkir et al. (2017) in their research found that the addition of 25% sucrose to soursop jelly (Annona muricata Linn) resulted in a score of 5.35 (liked) from the panelists. The intensity of sweetness in jelly candy can be determined by the amount of sucrose used. The more sucrose concentration added to the soursop jelly (Annona muricata Linn), the more it will produce a sweetness that is just right and favored by the panelists.

Based on the results of the extended taste assessment test of milk jelly candy in Table 2, it shows that in the treatments using honey (P1, P2, P3), P3 (using 25% multiflora honey) has a different effect compared to P1 (using 25% coffee honey) and P2 (using 25% randu honey). The difference in taste assessment from the panelists may be due to each type of honey having a different flavor depending on its nectar source, so the resulting taste will also follow the original flavor of that honey. Coffee honey has a characteristic sweet taste of coffee flowers and a slight acidity (Tanjung, et al., 2021). Milk jelly candy using 25% coffee honey (P1) received a somewhat liked rating from the panel of 3.67 (somewhat liked). Randu honey has a sweet taste but with a slight sourness (Jayanti, 2024). Milk jelly candy using 25% randu honey (P2) received a somewhat liked rating of 3.67 (somewhat liked) from the panelists. Multifloral honey has a distinctive sweet taste because it is obtained from several types of flower nectar and has a fragrant aroma when swallowed (Rahayu et al., 2023). It produced the highest average taste rating from the panelists of 3.79 (liked). Based on the comparison of the original honey flavor and the panelists' evaluation of the flavor of milk jelly candy using honey, it shows that the panelists gave higher scores to the milk jelly candy using multifloral honey (P3:3.79). This may be due to the sweet taste and floral aroma when tasted. Unlike coffee honey and kapok, which have a slight sour taste, the panelists may not have liked them much when mixed into milk jelly candy, resulting in a low average score (P1: 3.67 and P2: 3.67).

The Effect of Using Different Honey on the Colour Milk Jelly Candy

The results of the analysis of variance on the organoleptic color test show that the use of different types of honey (coffee honey, randu honey, multiflora honey) has a very significant effect ($P<0.01$) on the organoleptic color of milk jelly candy. Based on the

average color assessment from the panelists presented in Table 2, the milk jelly candy favored by the panelists is the one using 25% sugar (P0) with an average score of 4.50 (liked), which has a slightly brownish white color, meaning the panelists prefer the milk jelly candy with a slightly brownish white color. Unlike the milk jelly candy that uses 25% coffee honey (P1), which is somewhat liked by the panelists with an average score of 3.33 (somewhat liked), it has a dark brown color. This indicates that the panelists prefer milk jelly candy with a slightly off-white to light brown color and do not particularly like milk jelly candy with a dark brown color. Comparable to Rofiah and Al Machfudz (2014) in their research on milk caramel candies made with different concentrations of sucrose and glucose, which produced light brown and dark brown colors. The results of the organoleptic test on the color of the milk caramel candy showed that color affects the panelists' preference levels. Milk caramel candy with a darker color is not favored by the panelists and received a score of 2.83. This is similar to the milk jelly candy; the treated milk jelly candy using 25% coffee honey (P1) has a darker brown color (Figure 1b) and received the lowest rating from the panelists, which is 3.33 (somewhat liked).



(a) **(b)** **(c)** **(d)**

Figure 1. Colour milk jelly candy

Ket : a = P0 : using 25% sugar; b= P1: using 25% coffee honey; c = P2: using 25% randu honey; d = P3: using 25% multiflora honey

Milk jelly candy that uses honey tends to have a yellowish-brown to dark brown color. In P2 (using 25% randu honey), it has a yellowish-brown color as shown in Figure 1c with an average panelist rating of 3.79 (somewhat like) and P3 (using 25% multiflora honey) has a yellowish-brown color as shown in Figure 1d with an average panelist rating of 3.83 (somewhat like). Unlike P1 (using 25% coffee honey), which has a dark brown color as shown in Figure 1b with an average panelist rating of 3.33 (somewhat liked). Based on this, it shows that the average color rating of the milk jelly candy from the

panelists is higher for those with a yellowish-brown color (P2 and P3). In line with the research by Ramdani et al. (2024), which shows that the treatment of 6% gelatin and 40% honey in mango jelly candy (Mangifera indica) results in a yellowish-brown color and an organoleptic color rating of 3.47 (somewhat liked), indicating that the panelists somewhat liked the mango jelly candy (Mangifera indica) with a yellowish-brown color. Khoerul et al. (2021) showed that the addition of 20% longan honey to soursop leaf jelly (Annona muricata L.) provided the highest organoleptic color rating from the panelists, which was 3.12 (slightly dislike-neutral), meaning the panelists slightly liked the color of the soursop leaf jelly (Annona muricata L.) that used 20% longan honey. Silaen and Ginting (2020) showed that kolangkaling jelly candy (Arenga pinnnata) with the addition of 25% honey resulted in a color rating of 3.18 from the panelists, categorized as clear yellow-clear brown. A score of 3.18 indicates that the kolangkaling jelly (Arenga pinnnata) with the addition of 25% honey has a very brown color according to the panelists' assessment, and the very brown color was the most frequently chosen by the panelists compared to other color criteria.

The difference in color produced by each type of honey indicates that each type of honey results in different colors of milk jelly candy. The milk jelly candy using 25% coffee honey (P1) has a darker brown color as shown in Figure 1b. Unlike the treatment using 25% randu randu honey (P2), which produces a yellowish-brown color in the milk jelly candy (Figure 1c), the 25% multiflora honey (P3) results in a brown color (Figure 1d). The difference in color of the milk jelly candy may be caused by the original color of the honey itself. Randu honey, which has a light brown transparent color (Figure 2b), while multiflora honey has a transparent brown color (Figure 2c) (Jayanti, 2024; Rahayu, et al., 2023). Unlike coffee honey, which has a reddish-brown color and tends to be darker than other types of honey, as shown in Figure 2a. Ustadi (2017) explains that the more yellow the honey, the lighter its color, and conversely, if the honey is more reddish, its color becomes darker. The color of coffee honey tends to be reddish, so the color of coffee honey is darker compared to other types of honey, resulting in a darker brown color for the jelly candy produced.

Figure 2. Honey with different types
Ket : a = coffee honey, b = randu honey, c = multiflora honey

CONCLUSION

Based on the research results, it can be concluded that the use of different types of honey (coffee honey, kapok honey, and multiflora honey) affects the quality of milk jelly candy. Further research can be conducted on water activity in jelly candy related to product shelf life.

REFERENCES

Afifah, K., Sumaryati, E.,dan Su'I, M. (2017). Studi Pembuatan Permen *Jelly* dengan Variasi Konsentrasi Sari Kulit Buah Naga (*Hylocereus Costaricencis*) Ddan Ekstrak Angkak. *Jurnal Ilmu-Ilmu Pertanian "AGRIKA"*, 11 (2), 206 – 220. DOI:10.31328/JA.V11I2.492

Alipal, J., Mohd Pu'ad, N. A., Lee, T. C., Nayan, N.H.M., Sahari, N., Basri, H., Idris, M.I. and Abdullah, H.Z. (2021). A review of gelatin: Properties, sources, process, applications, and commercialisation. *Materials Today: Proceedings*, 42(1), 240–250. DOI : https://doi.org/10.1016/j.matpr.2020.12.922

AOAC. 2005. Official Method of Analysis of The Association of Official Analytical of Chemist. Association of OfficialAnalytical Chemist, Inc, USA.

Badan Pusat Statistika. 2024. *Produksi Susu Sapi Segar Menurut Provinsi (Ton), 2021-2023*. Diakses 19 Juli 2024. <https://www.bps.go.id/id/statistics-table/2/NDkzIzI=/produksi-susu-segar-menurut-provinsi.html>

Badan Standarisasi Nasional. 2008. Syarat Mutu Permen *Jelly* Tertuang Dalam SNI 3547.2-2008. Jakarta

Brilianty, S.L., Suprihatin., Purwoko. (2022). Penilaian Daur Hidup Produk Susu Sapi Segar: Studi Kasus Di Kpbs Pangalengan. *Jurnal Teknologi Industri Pertanian*, 32 (3) , 220-228. DOI : https://doi.org/10.24961/j.tek.ind.pert.2022.32.3.220

Damto, T., Birhanu, T., and Zewdu, A. (2023). Physicochemical and antioxidant characterization of commercially available honey sample from Addis Ababa market, Ethiopia. *Heliyon*, 9(10), 1-12. DOI : https://doi.org/10.1016/j.heliyon.2023.e20830

Hasan, A.E.Z., Herawati, H., Purnomo., Amalia, L. (2020). Fisikokimia Madu Multiflora Asal Riau Dan Potensinya Sebagai Antibakteri *Escherichia coli* dan *Staphylococcus aureu. Chem. Prog*, 13(2), 81-90. DOI : https://doi.org/10.35799/cp.13.2.2020.31594

Hutami, R., Handayani, A., dan Rohmayanti, T. (2019). Karakteristik Sensori Dan Fisikokimia Permen *Jelly* Ubi Cilembu (*Ipomoea Batatas (L). Lam*) CV. Cilembu Dengan Gelling Agent Karagenan Dan Gelatin. *Jurnal Pangan Halal*, 1 (2), 66-74. DOI : https://doi.org/10.30997/jiph.v1i2.3099

Ismail, M., Kautsar, R., Sembada, P., Aslimah, S. dan Arief, I.I. (2016). Kualitas Fisik Dan Mikrobiologis Bakso Daging Sapi Pada Penyimpanan Suhu Yang Berbeda. *Jurnal Ilmu Produksi dan Teknologi Hsial Peternakan*, 45(3), 372-374. DOI : http://dx.doi.org/10.29244/jipthp.4.3.372-374

Jayanti, N.D. (2024). Madu Randu (*Ceiba Pentandra*) Dalam Peningkatan Nafsu Makan Balita. *Media Husada Journal*, 2(2), 38-45. DOI : https://doi.org/10.33475/mhjms.v2i2.5

Kamboj, R., Nayik, G.A., Bera, M.B., Nanda, V. (2020). Sugar profile and rheological behaviour of four different Indian honey varieties. *J Food Sci Technol*, 57(8), 2985–2993. DOI : https://doi.org/10.1007/s13197-020-04331-7

Khoerul, M.F.A., Sani, E.Y., Putri, A.S. (2021). *Karakteristik Permen Jelly Sari Daun Sirsak (Annona muricata L.) Dengan Penambahan Madu Kelengkeng.* SKRIPSI. Universitas Semarang.

Leviana, W dan Paramita, V. (2017). Pengaruh Suhu Terhadap Kadar Air Dan Aktivitas Air Dalam Bahan Pada Kunyit (*Curcuma Longa*) Dengan Alat Pengering Electrical Oven. *METANA*, 13(2), 37-44. DOI : https://doi.org/10.14710/jis.%25v.%25i.%25Y.645-654

Maharani., Sudarwanto, M.B., Soviana, S., Pisestyani, H. (2020). Pemeriksaan Kualitas Susu Asal Kedai Susu Kawasan Permukiman Mahasiswa IPB Dramaga Dan Cilibende Bogor. *Jurnal Kajian Veteriner*, 8(1), 24-33. DOI : https://doi.org/10.35508/jkv.v8i1.2230

Majidah, A.S., Susilawati, Nawasih, O. (2024). Pengaruh Lama Pemasakan terhadap Permen *Jelly* Susu Kambing. *Jurnal Agroindustri Berkelanjutan*, 3(1), 96-110.

Marangoni, F., Pellegrino, L., Verduci, E., Ghiselli, A., Bernabei, R., Calvani, R., Cetin, I., Giampietro, M., Perticone, F., iretta, L., Giacco, R., Vecchia, C.L., Bradi, M.L. Poli, A. (2018). Cow's Milk Consumption And Health: A Health Professional's Guide. *J Am Coll Nutr*, 38(3), 197-208. DOI : https://doi.org/10.1080/07315724.2018.1491016

Marda, N., Mustafa, I., dan Asmi, N. F. (2023). Chemical Properties and Acceptability of Gandaria *Jelly* Candy (*Bouea Macrophylla Griffith*) Combination of Honey as a sugar substitute. *Jurnal Gizi Kerja dan Produktivitas*, 4(2), 133 – 140. DOI : http://dx.doi.org/10.52742/jgkp.v4i2.183

Nelwan, B., Langi, T., Koapaha, T. dan Tuju, T. (2015). Pengaruh Konsentrasi Gelatin Dan Sirup Glukosa Terhadap Sifat Kimia Dan Sensoris Permen *Jelly* Sari Buah Pala (*Myristica fragrans Houtt*). *COCOS*, 6(3), 1- 10. https://doi.org/10.35791/cocos.v6i3.6818

Ningtyas, I., Fitriana, I., Larasati, D., dan Haslina. (2017). Pengaruh Penambahan Madu Terhadap Sifat Fisikokimia Dan Organoleptik Permen *Jelly* Albedo Semangka (*Citrullus vurgaris sp*). SKRIPSI. Teknologi Hasil Pertanian. Universitas Semarang.

Nuh, M., Barus, W.B.J., Miranti, M., Yulanda, F. A.R. dan Pane, M.R. (2020). Studi Pembuatan Permen *Jelly* Dari Sari Buah Nangka. *Wahana Inovasi*, 9 (1), 193-198.

Putri, R. M. S. P. S., Ninsix, R., dan Sari, A. G. (2015). Pengaruh jenis gula yang berbeda terhadap mutu permen *jelly* rumput laut (*Eucheuma cottonii*). *Jurnal Teknologi Pertanian Andalas*, 19 (1), 51 – 58. DOI : https://doi.org/10.25077/jtpa.19.1.51-58.2015

Rahayu, R.R., Widowati, R., Dahlan, F.M.(2023). Perbedaan Efek Madu Akasia dengan Madu Multiflora terhadap Peningkatan Kadar Hemoglobin Remaja Putri. *Jurnal Ilmiah Institut Citra Internasional*, 7(1), 1-7. http://dx.doi.org/10.33862/citradelima.v7i1.344

Ramdani, S., Saputrayadi, A., Marianah. and Nazaruddin. (2024). Kajian Karakteristik Permen Jeli Mangga Dengan Formulasi Gelatin Dan Madu. *Journal of Agritechnology and Food Processing*, 4(1) , 49-59.

Ridhani, M. A., Vidyaningrum, I. P., Akmala, N. N., Fatihatunisa, R., Azzahro, S., dan Aini, N. (2021). Potensi Penambahan Berbagai Jenis Gula Terhadap Sifat Sensori Dan Fisikokimia Roti Manis: Review. *Pasundan Food Technology Journal (PFTJ)*, 8 (3), 61 – 68. DOI : https://doi.org/10.23969/pftj.v8i3.4106

Rismandari, M., Agustini, T.W., dan Amalia, U. (2017). Karakteristik Permen *Jelly* Dengan Penambahan Iota Karagenan Dari Rumput Laut *Eucheuma spinosum*. *Journal of Fisheries Science and Technology*, 12(2), 103-108. DOI : https://doi.org/10.14710/ijfst.12.2.103-108

Rofiah, A., dan Al Machfudz, W.D.P. (2014). Kajian Dosis Sukrosa Dan Sirup Glukosa Terhadap Kualitas Permen Karamel Susu. *Nabatia*, 11(1), 55-65.

Rosiana, N.M., dan Khoiriyah, T.(2018). Yogurt Tinggi Antioksidan Dan Rendah Gula Dari Sari Buah Apel Rome Beauty Dan Madu. *Jurnal Ilmu dan Teknologi Hasil Ternak*, 13 (2), 81-90. DOI : http://dx.doi.org/10.21776/ub.jitek.2018.013.02.2

Santana, S.A., Maesaroh, T.F., Angela, E., Andriana., dan Kunaedi, A. (2023). Penyuluhan tentang "Manisnya Madu Penuh Manfaat" kepada Anak-Anak. *Jurnal SOLMA*, 12 (1), 172-177. DOI : https://doi.org/10.22236/solma.v12i1.10556

Sigit, M., Putri, W.R., Pratama, J.W.A. (2021). Perbandingan Kadar Lemak, Protein Dan Bahan Kering Tanpa Lemak (BKTL) Pada Susu Sapi Segar Di Kota Kediri Dan Kabupaten Kediri. *Jurnal Ilmiah Fillia Cendekia*, 6 (1), 31-35.

Sihombing, D.R., Simbolon, C.D., Gulo, H. (2024). Kandungan Senyawa Antioksidan dan Daya Terima Permen *Jelly* Substitusi Ekstrak Kapulaga dengan Jahe Merah. *Jurnal Riset Teknologi Pangan dan Hasil Pertanian (RETIPA)*, 4(2), 100-110.

Silaen, N.R. dan Ginting, S. (2020). Pengaruh Penambahan Madu Pada Pembuatan Permen *Jelly* Kolangkaling (*Arenga pinnata*). *Jurnal Teknologi Pangan dan Hasil Pertanian*, 3 (2), 64-72. DOI : https://doi.org/10.30596/agrintech.v2i2.3661

Simorangkir, T. R. S., Rawung, D., dan Moningka, J. (2017). Pengaruh Konsentrasi Sukrosa Terhadap Karakteristik Permen *Jelly* sirsak (*Annona muricata Linn*). *Cocos,* 9(3), 1 – 13. DOI : https://doi.org/10.35791/cocos.v1i8.17777

Sudarmadji, S., Haryono, B., Suhardi.(2007). *Prosedur Analisa Untuk Bahan Makanan dan Pertanian*. Edisi Ketiga. Yogyakarta: Liberty.

Tanjung, R.A., Moulana, R., dan Rasnovi, S. (2021). Pengaruh Keragaman Sumber Pakan Terhadap Kualitas Madu Lebah Apis Cerana Fabr, 1798 Di Balai Penelitian Dan Pengembangan Lingkungan Hidup Dan Kehutanan (BP2LHK) Aek Nauli Sumatera Utara. *Jurnal Ilmiah Mahasiswa Pertanian*, 6(4), 1000-1013. DOI : https://doi.org/10.17969/jimfp.v6i4.18698

Ustadi, Radiati, L. K., dan Thohari, I. (2017). Komponen Bioaktif Pada Madu Karet (*Hevea Brasiliensis*) Madu Kaliandra (*Calliandra callothyrsus*) Dan Madu Randu (C*eiba pentandra*). *Jurnal Ilmu dan Teknologi Hasil Ternak*, 12(2), 97-102. DI : /10.21776/ub.jitek.2017.012.02.6

Wardhani, I.Y., Fikri, A.A., Rizqi, M.K, Aryani, N.F., Rohmawati, F. dan Choir, M.C. M. (2023). Analisis Komparasi Kualitas Madu di Kudus Raya Pantura Jawa Tengah. *National Conference Of Islamic Natural Scienc*,. 3(1), 86-92.

Wulandari, D., Sugiyanto, dan Tawarniate, A.Z. (2023). Characteristics of *Jelly* Candy Based on Bovine Split Hide Gelatin. *Jurnal Ilmu Ternak Universitas Padjadjaran*, 23(1), 14-21. DOI : 10.24198/jit.v23i1.43854