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Analyzing Milk Caramel Candy with the Addition of *Emprit* Ginger and *Secang* Wood Extract

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Abstract. This study added *Emprit* ginger extract and *Secang* wood extract to milk caramel candy. Adding *Emprit* ginger extract and *Secang* wood extract was expected to add nutritional value to milk caramel candy. The objectives of this study include (1) knowing the effect of adding *Emprit* ginger extract and *Secang* wood extract on the sensory quality of milk caramel candy, (2) finding out what people like, and (3) knowing the nutritional content in the form of water content and flavonoid content. The independent variable in this study was the addition of *Emprit* ginger extract and *Secang* wood extract, which were not the same, namely samples A (5%), B (7.5%), and C (10%). The data collection method in this study is to use subjective assessments, namely sensory tests and favorability tests, as well as objective assessments, namely laboratory tests of water and flavonoid content. The analytical method used in sensory tests is simple linear regression. The results showed an influence on the sensory quality of the experimental milk caramel candy in terms of color, aroma, texture, and taste. In the preference test sample, A has the highest average value in all aspects, and the sample with the lowest average value is sample C. The results of laboratory tests of water content in sample K were 2.91%, sample A was 4.26%, sample B was 5.62%, and sample C was 7.08%. Laboratory test results of flavonoid content of sample K are 0%, sample A as much as 0.16%, sample B as much as 0.24%, and sample C as much as 0.31%.

Keywords: Milk caramel candy, *Emprit* ginger, *Secang* wood, sensory quality, water content, flavonoid content.

INTRODUCTION

Candy is one of the snacks favored by people ranging from children to adults because candy has a varied taste and exciting shape. Based on the type, candy is divided into two types, namely crystalline candy and non-crystalline candy. Examples of crystalline candies are fondant and fudge. At the same time, non-crystalline candy, according to its texture, is distinguished as hard candy, soft candy, gum, and jellies. Other confectionery products are caramel or toffee and cotton candy.

Based on Indonesian National Standard 3547.2-2008, soft confectionery is a type of solid interlude food made from sugar or a mixture of sugar with other sweeteners, using or without the addition of other foodstuffs and food additives that are permitted, textured quite soft or become soft if chewed. Non-jelly soft confectionery has a maximum moisture content of 7.5% and a maximum ash content of 2.0% (Dewi et al., 2018). One of the soft confectioneries much liked in the community is milk caramel candy. Milk caramel candy is a dairy product that is added sugar using a high-temperature cooking process and stirring that is carried out continuously until it reaches the caramelization process (Monica et al., 2020). The main ingredient in milk caramel candy is pure cow's milk. Pure cow's milk is

produced from secretory cells in cows' udder through the nipples with white liquid, complete nutritional components, and is suitable for body health (Christi et al., 2022).

According to the Central Bureau of Statistics of Central Java Province, Salatiga will be the fourth largest dairy-producing city in 2021, with 4.687 kiloliters of cow's milk. Generally, dairy farming communities sell cow's milk as fresh cow's milk. Generally, the dairy farming community sells cow's milk as fresh cow's milk, processing milk into dairy products such as milk caramel candy. Milk caramel candy is a type of processing that makes milk edible for a long time. According to Koswara (2009), milk caramel candy is generally made using a mixture of milk, sugar, butter, meal vinegar, and flavor to enhance the taste. Flavor will be harmful to the health of the body if used for a long time. Adding flavor comes from fruits, plants, or spices. For this reason, adding flavor can use spices such as ginger and *Secang* wood in this study to increase the nutritional content of milk caramel candy.

Ginger rhizomes contain various secondary metabolite compounds, including alkaloids, flavonoids, phenolics, triterpenoids, and saponins (Sianipar, 2021). Flavonoids in ginger are helpful as analgesics, anti-tumors, antioxidants, anti-inflammatories, antibiotics, anti-allergy, and diuretics (Yuliningtyas et al., 2019). The ginger that will be used in this study is *Emprit* ginger. *Emprit* ginger rhizome contains high nutrition, namely 3,5% oleoresin and 1-3% essential oil (Rukmana, 2000). The level of flavonoid content in *Emprit* ginger is 0,6 mgQE/g (Wahyudi & Minarsih, 2023). *Emprit* ginger has a fiber content of 0,64-6,25% and a reasonably high phenol content compared to other gingers, such as 2,21-3,04% (Winarsih et al., 2023). According to Santoso (2008), ginger is efficacious for treating impotence, coughs, body aches, headaches, rheumatism, back pain, and colds

The sappan wood plant contains flavonoids, brazilin, alkaloids, saponins, tannins, phenyl propane, and terpenoids (Hasanah et al., 2021). One of the flavonoids in *Secang* wood is anthocyanin. Anthocyanins are good for health because they have antioxidant activity (Nomer et al., 2019). *Secang* wood extract using the infudation method (water solvent) contains a flavonoid level of 1.9%/g (Rusita, 2016). Consumption of flavonoids is beneficial for physiological health and human brain function, such as improving memory and speeding up psychomotor processes (Saputra & Sitepu, 2016). Flavonoids are also beneficial for treating digestive tract problems, diabetes Mellitus, skin diseases, the central nervous system, the cardiovascular system, and dyslipidemia (Mutha et al., 2016). The brazilin content in *Secang* wood has an anti-inflammatory effect, which can reduce pain in people with dysmenorrhea (pain during menstruation) and is anti-bacterial (*Staphylococcus aureus* and *Escherichia coli*) (Sampara et al., 2020).

Researchers have conducted pre-experiments, making three milk caramel candies twice. The first pre-experiment with the addition of empiric ginger extract and *Secang* wood extract as much as A (3%), B (4%), and C (5%) produced a very slight difference between the three. For this reason, researchers conducted a second pre-experiment by adding *Emprit* ginger extract and *Secang* wood extract to milk caramel candy as much as A (5%), B (7.5%), and C (10%). The second pre-experiment results showed sample A flavored ginger milk caramel candy, B tasted ginger milk caramel candy more, and C tasted more robust ginger milk caramel candy flavor. The addition to the second pre-experiment refers to Suharto's research (2018) which produced water content in P0 samples (0% *Emprit* ginger juice) with a water content of 2.94%, P1 samples (5% *Emprit* ginger essence) with a water content of 4.41%, P2 (10% *Emprit* ginger juice) with a water content of 5.39%, P3 (15% *Emprit* ginger juice) with a water content of 7.10%, and P4 (20% *Emprit* ginger essence) with a water content of 8.07%. Referring to the research above, the second pre-experiment with the addition of A (5% *Emprit* ginger extract and 5% *Secang* wood extract), B (7.5% *Emprit* ginger extract and 7.5% *Secang* wood extract), and C (10% *Emprit* ginger extract and 10% *Secang* wood extract) is expected to produce milk caramel candy with a water content that does not exceed the Indonesian National Standard, which is a maximum of 7.5%. To determine the effect of the quality of milk caramel candy with the addition of *Emprit* ginger extract and *Secang* wood extract, it is necessary to do a sensory test. To find out the level of people's liking, it is necessary to do a favorability test or hedonic Test. Furthermore, to determine the flavonoid content and water content will be done with laboratory tests.

METHODS

The method carried out in this study is the experimental research method. Experimental research methods can be interpreted as methods used to find the effect of specific treatments on others under controlled conditions (Sugiyono, 2013). The research design used in this study is a perfect random design, where all treatments are randomly assigned to experimental units (Sudjana in Dewi et al., 2015). The independent variable in this study was the addition of *Emprit* ginger extract and *Secang* wood extract, which were not the same, namely samples A (5%), B (7.5%), and C (10%). The analytical method used for sensory tests is simple linear regression. The study results will be tested using

subjective assessments, namely sensory tests, using a somewhat trained panel of 15 people. The assessment of sensory tests uses scoring techniques with the highest value of 5 with good quality and the lowest value of 1 with poor quality.

Furthermore, the favorability test to determine the community's preferences involved as many as 80 untrained panelists consisting of 20 young men and women (ages 12-19 years) and 20 people each. The favorability test assessment criteria use scoring techniques with the highest value of 5 with the criteria of liking and the lowest value of 1 with the criteria of dislike. The objective assessment in this study is laboratory tests of water and flavonoid content.

RESULTS AND DISCUSSION

Sensory Test Results

Color Aspect

TABLE 1. Color aspect test results.

Sample	Average Score	Criterion
K (Control)	4.27	Chocolate
A (5%)	4.07	Slightly dark chocolate
B (7.5%)	3.13	Pretty dark chocolate
C (10%)	2.23	Dark chocolate

Based on **TABLE 1**, it is known that in the color aspect, the sample with the highest average value is sample K, with a value of 4.27, which has chocolate criteria. In contrast, the sample with the lowest average value is sample C, with a value of 2.23 with slightly dark chocolate.

Aroma Aspect

TABLE 2. Aroma aspect test results.

Sample	Average Score	Criterion
K (Control)	4.23	Typical milk caramel candy
A (5%)	3.63	Quite typical milk caramel candy
B (7.5%)	3.33	Rather than typical milk caramel candy
C (10%)	2.63	Rather than typical milk caramel candy

Based on **TABLE 2**, it is known that in the aspect of aroma, sample K gets the highest average value of 4.23 with typical criteria of milk caramel candy. The sample with the lowest average value is sample C, with an average value of 2.63, which has rather typical criteria for milk caramel candy.

Texture Aspect

TABLE 3. Texture aspect test results.

Sample	Average Score	Criterion
K (Control)	2.63	Slightly soft when chewed
A (5%)	3.13	Slightly soft when chewed
B (7.5%)	3.43	Quite soft when chewed
C (10%)	4.23	Soft when chewed

Based on **TABLE 3**, it is known that in the aspect of texture, sample C gets the highest average value of 4.23 with soft criteria when chewed. At the same time, the sample with the lowest average value is the K sample with an average value of 2.63, which has slightly soft criteria when chewed.

Taste Aspect

TABLE 4. Taste aspect test results.

Sample	Average Score	Criterion
K (Control)	4.27	Sweet
A (5%)	3.53	Quite sweet
B (7.5%)	3.43	Quite sweet
C (10%)	2.8	Rather sweet

Based on **TABLE 4**, it is known that in the aspect of color, sample K gets the highest average value of 4.27 with sweet criteria. The sample with the lowest average value is sample C, with an average value of 2.8, which has a rather sweet criterion.

Simple Linear Regression Results

Simple Linear Regression Results of Color Aspect

TABLE 5. Simple linear regression results of color aspect.

	Coefficients	Standard Error	t stat	P value
Intercept	4.5457	0.15466	29.391	0.0000
Treatment	-0.1999	0.02297	-8.671	0.0000

Based on **TABLE 5**, the results obtained value constant (a) is 4.545, while the value of the regression coefficient (b) is -0,199. From these results can be included in the regression equation as follows:

Y = a + bX

Y = 4.545 + (-0.199)X or (-0.199 + 4.545)

It can also be seen in the **FIGURE 1**.

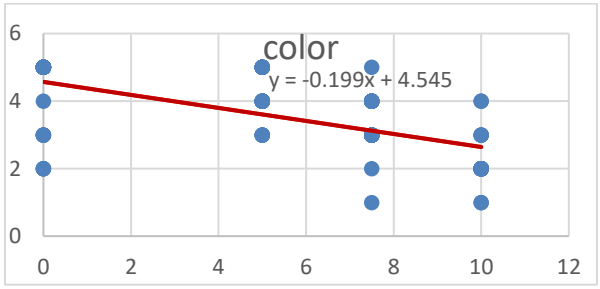

FIGURE 1. Simple linear regression graph of color aspects.

Based on **FIGURE 1**, it is explained that the regression coefficient is -0.199. This shows that with increasing variable X, variable Y will decrease by 0.199.

Coefficient Test of Color Aspects

TABLE 6. Coefficient test of color aspects.

Regression statistics	
Multiple R	0.6238
R Square	0.3892
Adjusted R square	0.384
Standard Error	0.9306
Observations	120

Based on **TABLE 6**, it explains that the value of the R relationship is 0.623. From the output, the coefficient of determination (R square) is 0.389, which means that the effect of the independent variables on the dependent variable is 38.9%.

Simultaneous Significance Test (F Test) Aspects of Color

TABLE 7. F-test results for color aspect.

	Df	SS	MS	F	Significance F
Regression	1	65.125	65.125	75.195	0.00000
Residual	118	102.199	-0.866		
Total	119	167.325			

Based on **TABLE 7**, F count (75.195) F table (3.074) with a significance value of 0.000 < 0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that the addition of *Emprit* ginger extract and *Secang* wood extract has a joint or simultaneous effect on sensory quality of milk caramel candy on the color aspect.

Partial Test (t-test)

TABLE 8. Color aspect test results.

	Coefficients	Standard Error	t stat	P value
Intercept	4.5457	0.15466	29.391	0.0000
Treatment	-0.1999	0.02297	-8.671	0.0000

Based on **TABLE 8**, the t count is negative (-8.671), so the t table also adjusts to be negative, or in other words, the hypothesis testing is carried out on the left side. Negative or positive results only indicate the direction of hypothesis testing and linearity, not the amount (Sarwono, 2007). So it can be said that t count (-8.67) > t table (-1.98) with a significance value of 0.000 <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that the addition of *Emprit* ginger extract and *Secang* wood extract influential and significant to the sensory quality of milk caramel candy on the color aspect.

Simple Linear Regression Results of Aroma Aspect

TABLE 9. Simple linear regression results of color aspect.

	Coefficients	Standard Error	t stat	P value
Intercept	4.321	0.1669	25.882	0.0000
Treatment	-0.1535	0.0248	-6.189	0.0000

TABLE 9 shows that the results obtained value constant (a) is 4,321, while the value of the regression coefficient (b) is -0,153. From these results can be included in the regression equation as follows :

Y = a + bX

Y = 4.321+ (-0.153)X or -0.153X + 4.321

It can also be seen in the following **FIGURE 2**.

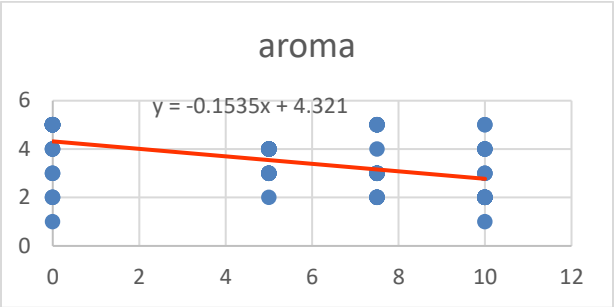

FIGURE 2. Simple linear regression graph of aroma aspects.

Based on **FIGURE 2**, it is explained that the regression coefficient is -0.153. This shows that with increasing variable X, variable Y will decrease by 0.153.

Coefficient Test of Aroma Aspects

TABLE 10. Coefficient test of aroma aspects.

Regression statistics	
Multiple R	0.4950
R Square	0.2450
Adjusted R square	0.2386
Standard Error	1.0047
Observations	120

Based on **TABLE 10**, it explains that the value of the R relationship is 0.623. From the output, the coefficient of determination (R square) is 0.245, which means that the effect of the independent variables on the dependent variable is 24.5%.

Simultaneous Significance Test (F Test) Aspects of Aroma

TABLE 11. F-test results for aroma aspect.

	Df	**SS**	**MS**	**F**	**Significance F**
Regression	1	38.668	38.668	38.304	0.00000
Residual	118	119.122	1.0095		
Total	119	157.791			

Based on **TABLE 11**, F count (38.304) F table (3.074) with a significance value of 0.000 < 0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that the addition of *Emprit* ginger extract and *Secang* wood extract has a joint or simultaneous effect on sensory quality of milk caramel candy on the aroma aspect.

Partial Test (t-test)

TABLE 12. Aroma aspect test results.

	Coefficients	**Standard Error**	**t stat**	**P value**
Intercept	4.321	0.1669	25.882	0.0000
Treatment	-0.153	0.0248	-6.189	0.0000

Based on **TABLE 12**, the t count is negative (-6.189), so the t table also adjusts to be harmful, or in other words, the hypothesis testing is carried out on the left side. Negative or positive results only indicate the direction of hypothesis testing and linearity, not the amount (Sarwono, 2007). So it can be said that t count (-6.189) > t table (-1.98) with a significance value of 0.000 <0.05, which means that Ho is rejected and Ha is accepted, so it can be

concluded that the addition of *Emprit* ginger extract and *Secang* wood extract influential and significant to the sensory quality of milk caramel candy on the aroma aspect.

Simple Linear Regression Results of Texture Aspect

TABLE 13. Simple linear regression results of texture aspect.

	Coefficients	Standard Error	t stat	P value
Intercept	2.5161	0.1903	13.218	0.0000
Treatment	0.1497	0.0282	5.294	0.0000

Based on **TABLE 13** shows that the results obtained value constant (a) is 2.516, while the value of the regression coefficient (b) is 0,149. From these results can be included in the regression equation as follows:

Y = a + bX

Y = 2.516 + 0.149X

It can also be seen in the following graph.

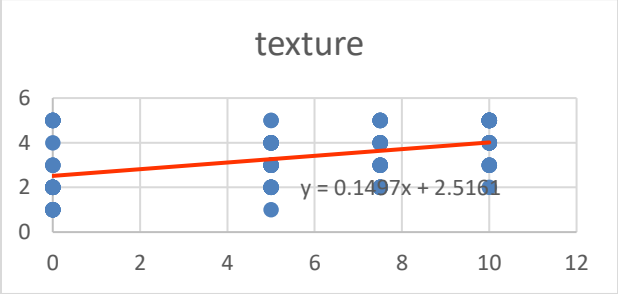

FIGURE 3. Simple linear regression graph of texture aspects.

FIGURE 3 explains that the regression coefficient is 0.149. This shows that with an increase in the X variable (addition of *Emprit* ginger extract and *Secang* wood extract), the Y variable (sensory quality of milk caramel candy in the texture aspect) will increase by 0.149.

Coefficient Test of Texture Aspects

TABLE 14. Coefficient test of texture aspects.

Regression statistics	
Multiple R	0.4381
R Square	0.1919
Adjusted R square	0.1850
Standard Error	1.1454
Observations	120

Based on **TABLE 14**, it explains that the value of the R relationship is 0.438. From the output, the coefficient of determination (R square) is 0.191, which means that the effect of the independent variables on the dependent variable is 19.1%.

Simultaneous Significance Test (F Test) Aspects of Texture

TABLE 15. F-test results for texture aspect.

	Df	SS	MS	F	Significance F
Regression	1	36.7735	36.773	28.028	0.00000
Residual	118	154.818	1.312		
Total	119	191.591			

Based on **TABLE 15**, F count (28.02) F table (3.074) with a significance value of 0.000 < 0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that the addition of *Emprit* ginger extract and *Secang* wood extract has a joint or simultaneous effect on sensory quality of milk caramel candy on the texture aspect.

Partial Test (t-test)

TABLE 16. Aroma aspect test results.

	Coefficients	Standard Errort stat		P value
Intercept	2.5161	0.1903	13.218	0.0000
Treatment	0.1497	0.0282	5.294	0.0000

Based on this **TABLE 16**, it can be seen that t count (5.29) > t table (1.98) with a significance value of 0.000 <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that the addition of *Emprit* ginger extract and *Secang* wood has a significant effect on the sensory quality of milk caramel candy in the texture aspect.

Simple Linear Regression Results of Texture Aspect

TABLE 17. Simple linear regression results of texture aspect.

	Coefficients	Standard Errort stat		P value
Intercept	4.2819	0.1682	25.447	0.0000
Treatment	-0.1375	0.0249	-5.501	0.0000

Based on **TABLE 17**, the results obtained value constant (a) is 4.281, while the value of the regression coefficient (b) is -0.137. From these results can be included in the regression equation as follows:

Y = a + bX

Y = 4.281 + (-0.137) X or -0.137X + 4.281

It can also be seen in the following graph.

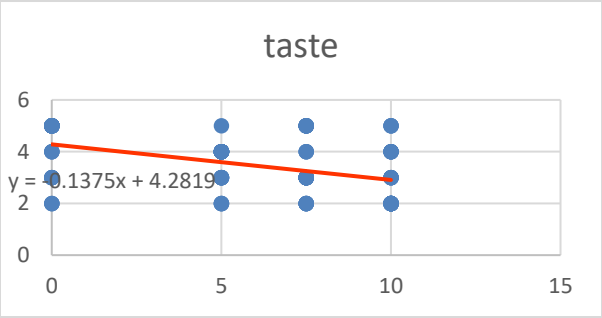

FIGURE 4. Simple linear regression graph of texture aspects.

FIGURE 4 explains that the regression coefficient is -0,137. This shows that with an increase in the X variable (addition of *Emprit* ginger extract and *Secang* wood extract), the Y variable (sensory quality of milk caramel candy in the taste aspect) will increase by 0.137.

Coefficient Test of Taste Aspects

TABLE 18. Coefficient test of taste aspects.

Regression statistics	
Multiple R	0.4518
R Square	0.2041
Adjusted R square	0.1974
Standard Error	1.0124
Observations	120

Based on **TABLE 18**, it explains that the value of the R relationship is 0.451. From the output, the coefficient of determination (R square) is 0.204, which means that the effect of the independent variables on the dependent variable is 20.4%.

Simultaneous Significance Test (F Test) Aspects of Taste

TABLE 19. F-test results for taste aspect.

	Df	SS	MS	F	Significance F
Regression	1	31.0288	31.028	30.268	0.00000
Residual	118	120.962	1.0251		
Total	119	151.991			

Based on **TABLE 19**, F count (30.028) F table (3.074) with a significance value of 0.000 < 0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that the addition of *Emprit* ginger extract and *Secang* wood extract has a joint or simultaneous effect on sensory quality of milk caramel candy on the taste aspect.

Partial Test (t-test)

TABLE 20. Taste aspect test results.

	Coefficients	Standard Errort stat		P value
Intercept	4.2819	0.1682	25.447	0.0000
Treatment	-0.1375	0.0249	-5.501	0.0000

Based on **TABLE 20**, the t count is negative (-5.501), so the t table also adjusts to be negative, or in other words, the hypothesis testing is carried out on the left side. Negative or positive results only indicate the direction of hypothesis testing and linearity, not the amount (Sarwono, 2007). So it can be said that t count (-5.501) > t table (-1.98) with a significance value of 0.000 <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that the addition of *Emprit* ginger extract and *Secang* wood extract influential and significant to the sensory quality of milk caramel candy on the taste aspect.

Favorability Test Results

Color Aspect

TABLE 21. Color aspect favorability test results.

Sample	Average Score	Criterion
K (Control)	4.2	Like
A (5%)	3.93	Kind of like
B (7.5%)	2.73	Neutral
C (10%)	3.47	Kind of like

Based on **TABLE 21**, it is known that in the aspect of color, sample K gets the highest average value of 4.2 with the criteria of somewhat like. The sample with the lowest average value is sample B, with an average value of 2.73, with neutral/ordinary criteria.

Aroma Aspect

TABLE 22. Aroma aspect favorability test results.

Sample	Average Score	Criterion
K (Control)	4.37	Like
A (5%)	4.32	Like
B (7.5%)	4.13	Kind of like
C (10%)	3.17	Neutral

Based on **TABLE 22**, it is known that in the aspect of aroma, sample K gets the highest average value of 4.37 with the criteria of liking. The sample with the lowest average value is sample C, with an average value of 3.17, with neutral/ordinary criteria.

Texture Aspect

TABLE 23. Texture aspect favorability test results.

Sample	Average Score	Criterion
K (Control)	3.13	Neutral
A (5%)	4.3	Like
B (7.5%)	3.78	Kind of like
C (10%)	3.28	Neutral

Based on **TABLE 23**, it is known that in the aspect of texture, sample A gets the highest average value of 4.3 with the criteria of liking. The sample with the lowest average value is sample K, with an average value of 3.13, with neutral/ordinary criteria.

Taste Aspect

TABLE 24. Taste aspect favorability test results.

Sample	Average Score	Criterion
K (Control)	3.71	Kind of like
A (5%)	4.36	Like
B (7.5%)	3.53	Kind of like
C (10%)	4.06	Kind of like

Based on **TABLE 24**, it is known that in the aspect of texture, sample A gets the highest average value of 4.36 with the criteria of liking. The sample with the lowest average value is sample B, with an average value of 3.53, with similar criteria.

Results of Nutritional Content Data Analysis

The results of the water and flavonoid content analysis in milk caramel candy with the addition of Emprit ginger extract and *Secang* wood extract, which have been carried out at the Chemistry laboratory of Satya Wacana Salatiga Christian University, obtained the following data.

Water Content

TABLE 25. Moisture analysis results.

Sample	Yield (%)
K (Control)	2.51
A (5%)	4.26
B (7.5%)	5.62
C (10%)	7.08

Based on **TABLE 25**, sample K got 2.51%, sample A of 4.26%, sample B of 5.62%, and sample C of 7.08%.

Flavonoid Content

TABLE 26. Results of flavonoid content analysis.

Sample	Yield (%)
K (Control)	0
A (5%)	0.16
B (7.5%)	0.24
C (10%)	0.31

Based on **TABLE 26**, sample K gets 0%, sample A is 0.16%, sample B is 0.24%, and sample C is 0.31%.

Discussion of Sensory Test Results

Discussion of Color Aspect Sensory Test Results

Based on the results of sensory tests conducted by 15 semi-trained panelists, it was shown that the sample with the highest average in the color aspect of milk caramel candy was obtained in sample K, which had an average of 4.27 with chocolate criteria. Meanwhile, the sample with the lowest average value is 2.23, namely sample C with dark brown criteria.

The color difference in milk caramel candy with the addition of *Emprit* ginger extract and *Secang* wood extract is caused by the different contents of *Emprit* ginger extract and *Secang* wood extract in each sample. The more *Emprit* ginger extract and *Secang* wood extract are used, the browner the milk caramel candy will be. This is because the *Secang* wood extract is dark red, and the *Emprit* ginger extract is yellowish. So, if more and more of this color is added to the milk caramel candy, it will produce milk caramel candy with a dark brown color. This is in line with the results of a study conducted by Saramoya (2015), which revealed that the more purple yam extract and elephant ginger extract used, the more the color produced by the milk caramel candy. The brown color of caramel candy comes from the Maillard or non-enzymatic browning reaction (Koswara, 2009).

Discussion of Aroma Aspect Sensory Test Results

The sensory test results show that the sample with the highest average value was obtained in sample K with an average of 4.23, which has typical criteria for milk caramel candy. The sample with the lowest average value is sample C, with an average value of 2.63, with criteria less typical of milk caramel candy. Milk caramel candy generally has a distinctive aroma of milk caramel candy. The difference in aroma caused in this study was caused by *Emprit* ginger extract used with different sizes. In comparison, *Secang* wood extract has no aroma.

For this reason, adding *Secang* wood extract does not affect the aroma of milk caramel candy. However, *Emprit* ginger extract affects the aroma of milk caramel candy because *Emprit* ginger extract has *zingiberene*, which causes a distinctive aroma in ginger (Mierza et al., 2023). This is in line with research conducted by Saramoya (2015), which revealed that the more elephant ginger rhizome extract used in milk caramel candy, the more pungent the distinctive aroma of ginger. Thus, the stronger the distinctive aroma of ginger, the more the distinctive aroma of milk caramel candy is lost.

Discussion of Texture Aspect Sensory Test Results

Caramel candy has a sticky texture when chewed in the mouth. The consistency of caramel candy can be challenging, elastic, and soft (Markovic, 2021). Meanwhile, milk caramel candy has a soft texture.

Based on sensory tests that have been carried out, samples with the highest average value were obtained in sample C, with an average value of 4.23, which has soft criteria when chewed. The sample with the lowest average value is sample K, with an average value of 2.63, which has fewer soft criteria when chewed—the difference caused by the addition of *Emprit* ginger extract and *Secang* wood extract used with different sizes. The more *Emprit* ginger extract and *Secang* wood extract were added to milk caramel candy, the softer the milk caramel candy produced. This is in line with research conducted by Suharto (2018), which revealed that the increasing percentage of Emprit ginger juice resulted in the texture of the milk caramel candy being softer. Essential oils, starch resin, and fiber in *Emprit* ginger rhizomes cause the soft texture of milk caramel candy.

Discussion of Taste Aspect Sensory Test Results

Taste is felt in the mouth, which is a combination of odors and feelings caused by a dish of food and drinks when tasting it (Manzalina et al., 2019). Based on sensory tests that have been carried out, sample K obtained the highest average value with a value of 4.27, which has sweet taste criteria. While the sample that obtained the lowest average, namely sample C with a value of 2.8, had fewer sweet criteria.

Sample K has sweet criteria because *Emprit* ginger extract and *Secang* wood extract are not added. Furthermore, sample C has less sweet criteria because there is an addition of Emprit ginger extract and *Secang* wood extract, which is relatively high, which is 10%. This is in line with research conducted by Ummah et al. (2021), revealing that differences in adding elephant ginger juice to each treatment will cause differences in taste. The more ginger is used, the more the sweetness will decrease due to the spicy nature of ginger, so the spicy taste is more prominent (Saramoya, 2015).

Discussion of Favorability Test Results

Discussion of Color Aspect Favorability Test Results

Based on the research results on the preference test on the color aspect, the color with the highest score is sample K (0%), with an average score of 4.21, with criteria for liking. Meanwhile, the one with the lowest score was sample B (7.5%), with an average score of 2.73 with neutral criteria. Sample K is the most preferred because it has a brown color that matches the color of the milk caramel candy. Meanwhile, sample B had a fairly dark brown color, which was of less interest to the public because sample B contained the addition of *Emprit* ginger extract and *Sappan* wood extract, which was quite a lot, namely 7.5%, which could affect the color of the milk caramel candy to become quite dark brown. Sample A (5%) has similar criteria with an average score of 3.93. Furthermore, sample C (10%) has neutral criteria with an average score of 3.47.

Discussion of Aroma Aspect Favorability Test Results

Based on the study results, the favorability test on the aroma aspect produced an aroma with the highest score, namely in sample K (0%), with an average score of 4.37, which had like criteria. Panelists preferred milk caramel candy without adding *Emprit* ginger extract and *Secang* wood extract because it has the distinctive aroma of milk caramel candy. The one with the lowest score is sample C (10%), with an average score of 3.17. Sample C has the highest addition of empiric ginger extract and *Secang* wood extract, which is 10%. For this reason, panelists did not like sample C because of the strong ginger aroma in the milk caramel candy and the smell of milk caramel candy in general.

Discussion of Texture Aspect Favorability Test Results

Based on the results of the favorability test research on the texture aspect, it produces a texture with the highest score, namely in sample B (7.5%) with an average score value of 4.3, which has like criteria. In contrast, the one with

the lowest score is sample K (0%), with an average score of 3.13. Sample K is a sample without the addition of *Emprit* ginger extract and *Secang* wood extract. For this reason, the K sample has a slightly soft texture when chewed, which is not liked by the panelists. At the same time, the panelists prefer sample B, which has a soft texture when chewed.

Discussion of the Results of the Taste Aspect Favorability Test

Based on the results of the favorability test study on the texture aspect, it produces a texture with the highest score, namely in sample A (5%) with an average score value of 4.36, which has the criteria of liking. In comparison, the one with the lowest score is sample B (7.5%), with an average score of 3.53. The panelists liked sample A because it added *Emprit* ginger extract and *Secang* wood extract, which was slightly to produce a sweet taste. At the same time, panelists do not prefer sample B because it adds *Emprit* ginger extract and *Secang* wood extract, which is quite a lot to produce a reasonably sweet taste.

Discussion of Laboratory Test Results

Discussion of Moisture Content Laboratory Test Results

The lowest water content was found in the K sample (0%), which was 2.51% because there was no addition of empiric ginger extract and *Secang* wood extract, which would affect the water content of milk caramel candy. Sample A (5%) produced a water content of 4.26%, sample B (7.5%) produced a water content of 5.62%, and sample C (10%) produced the highest water content of 7.08% because sample C is a sample that has a high addition of *Emprit* ginger extract and *Secang* wood extract which is 10%. This is in line with research conducted by Suharto (2018), which revealed that the water content in Emprit ginger juice causes an increase in water content in milk caramel candy. The water content in the *Emprit* ginger rhizome will affect the total dissolved solids in the material, so the lower the total dissolved solids, the more the water content will increase. All samples have met the moisture content standard required by the Indonesian National Standard, which is a maximum of 7.5% because making milk caramel candy uses a heating process to caramelize, which causes evaporation and shrinkage of water in milk caramel candy products. For this reason, the addition of *Emprit* ginger extract and *Secang* wood extract to samples K, A, B, and C still meets Indonesian National Standard water content standards.

Discussion of Laboratory Test Results of Flavonoid Content

In sample K (0%), there is no flavonoid content because sample K does not have the addition of *Emprit* ginger extract and *Secang* wood extract. In sample A (5%), the flavonoid content was 0.16% / bb. In sample B (7.5%), there was a flavonoid content of 0.24% / bb, and in sample C (10%), there was a flavonoid content of 0.31% / bb. *Emprit* ginger extract has a flavonoid content of 0.6 mgQE/g, and *Secang* wood extract has a flavonoid content of 1.9%/g. So, the more *Emprit* ginger extract and *Secang* wood extract are added to milk caramel candy, the more flavonoid content is found in milk caramel candy. However, milk caramel candy is made using high-temperature heating, so the flavonoid content added to milk caramel candy will be reduced due to the heating.

CONCLUSION

There is an effect of the addition of *Emprit* ginger extract and *Secang* wood extract on the sensory quality of milk caramel candy in terms of color, aroma, texture, and taste.

Based on the community preference test on 80 untrained panelists, it was found that for color indicators, sample K had an average preference of 4.21, sample A had 3.93, sample B had 2.73, and sample C had 3.47. In terms of aroma, sample K has an average value of 4.37, sample A is 4.32, sample B is 4.13, and sample C is 3.17. In terms of texture, sample K has an average value of 3.13, sample A is 4.36, sample B is 3.78, and sample C is 3.78. In terms of taste, sample K has an average value of 3.71, sample A is 4.36, sample B is 3.53, and sample C is 4.06.

Furthermore, based on the results of laboratory tests on milk caramel candy with the addition of *Emprit* ginger extract and *Secang* wood extract, the moisture content of sample K was 2.51%, sample A was 4.26%, sample B was 5.62%, and sample C was 7.08%. The flavonoid content in milk caramel candy with *Emprit* ginger extract and *Secang* wood extract is sample K by 0%, sample A by 0.16%, sample B by 0.24%, and sample C by 0.31%.

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