

Organoleptic Test of Adding Purple Sweet Potato and Durian Fruit Extract to Goat Milk Ice Cream

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Abstract— The purpose of this study was to determine the effect of adding the purple sweet potato and durian fruit extracts on the organoleptic properties of goat milk ice cream. The research design used was a Completely Randomized Design (CRD) with 16 treatments, two replications. The treatments examined were as follows P0 = control, P1 = 10% purple sweet potato + 1% durian fruit extract, P2 = 20% purple sweet potato + 2% durian fruit extract, and P3 = 30% purple sweet potato + 3 durian fruit extracts %. The results of this study indicate that the administration of purple sweet potato and durian fruit extracts has a significant effect on the organoleptic properties of goat milk ice cream. Interaction between the addition of purple sweet potato and durian fruit extract on the organoleptic properties of goat milk ice cream. The type of panellists used by panellists are not formally trained but can distinguish and communicate reactions from organoleptic assessments tested.

Keywords— Goat milk, yam, durian, organoleptic.

I. INTRODUCTION

Goat milk like milk from other animal sources is a complex mixture, which is a fat emulsion in water. When compared with cow's milk, the four main components of goat's milk, lactose, fat, nitrogen compounds, and minerals, have similarities with cow's milk. Goat milk has an average size of 2 micrometres of fat, smaller than the size of cow's milk fat, which reaches 2.5 - 3.5 micrometres. The smaller size of fat granules makes goat milk fat more dispersed and homogeneous so that it is more easily digested by the human digestive system (Purbayanto, 2009).

According to Arixs (2006), of the three sweet potatoes (white, yellow and purple sweet potatoes) the highest anthocyanin levels are the purple sweet potato. The anthocyanin agent gives a reddish-purple colour so that it is no longer necessary to provide synthetic dyes so that it can be developed into a source of natural dyes.

The limited information about the type and its use could be one of the causes of the minimal utilization of tubers, especially from the types of potatoes, cassava, taro and sweet potatoes. Selling products and has many benefits and many nutrients. One way to increase consumption of goat milk is to reduce the aroma of Prengus, which can be done by processing goat milk into purple sweet potato flavoured ice cream. The addition of fruit to the ice cream reduces the aroma of Prengusto the aroma of fruit. Ice cream is one type of food and drink that is preferred by consumers from the age of children to adults.

II. METHODOLOGY

The experimental design used in the study was a factorial complete randomized design consisting of 2 treatments by administering purple sweet potato and durian fruit extracts.

The treatment of 1 purple sweet potato with four levels of concentration:

- U0 : without purple sweet potatoes
- U1 : 10% purple sweet potato addition
- U2 : 20% addition of purple sweet potato
- U3 : addition of 30% purple sweet potato

The treatment of 2 extra durian with four levels of concentration:

- B0 : without durian fruit extract
- B1 : addition of 1% durian fruit extract
- B2 : addition of 2% durian fruit extract
- B3 : addition of durian fruit extract 3%

Information :

- U : purple sweet potato
- B : durian fruit extract

The repetition was obtained from the formula:

$$(n-1)(t-1) \geq 15$$

$$(n-1)(16-1) \geq 15$$

$$(n-1)15 \geq 15$$

$$15n - 15 \geq 15$$

$$15n \geq 15 + 15$$

$$n \geq \frac{30}{15}$$

$$n \geq 2$$

$$n = 2$$

Randomization was carried out as follows:

U0B0	U1B0	U2B0	U3B0
U0B1	U1B1	U2B1	U3B1
U0B2	U1B2	U2B2	U3B2
U0B3	U1B3	U2B3	U3B3

A. Data Analysis

The research model that explains the value of observations according to a factorial Complete Randomized Design that is filled with a linear model is as follows:

$$Y_{ij} = \mu + \tau_i + \varepsilon_{ij} \text{ atau } Y_{ij} = \mu_i + \varepsilon_{ij}$$

Information:

- Y_{ij} = Observation value in the i-th treatment and j-th test
- m = general average value
- t_i = effect of i-th treatment
- ε_{ij} = random effect on the i-th test of the jth replication

The data obtained were processed by variation analysis to determine the effect of the treatment on the measured change. If it has a significant effect, it is continued with further tests according to the coefficient of the diversity of research results (Sastrosupandi, 2000).

B. Preparation for Making Ice Cream

This research begins with the purchase of the materials used. The first process begins with buying purple sweet potatoes in the Brastagi tax, then purchasing goat milk to goat breeders in Binjai, then buying durian fruit in Binjai, after all available research materials then selecting purple sweet potatoes to get the best quality then peeling purple sweet potato skins after it is washed thoroughly and drained, prepare water in a pan and then place the purple sweet potato in the pan to be boiled until smooth, then finely ground then weigh the purple sweet potato as much as 10%, 20%, and 30% of the goat milk used. Then weigh the extra durian 1%, 2%, 3% of the goat milk used. Heat the goat milk then add sugar, and salt stir until it boils. Dissolve gelatin with hot water. After the milk mixture has cooled, then add the purple sweet potato, gelatin solution, and durian fruit extract into a container and then mix until evenly distributed. After that, put the mixture into the pan and store it in the freezer until it is frozen.

C. Organoleptic Ice Cream Test

Organoleptic test carried out is to use a scoring test including testing of taste, texture, colour, and aroma while for overall acceptance is carried out by a hedonic test. The assessment was conducted with 25 panellists.

III. RESULT AND DISCUSSION

A. Organoleptic Test of Goat Milk Ice Cream

Organoleptic test assessments that will be assessed by panellists include taste, aroma, texture, and colour. The results of the organoleptic test will be analyzed statistically based on the calculation of variance (Test F) or often called the Analysis of Variance (ANOVA) because the results of the ANOVA calculation have a significant or genuine effect, then the smallest significant further test is performed.

The parameters observed by the panellists started from the taste, aroma, texture, and colour of goat's milk ice cream. For research conducted by panellists based on their favorite interests ranging from 1-9 (1 = very, very dislike, 2 = very disliked, 3 = disliked, 4 = close neutral, 5 = neutral, 6 = sufficient, 7 = satisfactory, 8 = very satisfying, 9 = very very satisfying)

TABLE I. Recapitulation of Research Data on Organoleptic Test for Addition of Purple Sweet Potatoes and Durian Fruit to Goat Milk Ice Cream.

Treatment	Taste	Flavour	Texture	Color
U0B0	2.7A	2.7A	2.25A	1.35A
U0B1	3.15AB	3.15B	4.45AB	1.8A
U0B2	3.6B	3.6C	5.05B	2.25A
U0B3	4.05B	4.05C	6.05BC	2.7A
U1B0	4.5BC	4.5CD	3.4BC	3.15A
U1B1	4.95C	4.95D	4.35C	3.6A
U1B2	5.4CD	5.4DR	5.3CD	4.05A
U1B3	5.65D	5.65EF	6.45D	4.2AB
U2B0	6.1DE	6.1FG	2.8D	4.65B
U2B1	6.55E	6.55G	4.7DE	4.8BC
U2B2	7EF	7GH	5.7E	4.9BC
U2B3	7.45EF	7.45H	7.2EF	5.35C
U3B0	7.7F	7.7H	3.9EF	5.8CD
U3B1	7.9FG	7.9H	5.4FG	5.8CD
U3B2	8.35H	8.15HI	7.45G	6.1E
U3B3	8.55HI	8.15I	8.35H	6.25F

Note: Numbers in the same column followed by the same letter indicate no significant difference at the 5% level.

B. Taste

Organoleptic test results of the study of goat milk ice cream flavour can be seen from the table. The most preferred flavour of goat milk ice cream is in the treatment (U3B3) the addition of 30% purple sweet potato and 3% durian fruit.

TABLE II. Average Research Data on Organoleptic Test on the Taste of Goat Milk Ice Cream

Treatment	U1	U2	T.ub	Y.ub
U0B0	2.3	3.1	5.4	2.7A
U0B1	2.8	3.5	6.3	3.15AB
U0B2	3.3	3.9	7.2	3.6B
U0B3	3.8	4.3	8.1	4.05B
TU0	12.2	14.8	27	13.5A
U1B0	4.3	4.7	9	4.5BC
U1B1	4.8	5.1	9.9	4.95C
U1B2	5.3	5.5	10.8	5.4CD
U1B3	5.8	5.5	11.3	5.65D
TU1	20.2	20.8	40.1	20.5B
U2B0	6.3	5.9	12.2	6.1DE
U2B1	6.8	6.3	13.1	6.55E
U2B2	7.3	6.7	14	7F
U2B3	7.8	7.1	14.9	7.45EF
TU2	28.2	26	54.2	27.1C
U3B0	8.3	7.1	15.4	7.7F
U3B1	8.3	7.5	15.8	7.9FG
U3B2	8.8	7.9	16.7	8.35H
U3B3	8.8	8.3	17.1	8.55HI
TU3	34.2	30.8	65	32.5D

C. Flavour

Organoleptic test results of the scent of goat milk ice cream can be seen from the table. The most preferred aroma of goat's milk cream is in the treatment (U3B3) the addition of 30% purple sweet potato and 3% durian fruit.

TABLE III. Average Research Data of Organoleptic Test on the Aroma of Goat Milk Ice Cream

Treatment	U1	U2	T.ub	Y.ub
U0B0	2.3	3.1	5.4	2.7A
U0B1	2.8	3.5	6.3	3.15B
U0B2	3.3	3.9	7.2	3.6BC
U0B3	3.8	4.3	8.1	4.05C
TU0	12.2	14.8	27	13.5A
U1B0	4.3	4.7	9	4.5CD
U1B1	4.8	5.1	9.9	4.95D
U1B2	5.3	5.5	10.8	5.4DE
U1B3	5.8	5.5	11.3	5.65EF
TU1	20.2	20.8	41	20.5B
U2B0	6.3	5.9	12.2	6.1FG
U2B1	6.8	6.3	13.1	6.55G
U2B2	7.3	6.7	14	7GH
U2B3	7.8	7.1	14.9	7.45H
TU2	28.2	26	54.2	27.1C
U3B0	8.3	7.1	15.4	7.7H
U3B1	8.3	7.5	15.8	7.9H
U3B2	8.8	7.5	16.03	8.15HI
U3B3	8.8	7.5	16.03	8.15I
TU3	34.2	29.6	63.8	31.9D

D. Texture

Organoleptic test results of the study of goat milk ice cream texture can be seen from the table. The most preferred

goat milk ice cream texture is in the treatment (U3B3) the addition of 30% purple sweet potato and 3% durian fruit.

TABLE IV. Average Research Data on Organoleptic Test on the Texture of Goat Milk Ice Cream

Treatment	U1	U2	T.ub	Y.ub
U0B0	2.3	2.2	4.5	2.25A
U0B1	4.5	4.4	8.9	4.45AB
U0B2	5	5.1	10.1	5.05B
U0B3	6	6.1	12.1	6.05BC
TU0	18.1	17.8	35.6	17.8A
U1B0	2.6	4.2	6.8	3.4BC
U1B1	4.4	4.3	8.7	4.35C
U1B2	5.6	5	10.6	5.3CD
U1B3	6.5	6.4	12.9	6.45CD
TU1	19.1	19.9	39	19.5B
U2B0	2.9	2.7	5.6	2.8CD
U2B1	4.8	4.6	9.4	4.7DE
U2B2	5.9	5.5	11.4	5.7E
U2B3	7.2	7.2	14.4	7.2EF
TU2	20.8	20	33.8	20.4C
U3B0	3.9	3.9	7.8	3.9EF
U3B1	5.4	5.4	10.8	5.4FG
U3B2	16.48	7.2	14.9	7.45G
U3B3	12.00	8.2	16.7	8.35H
TU3	25	24.7	50.2	25.1D

E. Colour

Organoleptic test results of the colour research of goat milk ice cream can be seen from the table. The most preferred colour of goat milk ice cream is in the treatment (U3B3) the addition of 30% purple sweet potato and 3% durian fruit

TABLE V. Average Research Data of Organoleptic Test on Goat Milk Ice Cream Color

Treatment	U1	U2	T.ub	Y.ub
U0B0	1.2	1.5	2.7	1.35A
U0B1	1.5	2.1	3.6	1.8A
U0B2	1.8	2.7	4.5	2.25A
U0B3	2.1	3.3	5.4	2.7A
TU0	6.6	9.6	16.2	8.1A
U1B0	2.4	3.9	6.3	3.15A
U1B1	2.7	4.5	7.2	3.6A
U1B2	3	5.1	8.1	4.05B
U1B3	3.3	5.1	8.4	4.2AB
TU1	11.4	18.6	30	15B
U2B0	3.6	5.7	9.3	4.65B
U2B1	3.9	5.7	9.6	4.8BC
U2B2	4.1	5.7	9.8	4.9BC
U2B3	4.4	6.3	10.7	5.35C
TU2	16	23.4	39.4	19.7C
U3B0	4.7	6.9	11.6	5.8CD
U3B1	4.7	6.9	11.6	5.8CD
U3B2	4.7	7.5	12.2	6.1E
U3B3	5	7.5	12.5	6.25F
TU3	19.1	28.8	47.9	23.95D

IV. RESEARCH DISCUSSION

A. Panellist Taste Test

The average value of the taste test results based on the provision of purple sweet potatoes and durian ice cream extracts of goat milk the highest value is shown by the U3B3 treatment of 8.55 with information on the test quality score that scoring 8.55HI is very satisfying.

Results of analysis of variance showed that there was a real change between one treatment and another treatment. The

taste change was caused by the addition of purple sweet potato and durian, which made the ice cream preferred by consumers.

Taste is a component of flavour and is an essential criterion in assessing food products that involve much sense of taste, such as the tongue. The flavour is a delicate and intricate sensory, which is a combination of taste (sweet, sour, bitter), odour (essential substances) and feels on the tongue. The flavour produced from formulations 1 and 2 is the taste of ice cream in addition to being influenced by the essence or distinctive aroma of purple yam, also influenced by the addition of sugar and salt. Aside from being a preservative, sugar and salt also function as a generator of aroma and flavour in ice cream.

The nutritional value of ice cream is very dependent on the nutritional value of the raw materials used. Ice cream, which has high-quality raw materials needs to be known with certainty, such as by using milk as the main ingredient in making ice cream; ice cream has the most significant contribution to its nutritional value. Ice cream is proven to have some unexpected nutritional facts behind the softness and sweet taste (Fitrahadini, 2010).

B. Flavour Test Panellist

The average value of the aroma test results based on the provision of purple sweet potato and durian ice cream extracts of goat milk the highest value indicated by the U3B3 treatment of 8.15I the results are very satisfying.

Results of analysis of variance showed that there was a real change between one treatment and another treatment. Changes in aroma due to the addition of durian fruit extracts that make the aroma of ice cream turns into the fragrance of durian, and there is no slight fishy odour. Durian fruit is the fruit that has the most exciting aroma and can mask the smell of the milkfish; durian fruit is generally very popular with the public.

According to Morton, the source of the typical aroma of durian fruit comes from a compound called indole. This compound can stop the growth of dead bacteria in fruit. So it can be said that durian fruit contains natural antiseptics, this substance which makes the aroma unique. The substance Indoles itself is mostly found in the digestive system when humans eat a source of protein. Indoles are high in the amino acid type of tryptophan, which is also found in turkey meat and substances in the human intestine. Durian lovers, this aroma is a tempting aroma that invokes taste. Many also force them to eat durian because they believe that this fruit is an aphrodisiac which can increase their strength.

Durian pulp contains 65 g of water, 134 Kal of energy, 2.5 g of protein, 3 g of fat, 28 g of carbohydrate, 7.4 mg of Ca, 44 mg of P, 1.3 mg of Fe and 175 SI of vitamin A and vitamin C and E for every 100 g of fruit flesh (Directorate of Nutrition of the Indonesian Ministry of Health, 1981).

The aroma or smell of food determines the delicacy of the food. The assessment of the aroma of food is inseparable from the function of the sense of smell. According to Winarno (1992), the odour received by the nose and brain is generally a mixture of four main odours, such as fragrant, sour, rancid, and scorched. The aroma produced from the two formulations produces a unique sweet potato. It is because the essential

ingredients used have a distinctive aroma, and the aroma of ice cream is influenced by the addition of milk and substitute materials used such as sugar or salt. The aroma in a food or product can also be influenced by additional ingredients used such as flavour enhancers. However, if the addition of flavour enhancers is done excessively, it will reduce the aroma of the ice cream itself. It is by the opinion of Afrianti (2008) that the flavour enhancer is an additive added to food that can strengthen the aroma and taste.

C. Panellist Texture Test

The average value of the aroma test results based on the provision of purple sweet potatoes and durian ice cream extracts of goat milk the highest value indicated by the U3B3 treatment that is 8.35H which results are very satisfying. Results of analysis of variance showed that there was a real change between one treatment and another treatment. Changes in texture due to the addition of durian fruit extracts and purple sweet potatoes, which makes the texture of the ice cream a little rough on the tongue, whereas in general, the ice cream is soft. Therefore the panellist texture test preferred without the addition of purple sweet potato and durian fruit extract.

Tenderness is one part of the organoleptic properties of products and foods. Milk fat and emulsifiers function to increase the nutritional value of ice cream, add flavour, produce soft texture characteristics, help provide shape and density, and provide excellent melting properties. Fat content in ice cream is between 8% to 16% (Padaga et al., 2005). Milk fat works to increase the nutritional value of ice cream, add flavour, produce soft texture characteristics, help provide shape and density, and provide excellent melting properties. Fat content in ice cream is between 8% to 16% (Padagadkk, 2005). Apart from the presence of fat in milk, the texture of the softness of ice cream is also influenced by the addition of sugar. It is due to sugar Sugar will soften the texture, increase the compatibility of ice cream, enrich the taste.

The composition of the dough when making ice cream will determine the quality of ice cream. Factors that influence include raw materials, manufacturing processes, freezing processes, packaging, and so on. The process of making all the ingredients of ice cream will be mixed into a primary ingredient of ice cream, one of which is the viscosity or thickness which has a significant effect on the level of smoothness of ice cream and ice cream resistance before it is liquid (Harris, 2011).

D. Panellist Color Test

The average value of the colour test results based on the provision of purple sweet potatoes and durian ice cream extracts of goat milk the highest value indicated by the U3B3 treatment is 6.25F with satisfactory results. Results of analysis of variance showed that there was a real change between one treatment and another treatment. The colour change was caused by the addition of the purple sweet potato, which made the ice cream colour turn purple. Purple sweet potato is also rich in nutrients, and purple sweet potato is a natural colouring agent.

The colour of purple sweet potato has an effect on the colour of ice cream products, where the more concentration of the use of sweet potatoes, the colour of ice cream will be more concentrated or purple, the mature purple sweet potato contains many antioxidants so that the colour of the sweet potato becomes dark purple.

Purple sweet potato (*Ipomoea batatas* L. Poir) is one type of sweet potato that is commonly found in Indonesia besides white, yellow and red. Purple sweet potato of *Ipomoea batatas* L. Poir has a purple colour which is entirely concentrated on the sweet potato flesh, so it attracts much attention. (Iriyanti, 2012).

The addition of purple sweet potato to goat milk ice cream affects the colour of ice cream. It is due to the fact that purple sweet potato contains Anthisionin compounds which can give a purple colour effect (Kumalaningsih, 2006).

Results of analysis of variance showed that there was a real change between one treatment and another treatment. The change was caused by the addition of durian extract and purple sweet potato, which made ice cream more attractive to the public. The community receives food through sensory-based on taste, aroma, colour, texture so as to attract its self-contained power to the community. With the technology of livestock products processing milk into ice cream with the addition of purple sweet potatoes and durian can increase the economic value of goat milk ice cream, and improve the community to drink milk because milk is essential for our bodies.

Goat milk can help restore the condition of people who have recovered from an illness. It is because the protein functions as a building agent that is forming new tissues in the body and replacing damaged body tissue, and that needs to be repaired (Winarno, 2002).

Physically, goat milk ice cream with the addition of purple sweet potato has a change in colour compared to goat milk ice without the addition of purple sweet potato.

The treatment of the addition of purple sweet potato and durian fruit extract to goat milk ice cream had a very significant effect on the results of organoleptic and hedonic test results from 25 panellists by determining the taste, colour, flavour, mouthfeel, and overall recipient.

Utilization of goat milk as an ingredient in making ice cream that has good nutritional content for the human body, and utilization as a technology for processing livestock products.

V. CONCLUSION

The provision of purple sweet potato has a very significant effect on the parameters of colour, taste, texture, and overall recipient. Giving durian fruit extract significantly affected the parameters of taste, odour, and overall recipient. The provision of purple sweet potato and durian fruit extracts has a very significant effect on organoleptic properties.

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