Enrichment of Soft Ice Cream with Different Fibrous Fruit Puree: Physicochemical, Textural Characteristics and Sensory Properties

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Abstract. The objective of this study was to improve nutritional, physical, chemical, and sensory properties of soft ice cream with the addition of fibrous fruit puree. The research design was carried out with 2 factors, namely the different types of fruit puree (durian, melon, guava, and jackfruit) and the concentration of the addition of different puree (15% and 25%). Data obtained were analyzed using ANOVA with Duncan Multiple Range Test at a 95% confidence level. Results of the study shows that the addition of durian, melon, guava and jackfruit puree can increase overrun, melt rate, viscosity, dietary fiber, protein, total solids, fat content, but reduce water content in soft ice cream products. Sensory acceptance test shows that ice cream with 25% melon puree has the highest preference score of aroma, taste, texture, and overall. Soft ice cream with the addition of 25% guava puree has the highest preference score of aftertaste while ice cream with 25% of jackfruit puree has the highest preference score of texture.

Keywords: soft ice cream, jackfruit puree, guavapuree, melonpuree, durian puree

1. Introduction
Ice cream is one of the most popular dessert made from mixing dairy products with other ingredients such as sweetener, flavour, stabilizer, etc [1]. According to Balhaqi [2], ice cream market in Indonesia is the largest in Southeast Asia. Sales of ice cream in Indonesia are estimated at 158 million litters and can grow up to 16% in the following year. This market development is a reflection of market growth in the Asian region and has shifted Europe and America which were once the biggest consumers of ice cream. Now, Asia Pacific region has a market share of around 30% of the total ice cream in the whole world, beating America which only controls 28% of total ice cream sales worldwide [2].

The problem faced regarding consumption of ice cream is its lack of nutrients such as vitamins, mineral and dietary fibres and its low physical quality such as short melting time and poor texture. Enrichment with fibrous fruit can increase total solids of ice cream which can solve both problems.
Based on the Ministry of Health of the Republic of Indonesia in 2010, the average fibre consumption of Indonesian still does not meet the Nutrition Adequacy Ratio (NAR) that has been determined. The average of fibre consumption in Indonesian society is 10.5 grams per day, while the Recommended Daily Allowance (RDA) is 25 grams per day [3].

Ice cream with fruit additions or substitutions can increase customer acceptance. The addition of fibrous fruit can improve nutritional, physical, chemical, and texture or organoleptic qualities of ice cream products [27]. The use of fibrous fruit to improve the texture and physical quality of ice cream has been done before by using pineapple (Ananas sativus) and siwalan fruit or palm fruit (Borassus flabellifer) [27,28]. In this study, the effect of adding fibrous fruit puree to the reception or organoleptic values and physicochemical properties of soft ice cream products will be analysed. The fibrous fruits that will be used in this experiment are red guava fruit (Psidium guajava), durian fruit (Durio zibethinus), jackfruit (Artocarpus heterophyllus Lamk.) and melon (Cucumis melo L.).

### 2. Materials and Methods

#### 2.1 Materials

Soft ice cream used in this study was produced with premix obtained from PT.XYZ (Jakarta, Indonesia). The premix consisted of sugar, non-dairy creamer, dextrose, vanilla essence, stabilizer, salt, and powdered milk. Red guava fruit (Psidium guajava), durian fruit (Durio zibethinus), jackfruit (Artocarpus heterophyllus Lamk.) and melon (Cucumis melo L.) were obtained from Puri’s Traditional Market in West Jakarta. The study began with sample preparation where all fruits were mashed up into puree using electric blender (Miyako, Japan), and meshed using mesh (BIT, Indonesia) No.30. The next step is to prepare soft ice cream using PT. XYZ premix with the addition of fruit puree with the concentration of puree addition 15% and 25%.

#### 2.2 Preparation of fruit puree and Soft Ice Cream

Compositions of ice cream and fruit puree mixtures at different design points are listed as follows: V (control), M15 (premix + 15% melon puree), M25 (premix + 25% melon puree), D15 (premix + 15% durian puree), D25 (premix + 25% durian puree), J15 (premix + 15% guava puree), J25 (premix + 25% guava puree), N15 (premix + 15% jackfruit puree) and N25 (premix + 25% jackfruit puree). Each formulation was prepared by mashing up the fruit that were separated from the skin or the seeds and steam blanched for 45 seconds with electric blender for 3 minutes. Fruit puree was meshed using Mesh No.30. Guava, jackfruit, and durian puree was diluted in water with the concentration 1:1 for guava puree, 1:2 for durian puree, and 1:1.5 for jackfruit puree.

Preparation of soft ice cream started with measuring each ingredient with the formulas as shown in Table 1. All ingredients and fruit puree were homogenized using a homogenizer (Bamix, Swiss) with medium speed for 3 minutes. Ice cream dough was then processed in Soft Ice Cream Machine (Taylor 152-4, USA) for 15 minutes.

| Ingredients         | Control (0%) | 15% | 25% |
|---------------------|--------------|-----|-----|
|                     | Weight | %  | Weight | %  | Weight | %  |
| Premix              | 1300 g   | 24.53 | 1300 g  | 24.53 | 1300 g  | 24.53 |
| Water               | 3500 ml  | 66.04 | 2900 ml | 54.72 | 2500 ml | 47.17 |
| Full Cream milk     | 500 ml   | 9.43  | 500 ml  | 9.43  | 500 ml  | 9.43  |
| Diluted Puree       | -        | -     | 600 ml  | 11.32 | 1000 ml | 18.87 |

#### 2.3 Physical Analysis

Physical analysis includes overrun, viscosity, and melting rate. Overrun was analyze based on Arbuckle method 1986 [4]. Melting rate was analyzed based on Zahro&Nissa method 2015 at 26.7 °C [5]. Viscosity was analyze using Brookfield Viscometer with spindle No. 64 and 120 rpm [7].
2.4 Chemical Analysis
Water content and ash content were conducted based on AOAC method 1999 [7], total solid content was conducted based on AOAC method 2000 [8], fat content was conducted based on Weibull Hydrolysis method from SNI 1992 [9], protein content was conducted based on AOAC method 2006 [10] and dietary fiber content was conducted based on AOAC method 1991 [11].

2.5 Sensory Analysis
Sensory properties were carried out using the principle of hedonic affective test analysis. Tests were carried out on 30 panelists who were asked to taste 9 test sample with the attributes of test aroma, taste, texture, body, aftertaste, and overall for the test sample without additions and by adding fruit puree. The hedonic rating test uses nine favorite scales: (1) dislike extremely, (2) dislike very much, (3) dislike moderately, (4) dislike slightly, (5) neutral, (6) like slightly, (7) like moderately, (8) like very much, and (9) like extremely.

2.6 Experimental Design and Data Analysis
The research method used is an experimental statistical method with quantitative data analysis. Experiments was carried out with 2 factors, namely 4 different fruits and 2 different concentrations for each fruit used. Observations were made 3 times (triple) or 2 times (duplo) for physical and chemical analysis and 1 time for acceptance analysis, where 30 panellists will assess 9 different samples. Data from physical, chemical and sensory analysis was analysed using the analysis of variance (ANOVA) method with a real level of 5% or a confidence level of 95%. If the results are stated that there is a significant difference value, then a post hoc test will be carried out using the Duncan’s Multiple Range test. Correlation test will be carried out using Pearson correlation analysis.

3. Results and Discussion
3.1 Effect of Fruit Puree Addition on Physical Quality of Soft Ice Cream
Physical analysis of soft ice cream products was carried out with 3 tests, namely the overrun test, melt rate, and viscosity. Overrun, melt rate, and viscosity value of vanilla soft ice cream (control), durian 15%, durian 25%, guava 15%, guava 25%, melon 15%, melon 25%, jackfruit 15%, and jackfruit 25% are indicated in Table 2. As was foreseeable, the addition of fibrous fruit into the ice cream mix affected the overrun, melting rate and viscosity of ice cream.

| Code | Overrun (%) | Melting rate 26.7 °C, 59% | Viscosity (Pa.s) |
|------|-------------|---------------------------|-----------------|
| V    | 20.69 ± 1.33<sup>cd</sup> | 42.05 ± 0.95<sup>†</sup> | 90.00 ± 10.00<sup>⁶</sup> |
| D15  | 24.79 ± 0.55<sup>ab</sup> | 57.97 ± 1.27<sup>b</sup> | 388.67 ± 1.53<sup>b</sup> |
| D25  | 26.76 ± 0.89<sup>a</sup>  | 61.48 ± 0.47<sup>a</sup> | 427.33 ± 17.79<sup>⁹</sup> |
| J15  | 18.55 ± 1.87<sup>de</sup> | 51.96 ± 0.42<sup>d</sup> | 276.67 ± 15.28<sup>⁸</sup> |
| J25  | 22.16 ± 1.44<sup>bc</sup> | 52.88 ± 0.70<sup>d</sup> | 303.33 ± 35.12<sup>cd</sup> |
| M15  | 22.07 ± 2.38<sup>bc</sup> | 41.25 ± 0.28<sup>f</sup> | 145.00 ± 25.00<sup>f</sup> |
| M25  | 17.26 ± 2.45<sup>fg</sup> | 43.44 ± 0.10<sup>g</sup> | 156.67 ± 2.89<sup>f</sup> |
| N15  | 17.08 ± 1.31<sup>ef</sup> | 55.28 ± 1.04<sup>e</sup> | 243.33 ± 5.77<sup>e</sup> |
| N25  | 15.59 ± 0.41<sup>ef</sup> | 57.60 ± 0.60<sup>e</sup> | 313.33 ± 5.77<sup>e</sup> |

Superscript letter in a same column shows significant value (p<0.05)

Overrun is associated with the amount of increased volume caused by the incorporation of air into the ice cream mixture that occurs during the agitation process when freezing takes place. Air bubbles
formed by their existence can be maintained because they are covered by layers of fat globules in the emulsion system [12]. The more air is trapped in the particles of ice cream cavities, the more volume will increase.

Based on statistical analysis, D15, D25, M25 N15, N25 gave significant differences (p <0.05) from vanilla ice cream (control). As illustrated on Table 2, the addition of durian puree significantly increases the overrun of ice cream, while the addition of jackfruit and melon puree decreases the overrun value compared to vanilla ice cream (control) which has an overrun value of 20.69%. D25 has the highest overrun value, 26.77%, followed by D15 which is 24.78%. M25 has a significant decrease in overrun value, which is 17.26%, followed by N15 which is 17.08%, and N25 which is 15.59%. Results also indicated that overrun value of experimental ice cream samples increases with increasing fruit concentration. However, addition of 25% guava fruit puree and 15% melon puree did not give a significant difference to the overrun value when compared to the control. Overall, the overrun quality of samples was low ranging from 15-26%. This may have occurred due to the small batch freezing and lack of agitation and homogenization which is a limitation of this study. Higher overrun values of ice creams enriched with durian could be attributed to the rheological properties of the fruit itself. Durian puree are higher in viscosity, water binding capacity and gel-forming ability, compared to other fruits used in this study [30].

Melting rate is the amount of time it takes for ice cream to melt perfectly. The length of melting time is the time b. it takes for a certain amount of ice cream to thaw completely at room temperature. In this study, the melting test was carried out in a room with a temperature of 26.7°C and relative humidity of 59%. The melting rate results can be seen in Table 2.

Based on the results of One-Way ANOVA analysis and DMRT with a confidence level of 95%, it was demonstrated that the addition of fruit puree had a significant effect (p <0.05) on melting rate compared to control except for M15 which does not make a significant difference. D25 has the longest melting time, which is 61.48 minutes, followed D15 which is 57.97 minutes, N25 ice cream which is 57.60 minutes, N15 ice cream which is 55.28 minutes, J25 which is 52.88 minutes, J15 which is 51.96 minutes, M25 which is 43.44 minutes, vanilla ice cream (control) which is 42.05 minutes, and M15 which is 41.25 minutes. The high melting rate of D25 could be related to its rheological properties, which shows higher value for viscosity [31].

Viscosity can be interpreted as the thickness of a liquid. The viscosity of soft ice cream mixture was measured using Brookfield Viscometer with no. 64 spindle and a speed of 120 rpm, before it was frozen. The results of the viscosity analysis can be seen in Table 2. From these results, it can be seen that the viscosity of ice cream increases with increasing concentration of fruit puree enrichment. Based on statistical analysis, the viscosity of ice cream with the addition of each fruit puree was significantly different compared to control (p <0.05). D25 has the highest viscosity value, which is 427.33 Pa.s followed by D15 with a viscosity value of 388.67 Pa.s, N25 with a viscosity value of 313.33 Pa.s, J25 with a viscosity value of 303.33%, J15 with a viscosity value of 276.67 Pa.s, N15 with a viscosity value of 243.33 P, M25 with a viscosity value of 156.67 Pa.s, M15 with a viscosity value of 145 Pa.s, and vanilla ice cream (control) with the lowest viscosity value of 90 Pa.

| Table 3. Correlation Analysis Between Overrun, Melting Rate, and Viscosity. |
|-------------------------------|-----------------|-----------------|-----------------|
|                               | Overrun         | Melting Rate    | Viscosity       |
| Overrun                       | 1.00            | 0.27            | 0.38*           |
| Melting Rate                  | 0.23            | 1.00            | 0.91            |
| Viscosity                     | 0.38*           | 0.91            | 1.00            |

(*) shows significant value

Addition of large amounts of fluid will reduce total solids which will result in increased overrun values [13]. If the viscosity of a material is high, the resulting overrun will be lower [14]. This is because higher viscous ingredient will limit the mobility of water molecules due to the space between
the particles in the mixture is getting narrower. The space between the narrow particles will cause the air entering the mixture during the agitation process to be less, resulting in lower overrun value [15].

Based on Table 3, only overrun and viscosity has a significant value of correlation with correlation value 0.38. From Table 2, it can be seen that the higher the viscosity, the higher the overrun of the ice cream. The viscosity value of ice cream with additional fruit purée is higher than vanilla ice cream (control), while the overrun of vanilla ice cream is in the 5th highest position. Durian ice cream has the highest viscosity and overrun value. This is inversely proportional to the opinion of McGhee et al. (2015) which states that the lower the viscosity of the dough, the free water that is not bound in the dough can reduce the surface tension so that the air more easily penetrates the surface of the dough so that the development of ice cream will be higher [16].

Melting rate has a positive relation with the overrun value, which is the higher the overrun value, the faster the melting time. From Table 2, ice cream which tends to melt longer, has an increase value of overrun and viscosity. It is known D25 has the highest overrun, viscosity and melting rate. In contrast to our results, research conducted by Zahro & Nisa (2015) stated that ice cream melts easily due to an increase of air in ice cream [5]. Kisworo (2015) also stated that lower value of overrun means the less air is trapped, so ice cream will not melt quickly [17].

According to Marshall et al. (2003), data obtained is in accordance with the theory that the higher the viscosity of the ice cream, the ice cream will also be more resistant to melting [18]. Sofian & Hartel (2004), also argued that ice cream that has a low overrun value will melt faster, while ice cream with high overrun will have a better resistance to melting properties. This is because the heat transfer rate is reduced due to more air volume [19].

3.2 Effect of Fruit Purée Enrichment on Chemical Contents of Soft Ice Cream

In this study, the chemical analysis carried out was water content, total solids, fat, protein, dietary fiber, and total sugar. The results of analysis of water content, total solids, fat, protein, dietary fiber, and total sugar are presented in Table 4.

### Table 4. Water Content, Total Solid, Fat, Protein, Dietary Fiber and Total Sugar of Soft Ice Cream

| Code | Water Content (%) | Total Solid (%) | Fat (%) | Protein (%) | Dietary Fibre (%) | Total Sugar (%) |
|------|-------------------|----------------|---------|-------------|-------------------|----------------|
| V    | 74.64±0.01c       | 25.34±0.02ab   | 5.26±0.03b | 2.31±0.17c  | ±0.00            | 40.76±0.07b    |
| D15  | 75.49±0.05b       | 24.51±0.05b    | 6.19±0.03b | 3.95±0.06a  | 6.88±0.13d       | 54.50±0.11b    |
| D25  | 74.61±0.12c       | 25.30±0.12ab   | 6.25±0.077a | 3.98±0.13a  | 11.46±0.03d       | 56.90±0.11b    |
| J15  | 74.07±0.05c       | 25.93±0.05a    | 5.28±0.06b | 2.35±0.11c  | 9.20±0.41c       | 47.19±0.01f    |
| J25  | 73.86±0.05c       | 26.14±0.05a    | 5.29±0.03b | 2.35±0.08c  | 15.37±0.08a       | 49.21±0.02e    |
| M15  | 76.14±1.50a       | 23.86±1.45c    | 5.28±0.13b | 2.36±0.04c  | 3.44±0.18f        | 45.24±0.04h    |
| M25  | 74.01±0.21c       | 25.99±0.21a    | 5.28±0.11b | 2.36±0.07c  | 5.74±0.07e        | 45.76±0.03f    |
| N15  | 74.54±0.21c       | 25.46±0.21a    | 5.26±0.03b | 3.19±0.06b  | 1.11±0.03d        | 51.17±0.07d    |
| N25  | 73.93±0.04c       | 26.07±0.04a    | 5.26±0.18b | 3.21±0.04b  | 1.83±0.20d        | 51.85±0.02e    |

Superscript letter in a same column shows significant value (p>0.05)

Based on statistical analysis from Table 4, it can be seen that M15 and D15 give a significant effect on the moisture content of ice cream. M15 has the highest water content with a value of 76.14% followed by D15 ice cream with a value of 75.54%, vanilla ice cream with a value of 74.64%, D25 with a value of 74.61%, N15 with a value of 74.54%, J15 with a value of 74.07%, M25 with a value of 74.01%, N25 with a value of 73.93%, and J25 with a value of 73.86%. However, the total solid value of M15 was significantly reduced compared to control with a value of 23.86%. The total content of solids and water content affects the melt speed of the ice cream.

Ice cream with higher concentration of fruit purée has a lower water content value and a higher total solid value. When compared with the results melting rate, this data is correspondent. This is
supported by the opinion of Widiantoko and Yunianta (2014) which states that a decrease in the total amount of solids can increase the freezing point of the dough so that trapped water is less and increases the mobility of free water. Decreasing the amount of free water trapped will produce ice cream that melts quickly [20].

Based on statistical analysis, durian ice cream with the addition of 25% and 15% puree had a significant increase in fat content compared to controls. From Table 4, it is seen that the highest fat content is in D25 with a value of 6.25%, followed by D15 with a value of 6.19%, J25 with a value of 5.29%, J15 and melon ice cream with a value of 5.28%, and the lowest in vanilla ice cream, N15, and N25 with a value of 5.26%.

### Table 5. Correlation Analysis Between Texture and Fat Content

| Texture | Fat |
|---------|-----|
| 1       | 0.35|
| 0.35    | 1   |

Table 5 shows the correlation between texture and fat content. From this table, it can be seen that there is no significant correlation between texture and fat content of ice cream. Based on Goff and Hartel (2013), fat can increase texture quality of ice cream [29].

Durian ice cream has the highest fat content and longest melting time, as well as vanilla ice cream which has the lowest fat content and the fastest melting time. This is consistent with the theory that the higher composition of fat decreases the content of solids without fat and lactose. The formation of ice crystals will also decrease with increasing fat content. The more fat content in ice cream will slow down the melting properties of ice cream [12].

Based on statistical analysis from Table 4, it can be seen that the addition of durian and jackfruit puree gave a significant increase in protein levels at 15% and 25% puree addition compared to vanilla ice cream (control) with a value highest D25 which is 3.98% followed by D15 with a value of 3.95%, N25 ice cream with a value of 3.21%, N15 with a value of 3.19%, 15% M25 with a value of 2.36%, J15 & J25 with a value of 2.35%, and ice cream control with a value of 2.31%. The higher the concentration of fruit puree, the higher the protein content. Protein in ice cream with the addition of durian puree has the highest value, and the protein in vanilla ice cream has the lowest value. Protein content in ice cream determine the texture of the final products. Protein can prevent rough texture in ice cream by forming a smooth and dense body [12].

The addition of fibrous fruit puree to ice cream has the aim of increasing the fiber content of food in ice cream and physicochemical properties of ice cream. Fiber is a component of plant foods that are important for health. The function of fiber in the body is closely related to digestive health, which can protect the colon from disorders of constipation, diarrhea, diverticulum, and colon cancer. Lack of fiber can also cause diseases of civilization such as coronary heart disease.

Based on statistical analysis, the addition of fruit puree gave a significant increase in the value of fiber content of food on ice cream for all fruits and concentrations. The highest dietary fiber content is in ice cream by adding 25% guava fruit puree with a value of 15.37% followed by D25 with a value of 11.46%, J15 with 9.2% value, D15 ice cream with a value of 6.88 %, M25 with a value of 5.74%, M15 with a value of 3.44%, N25 with a value of 1.83%, and N15 ice cream with a value of 1.11%.

Based on melting range analysis, in Table 2 it was seen that the addition of fruit puree had a significant effect (P <0.05) on the speed of melting ice cream. DMRT further test results showed that ice cream with a percentage increase of 15%, and 25% pure had a significant difference. Ice cream with a higher concentration of fruit puree has higher food fiber content and longer melting speed.

The highest dietary fiber content is 25% guava ice cream and the lowest is 15% jackfruit ice cream. The high fiber content causes the total solids to increase so that the melting time of ice cream is longer [21]. This theory is not in accordance with the results of analysis where J25 has the highest dietary fiber value, but the highest total solids are in D25 which also has the longest melting time. This can be due to the analysis of the fiber of the food tested is total food fiber, which is food fiber dissolved and
insoluble. As for the total solids test, water soluble food fibers have disappeared along with water in the ingredients, and other factors that can affect the speed of melting time such as fat, protein, and so on.

Based on statistical analysis, ice cream with the addition of durian, guava, melon and jackfruit puree at a concentration of 15% and 25% gave a significant increase in total sugar value when compared with controls. D25 has the highest total sugar content with a value of 56.9% followed by D15 with a value of 54.5%, N25 with a value of 51.85%, N15 with a value of 51.17%, J25 with a value of 49.21%, J15 with a value of 47.19%, M25 with a value of 45.76%, M15 with a value of 45.24%, and vanilla ice cream with a value of 40.76%.

Sugar in ice cream plays an important role in the taste of ice cream and decreases in freezing. Too little sugar in the ice cream causes too much ice to form. Too much sugar makes the resulting ice cream too sweet. In addition, sugar also plays a role in increasing viscosity [22]. This is directly proportional to the results of the viscosity analysis in Table 2, where the highest viscosity value is in D25, followed by D15, N25, N15, J25, J15, M25, M15 and V.

### 3.3 The Effect of Fruit Puree Addition on Panelist Preference Level

Preference Analysis was carried out using the principle of hedonic affective test analysis which included test parameters for aroma, taste, texture, body, aftertaste, and overall. This analysis aims to see panelist’s acceptance of soft ice cream products that have been added to fruit puree. The results of acceptance analysis are shown in Table 6.

| Code | Aroma | Taste | Texture | Body | Aftertaste | Overall |
|------|-------|-------|---------|------|------------|---------|
| V    | 6.53 ± 0.82b | 6.93 ± 0.87c | 6.53 ± 0.78c | 6.83 ± 0.75c | 6.87 ± 0.73c | 6.97 ± 0.49bc |
| D15  | 5.83 ± 1.15c | 6.73 ± 0.83c | 7.00 ± 0.83bc | 6.90 ± 0.84c | 6.67 ± 0.92c | 6.83 ± 0.75c |
| D25  | 5.90 ± 1.12c | 6.70 ± 0.92c | 6.90 ± 0.92bc | 6.90 ± 0.96c | 6.80 ± 1.00cde | 6.87 ± 0.94c |
| J15  | 6.76 ± 1.10a | 7.20 ± 0.92bc | 7.23 ± 1.04b | 7.50 ± 0.78b | 7.33 ± 0.92abc | 7.33 ± 0.84b |
| J25  | 7.17 ± 1.3ab | 7.83 ± 0.9a | 7.87 ± 0.82a | 7.80 ± 1.00a | 7.80 ± 1.00a | 7.80 ± 0.71a |
| M15  | 6.57 ± 1.30b | 7.20 ± 0.92bc | 7.10 ± 1.03b | 7.17 ± 0.91bc | 7.23 ± 0.77bcd | 7.30 ± 0.70b |
| M25  | 7.43 ± 1.3ab | 7.93 ± 0.83a | 8.00 ± 0.98a | 7.93 ± 0.87a | 7.73 ± 0.94ab | 8.00 ± 0.74a |
| N15  | 5.03 ± 1.16ab | 5.90 ± 1.30d | 6.80 ± 0.71bc | 6.87 ± 0.63d | 6.27 ± 0.94d | 6.20 ± 0.96g |
| N25  | 6.90 ± 1.12ab | 7.60 ± 0.81ab | 8.00 ± 0.87a | 7.87 ± 0.57a | 7.70 ± 0.60ab | 7.73 ± 0.73a |

Superscript letter in a same column shows significant value (p<0.05)

Based on the data in Table 6, it can be seen that D15, D25, N15 have a lower preference level and are significantly different from vanilla ice cream, while M25 has higher preference score and significantly different compared to vanilla ice cream. Hendriani (2005) states that the aroma of ice cream is strongly influenced by the ingredients used in preparing ice cream mixtures. The aroma of ice cream is more determined by milk fat and added skim milk [23]. The aroma of ice cream is mostly dominated by the aroma of milk. Adding fruit puree can eliminate the aroma of milk from ice cream.

Ice cream with the addition of 25% melon puree has the highest preference level with a score of 7.43 followed by J25 with a score of 7.17, N25 with a score of 6.90, J15 with a score of 6.76, M15 with a score of 6.57, vanilla ice cream with a score of 6.53, D25 with a score of 5.90, D15 with a score of 5.83, and N15 ice cream with a score of 5.03.

Based on the results of the organoleptic taste of ice cream, it can be seen that J25, N25, M25 have a higher preference level and significantly different from vanilla ice cream, while N15 has a lower preference level and significantly different compared to vanilla ice cream. M25 has the highest preference level with a score of 7.93 followed by J25 with a score of 7.83, N25 with a score of 7.60, J15 with a score of 7.20 and M15 with a score of 7.20, vanilla ice cream with a score of 6.93, D15 with a score of 6.73, D25 with a score of 6.70, and N15 ice cream with a score of 5.90. From these results it can be seen that the addition of fruit puree with higher concentration increases the value of
panellist’s acceptance of aroma except on ice cream with durian puree, where addition with smaller concentrations is more preferable. The taste of ice cream is a combination of taste and smell. The results of the taste preference test are directly proportional to the results of the test of aroma preference except for durian fruit. This can be due to the taste of durian fruit, which is too strong at a greater concentration, so the panellists prefer durian ice cream with a lower concentration.

Based on the results of organoleptic texture of ice cream, it is seen that J15, J25, N25, M15, M25 have a higher preference level and significantly different from vanilla ice cream. Texture is the state of the particles that make up the whole ice cream. The texture of ice cream is strongly influenced by fat as raw material for ice cream. Fat in ice cream functions to give a smooth texture, contribute with flavour and provide a synergistic effect with flavour added and beautified appearance [24] [25]. Sutrisno and Susanto (2014) stated that if the fat content of milk was too low, it would make large ice crystals and the texture more will be coarser and feel cooler [26]. N25 and M25 have the highest preference level with a score of 8.00 followed by J25 with a score of 7.87, J15 with a score of 7.23, M15 with a score of 7.10, D15 with a score of 7.00, D25 with a score of 6.90, N15 ice cream with a score of 6.80, and vanilla ice cream with a score of 6.53. From these results it can be seen that ice cream with the addition of high concentration of fruit puree has a higher preference level except in durian fruit where the addition of puree with smaller concentrations has a higher reception value. Ice cream with the addition of durian and jackfruit puree has a higher fat content compared to ice cream by adding other fruit puree but the value of durian ice cream texture preference is in the 6th and 7th positions. This can be due to the texture of durian ice cream that is too heavy or dense because the value of its viscosity occupies the highest position, so the panellists prefer other ice cream with a lighter texture.

The desired body is a firm with a solid substance that is united in the form of foam / foam [27]. Based on the results of the organoleptic body ice cream test, it can be seen that J15, J25, N25, M25 have a higher preference level and are significantly different from vanilla ice cream. M25 has the highest preference level with a score of 7.93 followed by N25 with a score of 7.87, J25 with a score of 7.80, J15 with a score of 7.50, M15 with a score of 7.17, D15 and D25 with a score of 6.90, N15 with a score of 6.87, and vanilla ice cream with a score of 6.83. From these results it can be seen that ice cream with the addition of high concentration of fruit puree has a higher preference level except in durian fruit where the addition of puree with smaller concentrations has a higher reception value.

Afterscent is a permanent impression that is obtained after the sensing is complete. Based on the organoleptic test results of the ice cream aftertaste, it was seen that N15 had a lower preference level and was significantly different from vanilla ice cream, whereas N25, J25, M25 had a higher preference level and significantly different from vanilla ice cream. Ice cream with the addition of guava fruit puree 25% had the highest preference level with a score of 7.80 followed by N25 with a score of 7.70 J15 with a score of 7.33, M15 and M25 with a score of 7.23, vanilla ice cream with a score of 6.87, D25 ice cream with a score of 6.80, D15 with a score of 6.67, and N15 with a score of 6.27.

Based on the overall organoleptic test results of ice cream, it is seen that N15 has a lower preference level and is significantly different from vanilla ice cream, while N25, J25, M25 has preference level higher and significantly different from vanilla ice cream. M25 has the highest preference level with a score of 8.00 followed by J25 with a score of 7.80, N25 with a score of 7.73, J15 with a score of 7.33, M15 with a score of 7.30, vanilla ice cream with a score of 6.97, D25 with a score of 6.87, D15 with a score of 6.83, and N15 with a score of 6.20. The lower level of preference for ice cream can be caused by the physical nature of ice cream which affects the level of preference of panelists. Consumer preferences for ice cream products are strongly influenced by taste, smell, mouth stimulation, and texture.

4. Conclusion

Based on research that has been done, it can be concluded that the addition of fruit puree can increase the nutritional content, physical quality, and panellist preferences. In chemical analysis of water content and total solids, M15 had the highest significant increase in water content and the
highest decrease in total solids when compared to controls. D25 has the highest increase in fat, total sugar and protein content. For dietary fibre, J25 has the highest increase in dietary fibre value. In physical analysis, the addition of fruit puree to soft ice cream can increase the value of overrun, melting rate, and viscosity. In the overrun parameter, D25 has the highest overrun value and N25 has the lowest significant overrun value compared to the control. In the analysis parameters of melting rate and viscosity, the addition of fruit puree gives a significant increase in value. D25 has the longest melting time and highest viscosity, while control has the lowest viscosity value, and M15 has the fastest melting time. For preference analysis, M25 has the highest preference value on the parameters of aroma, taste, body, and overall. N25 has the highest preference value in texture parameters, and J25 has the highest preference value in the aftertaste parameter.

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