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Department of Mechanical and Biosystem Engineering, Faculty of Agricultural Engineering and Technology, Bogor  
Agricultural University IPB, Dramaga Bogor PO BOX 220  
Tel : +62-251-8620480; 8623026; E-mail: [aesapipb@gmail.com](mailto:aesapipb@gmail.com); Website: [www.aesap2016.com](http://www.aesap2016.com)



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Bogor Chapter

Subject: Acceptance Letter

Bogor, December 5<sup>th</sup> 2016

To:

**I Ketut Budaraga**

Technology Studies Program Faculty of Agriculture  
University of Ekasakti  
Indonesia

Dear **I Ketut Budaraga**,

We are pleased to inform you that your abstract entitled “**STUDY USE AS GREEN BEAN SARI SKIM MILK SUBSTITUTE FOR ICE CREAM YELLOW PUMPKIN (Cucurbita maxima)**” with authors **I Ketut Budaraga, Rahmita, Lefly Hermalena and Williyana** is accepted for oral presentation in the upcoming The 1<sup>st</sup> International Conference “The Role of Agricultural Engineering for Sustainable Agriculture Production” which will be held on December 13-14<sup>th</sup> 2016 in IPB International Convention Center, Bogor, West Java, Indonesia.

Accordingly, we would like to request you kindly prepare your full paper by following our full paper format that can be downloaded in [www.aesap2016.com](http://www.aesap2016.com) and send it to us before 12<sup>th</sup> December 2016. In accordance with oral presentation, we would like you to prepare your oral presentation material in power point slides for 15 minutes and 5 minutes discussion.

To be officially included in the program, please transfer your registration fee through bank transfer and sending us the transfer receipt to [aesapipb@gmail.com](mailto:aesapipb@gmail.com). Kindly visit our official website page [www.aesap2016.com](http://www.aesap2016.com) for further details of payment.

Thank you for your kind attention and we look forward to welcoming you in Indonesia. Should you require further information and assistance, please do not hesitate to contact us.

Yours sincerely,

Dr. Ir. Y. Aris Purwanto, M.Sc  
Chairman

# Study on the Use of Green Bean as Skim Milk Substitution in Yellow Pumpkin (*Cucurbita maxima*) Ice Cream

I Ketut Budaraga<sup>1\*</sup>, Rahmita<sup>1</sup>, Gusriati<sup>1</sup>, Leffy Hermalena<sup>1</sup>, and Williyana<sup>1</sup>

<sup>1</sup>Technology Studies Program Faculty of Agriculture, University of Ekasakti

Email: [ketut\\_budaraga@yahoo.com](mailto:ketut_budaraga@yahoo.com)/[budaraga1968@gmail.com](mailto:budaraga1968@gmail.com)\*

## Abstract

The purpose of this study were (1) to observe the effect of extracts of green beans as a substitute skim milk to the properties of the chemical, physical and sensory ice cream pumpkin produced, (2) determine the substitution optimal from the juice of green beans to the skim milk in ice cream making pumpkin order meet the quality standards that have been set. The design used in this study is completely randomized design (CRD) with 5 treatments and 3 repetitions. Data were analyzed by F test and treatment if F count larger than F table 5%, followed by a further test of Duncan's Multiple Range Test (DNMRT) at the 5% significance level. The treatment in this study is the substitution of green bean extract is as follows: (a) Treatment A = 0%); (b) Treatment B = 25%); (C) Treatment C = 50%); (D) Treatment D = 75%); (e) Treatment of E = 100%). The results showed that the substitution of green beans affect the chemical and physical properties, but does not influence the sensory properties of ice cream pumpkin. Total substitution optimal bean extract as a substitute skim milk in ice cream making pumpkin obtained in treatment D (25% skim milk and green beans 75%) with the level of acceptance of organoleptic and microbial content with the SNI, the protein quality characteristics is 3.0526% , 5.7970% fat content, total sugar 14.3442, 85.0000% Overrun and melt speed of 14.25 minutes.

**Keywords:** Ice cream, green beans, pumpkin, skim milk.

## 1. INTRODUCTION

Pumpkin is one of the agricultural commodity production is relatively abundant amount annually. Pumpkin easily found both in traditional markets and modern. Pumpkin production can reach 20-40 tons per hectare. Pumpkin plants aged 45-60 days usually start flowering plants. Ripe fruit can be harvested after the age of 100-140 days after planting (Sutarya, Grubben and Sutarno, 1995).

Pumpkin (*Cucurbita maxima*) has potential as a source of provitamin A plant-based form of  $\beta$ -carotene. The content of provitamin A in pumpkin of 767 mg/g material. In addition, pumpkin also contains vitamin C, fiber and carbohydrates are high enough (Gard-jito,2005). According to the Nutrition Directorate of the Ministry of Health (1996), that the pumpkin also contains 1.1% protein, 0.3% fat, 45 mg calcium, phosphorus 64 mg and 1.4 mg of iron per 100 g of material.

Kristianingsih study (2010) that the addition of 45% pumpkin flour and 55% of the brownies are the most preferred treatment

panelists and also contains betakaroten 1.2488 mg. Given the fairly complete nutritional content, the price is relatively cheap, and its utilization is still low, the pumpkin is a source of nutrition is very potential to be developed as an alternative diversification in manufacturing snack foods (snack) and one ice cream.

Ice cream is a frozen food product made through a combination of freezing process and agitation on the materials consisting of milk and dairy products, sweeteners, stabilizers, emulsifiers, as well as a flavor enhancer. The principle of making ice cream is forming an air cavity in a mixture of ice cream or Ice Cream Mix (ICM) in order to obtain the development of volume that makes the ice cream into a lighter, less dense, and has a soft texture (Padaga and Savitri, 2005).

Ice cream according to ISO (1995) is a kind of semi-solid foods made with flour by freezing the ice cream or from a mixture of milk, animal and vegetable fats, sugar, with or without other food ingredients and food additives are permitted. Variations in flavor

and presentation of ice cream increasingly diverse. Many ice cream vendors add other ingredients like choco chips, nuts, and fresh fruits, to mix or sprinkled on it. In addition to adding flavor, these materials can also improve the performance of the ice cream thus increasing consumer interest (Chan, 2008).

The ice cream was well loved by the people of all walks of life, from children and adults. In general, the ice cream does not contain vitamin A. In accordance with established quality standards, the nutritional composition of ice cream that is required in the form of protein and fat. Interest Extra pumpkin on making ice cream can make the ice cream is rich in plant-based sources of provitamin A in the form of  $\beta$ -carotene. Vitamin A and beta-carotene is very useful for healthy eyes and skin, immunity and reproduction. In addition, this nutrient has benefits as an antioxidant (Brotodjojo, 2010).

There are several factors that can affect the quality of ice cream, one of which is nonfat dry material is skim milk. Skim milk contains lactose, protein and so on. According Sugiono (1992), the materials that can be used as a source of milk solids in ice cream include fresh milk, skim milk, full cream milk powder or skim milk powder. Number of nonfat milk solids is inversely proportional to the amount of fat in maintaining the equilibrium properties of the mixture. Nonfat milk solids also determine the texture of ice cream as well as keeping the deviation properties. Currently, a protein derived from skim milk can be substituted / replaced from nuts one green beans. According Iswandari (2006) fresh green beans contains moisture 12.10%, ash content of 3.08%, 0.49% fat, protein, carbohydrates 21.78% and 62.39%.

The underlying reason why choose green bean extract in the manufacture of ice cream is because the green bean extract has a fairly high protein content and is rich in the amino acid lysine. The advantages of green bean extract than the skim milk is an extract of green beans contain no cholesterol at all. Besides green bean juice does not contain lactose, low-fat, cholesterol-free, highly nutritious and also contain isoflavones which are essential to health (Winarsi, 2004).

Research Pamungkasari (2008) on the use of soy milk as a substitute for cow's milk in the nature of sweet potato ice cream is 0%, 25%, 50%, 75% and 100%. In the soy milk substitutes 25% overall yield panelists favored

ice cream with a good overrun and the amount of fat, protein and total solids that meet SNI No.01-3713-1995. With this case the use of green bean juice to follow the research. Expected levels of protein from green bean extract can meet the standards of quality of the ice cream. The research objective is achieved are: (1) Determine the influence of green bean extract as a substitute skim milk to the properties of the chemical, physical and sensory pumpkin ice cream produced. (2). Knowing the optimal substitution of green bean juice to skim milk in ice cream making pumpkin in order to meet the quality standards that have been set.

## 2. METHOD

This research has been conducted at the Laboratory Agricultural Technology Faculty of Agriculture, University Ekasakti and laboratory Instrumentation Faculty of Agricultural Technology Center, University of Andalas Padang, West Sumatra in April and May 2016. The raw materials used are green beans and pumpkins were purchased from Pasar Raya Padang, West Sumatra. Additional materials used include coconut milk purchased from the highway, skim milk, whip cream brand Pondan, sugar, that - that brand Swallow Globe Brand, emulsifier (TBM), salt and water. Chemicals used in this analysis is concentrated sulfuric acid ( $H_2SO_4$ ), mercury oxide ( $HgO$ ), Potassium Sulfate ( $K_2SO_4$ ), a solution of sodium hydroxide sodium thiosulfate ( $Na_2SO_3$ ), a saturated solution of Boric Acid ( $H_3BO_3$ ), solution of Hydrochloric Acid ( $HCl$ ), the indicator methyl red, methyl blue indicator, the indicator phenolphthalein, stone boiling, water distillate, n-hexane, and media PCA.

Tools - a tool used for making ice cream is an analytical balance, blender, mixer, plastic containers, pots, spoons stirrer, stoves, knives, freezer brand Gea models AB-396-T-X and packaging plastic cup. The tools used for chemical analysis is a set of analytical tools protein levels, a set of acid hydrolysis soxhlet complete with pumpkin fat, filter paper and litmus paper, for analysis of the amount of sugar (calculated as sucrose) is a flask of 100 ml, Pipette drops, Erlenmeyer 500 ml, funnel, the size of a 50 ml pipette, measuring pipette 5 ml / 10 ml.

The design used in this study is completely randomized design (CRD) with 5 treatments and 3 repetitions. Data were analyzed by F test and treatment if F count larger than F table 5%, followed by a further test of Duncan's Multiple Range Test (DNMRT) at the 5% significance level (Hanafi, 1993). The treatment in this study is the substitution of green bean extract is as follows: a. Treatment A = 0%); b. Treatment B = 25%); c. Treatment C = 50%); d. Treatment D = 75%); e. Treatment E = 100%).The mathematical model of the design are:  $Y_{ij} = \mu + \tau_i + E_{ij}$ . Information:  $Y_{ij}$  = Observations on experimental unit substitution of skim milk with a green bean extract all replicates all i and j

**2.1 Materials Formulation**

Formulation is very important in the manufacture of ice cream, when an error in determining the formulation of the ice cream could be damaged and not preferred by consumers. The formulation as shown in Table 1.

Table 1. Formulation Materials

Materials	Treatment				
	A	B	C	D	E
Coconut milk (g)	60	60	60	60	60
Skimmed milk (g)	60	45	30	15	-
Green beans (g)	-	15	30	45	60
Sugar (g)	62,5	62,5	62,5	62,5	62,5
Whip cream (g)	25	25	25	25	25
Stabilizer (g)	1,5	1,5	1,5	1,5	1,5
Emulsifier (g)	3	3	3	3	3
Water (g)	225,5	225,5	225,5	225,5	225,5
Summer squash (g)	62,5	62,5	62,5	62,5	62,5

**2.2 Stages Research**

**2.2.1 Make Sari Green Beans (Violisia, et al., 2013)**

- a. Choosing green beans were good quality, (separate if there is gravel or other debris).

- b. Wash the green beans until they are clean.
- c. Green beans soak for ± 12 hours with hot water, in order to eliminate the taste and smell of rotten.
- d. After the green beans soaked, then washed while squeezing so husk peeled off.
- e. Green beans drained and then milled / blander with hot water added to taste until smooth.
- f. The green beans were already finished milled / blander inserted into the container and added boiled water (ratio 1: 3).
- g. The green beans that have been given boiled water and then filtered with gauze pads, gauze pads used most meetings, so that the dregs of green beans was not lost on the filter and green bean juice obtained (Scheme green bean juice-making procedures in Annex 3).

**2.2.2 Processing Summer Squash (Aristika, et al., 2013)**

- a. Choose a pumpkin that is aged 4-5 months
- b. Peeling the pumpkin skin.
- c. Furthermore pumpkin pulp is washed with water to remove feces.
- d. Pumpkin already clean cut.
- e. Then steamed in a steamer pan for 15 minutes until soft. Previous heat water in a saucepan until boiling steam.
- f. Once steamed pumpkin pulp in a blender with water added to taste until smooth

**2.2.3 Make Ice Cream (Masykuri, et al., 2009)**

- a. All materials incorporated into the skillet and stirred using a mixer.
- b. The mixture was heated, pasteurized at a temperature of 800 C for 25 seconds.
- c. Mixer dough subs 10 minutes.
- d. Perform cooling using freezer at a temperature of 40 C for 4 hours.
- e. Mixer birthday ice cream for 10 minutes.
- f. Freeze in freezer at -50 C for 30 minutes.
- g. Perform homogenization back in order to get a soft ice cream by using a mixer for 10 minutes.
- h. Packaged use containers.
- i. Freeze at a temperature of -200 C for 4 hours.

**2.2.4 Parameter Observation:**

- a. Chemical analysis: a. Content protein micro kjeldahl methods (AOAC, 1995); b. Content Fat Hydrolysis Method (Weibull) (SNI 01-2891-1992);c. Determination Sugar Levels sakarosa Luff method Schrool (SNI 01-2891-1992):
- b. Analysis Microbiology: Testing Total Plate Count (TPC) (SNI 01-2332.03-2006);
- c. Analysis Physical Properties: Analysis overrun Ice Cream (Arbuckle, 1996) and Test Sensory (SNI 01-2346-2006)

### 3. RESULTS AND DISCUSSION

#### Analysis of Chemical Properties Yellow Pumpkin Ice Cream

##### 3.1 Protein Levels

Results of analysis of variance showed that the substitution of green beans provides a significantly different effect ( $P < 0,05$ ) the protein content of pumpkin ice cream produced. The average value of the protein content in ice cream of pumpkin can be seen in Table 2.

Table 2. Average protein content of Yellow Pumpkin Ice Cream Substitutes Sari Green Beans

Treatment (Sari substitution Green Beans)	Protein (%)
E (100%)	2,4889 a
D (75%)	3,0526 b
C (50%)	3,8744 c
B (25%)	4,3907 d
A (0%)	4,5430 d
KK	2,2807%

Note: The figures in the same column followed by the same lowercase not significant according DNMRT test at 5%

Table 2 shows that the treatment E significantly different from the D, C, B, and A. Treatment D significantly different with treatment C, B and A. Treatment C significantly different with treatment B and A. Treatment B was not significantly different with treatment A. Value the highest protein from pumpkin ice cream are on treatment A

(0% green beans) amounted to 4.5430% and the lowest in treatment E (100% green beans) amounted to 2.4889%.

The decrease in protein content in green pea ice cream because it has a protein content of 22.90%, while skim milk has the highest protein content of 36% (Winarno, 2004). In addition, the use of green bean juice in ice cream making this causes the protein was also reduced because of the dilution process. This is consistent with studies Failisnur (2013), that the use of powdered green beans has a protein content of about 4.84% on ice cream bengkoang 6:29 while the use of soybean powder and soy milk liquid% only 2:24%.

The protein content in the pumpkin ice cream product is in compliance with statutes based on the Indonesian National Standard (SNI) of at least 2.7%, except in the treatment of 100% green beans. Of the value of the protein content of pumpkin ice cream with green bean juice substitution 0%, 25%, 50% and 75% of the ice cream are good quality in terms of protein content.

##### 3.2 Fat Content

Results of analysis of variance showed that the substitution of green beans provides a significantly different effect ( $P < 0,05$ ) the fat content of ice cream produced pumpkins. The average value of the levels of fat in the ice cream of pumpkin can be seen in Table 3.

Table 3. Mean Fat Content Substitution Yellow Pumpkin Ice Cream Sari Green Beans

Treatment (Sari substitution Green Beans)	Fat (%)
A (0%)	5,5223 a
B (25%)	5,5394 a
C (50%)	5,6884 b
D (75%)	5,7970 bc
E (100%)	5,8920 c
KK	1,3843%

Note: The figures in the same column followed by the same lowercase not significant according DNMRT test at 5%

Table 3 shows that no significant

treatment A with treatment B and significantly different with treatment C, D and E. In the treatment of B was significantly different from treatment C, D and E. In the treatment had no significant C with D and E significantly different treatments. in the treatment had no significant D with treatment E. Values highest content of pumpkin ice cream are on treatment E (100% green beans) amounted to 5.8920% and the lowest for the treatment of A (0% green beans) that is equal to 5,5223%. Sources of fat in ice cream are the pumpkin in coconut milk. The coconut milk is used in coconut milk and a half old. Coconut-aged fat 15% (Nutrition Directorate of the Ministry of Health, 1981).

The increasing substitution of green bean juice causes the fat content also increased. This is because the green beans also contain fat. In raw green beans contains 1.30% fat. Fat can increase the thickness of ice cream which will then affect the texture of ice cream produced. With increasing levels of fat in ice cream results in increased development of the volume of ice cream. According to research Triyono, et al (2010) that the green bean milk by adding water 1: 6 fats is 0.30%.

Bennion and Hughes (1975), the mixing process results in the components of the fat spread and form a network in the surrounding air and water binding. The mixing process is done at a low temperature (below 100C) to enable the crystallization of fat. Fat crystallization process is very important to form a fat globule (glubula fat) into three-dimensional structures that can trap water and air, resulting in the development of the volume of ice cream. Fat levels in the pumpkin ice cream product is in compliance with Indonesian National Standard (SNI) of at least 5.0%.

### 3.3 Total Sugar

Results of analysis of variance showed that the substitution of green beans provides a significantly different effect ( $P < 0,05$ ) against sugar pumpkin ice cream produced. The average value of total sugar in ice cream of pumpkin can be seen in Table 4.

Table 4 shows that treatment A is not significantly different with treatment B and C but significantly different with treatment D and E. Treatment B was not significantly different and significantly different treatment

C with treatment D and E. C treatment was not significantly different, but different treatment D real with E. Treatment D treatment did not differ significantly with treatment E.

Table 4. Average Total Sugar Ice Cream Pumpkin Sari Substitution Yellow Green Beans

Treatment (Sari substitution Green Beans)	Total Sugar (%)
A (0%)	13,8755 a
B (25%)	13,9313 a
C (50%)	14,2208 ab
D (75%)	14,3442 bc
E (100%)	14,6207 c
KK	1,2968%

Note: The figures in the same column followed by the same lowercase not significant according DNMR test at 5%

The total value of the highest sugar pumpkin ice cream is on treatment E (100% green beans) of 14.6207% and the lowest for the treatment of A (0% green beans) that is equal to 13.8755%. An increase in the total ice-cream icing on pumpkins because in the skim milk contains lactose 5% and green beans containing glucose 24.58%. Glucose levels in the larger green beans because the green beans are more easily digestible carbohydrates into glucose. Green beans carbohydrate levels ranged between 62.00-62.90% (Adnan, 1984). Sugar not only serves as a conduit sweet taste in ice cream, but also lowers the freezing point of the dough so that the dough is not too fast freeze when processed. The goal is that air enters the batter can be more so that the texture of the ice cream becomes softer. Pure water freezes at a temperature of 0 °C, in the presence of solutes such as sugar are added then the freezing point of the solution is not the same as 0 °C, but will fall below 0 °C. The level of sugar calculated as sucrose on pumpkin ice cream product is in compliance with statutes based Indonesian National standard (SNI) of at least 8.0%.

### 3.4 Analysis Microbiology (Total Plate Count / TPC)

Observation of the total microbial testing conducted on the 2nd day. Testing was conducted on five samples of ice cream of pumpkin which can be seen in Table 5.

Table 5. Test Results Total Microbial Ice Cream Pumpkin Sari Substitution Yellow Green Beans

Treatment (Sari substitution Green Beans)	Total Mikroba (CFU/g)
A ( 0% )	2,5 x 10 <sup>5</sup>
B ( 25% )	2.2 x 10 <sup>5</sup>
C ( 50% )	1.5 x 10 <sup>5</sup>
D ( 75% )	1.2 x 10 <sup>5</sup>
E ( 100% )	1.0 x 10 <sup>5</sup>

From Table 5 it can be seen that the total number of microbes on the ice cream decreased. This is because the use of green bean juice and coconut milk. Reduced total microbes in ice cream, it is suspected due to the reduced value of protein in ice cream. Conditions good nutrition at the ice cream also provide good opportunities for growth of microbes such as bacteria, molds, and yeasts, for the growth of microbes also need food, especially protein (Punc and Olson, 1984 cit Abubakar et al, 2000). Making the green bean juice in this study using water that has been cooked. Besides green beans and coconut milk is pasteurized at a temperature of 800 C. This is consistent with studies Ismail (2012), that the vegetable milk from soybeans is not found E. coli and coliform bacteria.

### 3.5 Analysis of Physical Properties

#### 3.5.1 Analysis Overrun Ice cream

Results of analysis of variance showed that the substitution of green beans provides a significantly different effect (P <0,05) to overrun pumpkin ice cream produced. The average value Overrun pumpkin ice cream can be seen in Table 6.

Table 6 shows that treatment A is not significantly different with treatment B and significantly different with treatment C, D and E. Treatment B significantly different with treatment C, D and E. C treatment did not

differ significantly with treatment D and E. significantly different treatments D treatment did not differ significantly by treatment with E. Rated highest overrun of the ice cream of pumpkin are in treatment E (100% green beans) by 90% and the lowest for the treatment of A (0% green beans) that is equal to 66.6667%.

Table 6. Test Results overrun Ice Cream Pumpkin Sari Substitution Yellow Green Beans

Treatment (Sari substitution Green Beans)	Overrun (%)
A (0%)	66.6667 a
B (25%)	73.3333 a
C (50%)	81.6667 b
D (75%)	85.0000 bc
E (100%)	90.0000 c
KK	4.8819%

Note: The figures in the same column followed by the same lowercase not significant according DNMR test at 5%

The increasing substitution of green beans cause a rise in the value of the overrun, this is due to increased fat content in ice cream. High fat content will lead to the development of the volume of ice cream. besides stirring repeatedly in the manufacture of ice cream can make the inlet air to the dough causing increased value overrun.

Cremers (1954), during the freezing process, the fat particles will be concentrated on the surface of the airspaces. This is why fat can provide a soft texture, good overrun and satisfying flavor in ice cream. This is also evidenced in the research Purnamayati (2008) that the substitution of avocado 0%, 20%, 40%, 60% and 80% in the manufacture of ice cream shows an increase in the value of the overrun on each treatment. In the treatment of 80% of an avocado can reach a value of 93.49% overrun.

Arbuckle (1986), overrun ice cream is good quality ranged between 80-100%. Overrun ice cream with green beans substitution of 50%, 75% and 100%

compliance with the standards overrun ice cream. Overrun ice cream with green beans substitution 0% and 25% produced is under the range so that it can be said that the ice cream is less able to provide a good overrun.

### 3.5.2 Melt Speed

Results of analysis of variance showed that the substitution of green beans provides a significantly different effect ( $P < 0,05$ ) to the speed of melting ice cream pumpkin generated. The average value of the speed of melting ice cream pumpkin can be seen in Table 7.

Table 7. Average Length of Melting Ice Cream Pumpkin Sari Substitution Yellow Green Beans

Treatment (Sari substitution Green Beans)	Melting time (Minute)
E (100%)	10.50 a
D (75%)	14.25 b
C (50%)	16.04 c
B (25%)	17.23 d
A (0%)	19.45 e
KK	0.2041 %

Note: The figures in the same column followed by the same lowercase not significant according DNMRT test at 5%

Table 7 shows that the treatment E was significantly different from treatment D, C, B, and A. Treatment D significantly different with treatment C, B and A. At C treatment significantly different with treatment B and A. Treatment B significantly different from A. the resistance level is highest in the treatment of A (0% green beans) for 19.45 minutes while resistance is lowest for the treatment E (100% green beans) for 10.50 minutes.

The rapid melting of ice cream due to the high value of overrun in ice cream making ice cream melts quickly. Besides ice cream resistance is getting down with the increasing substitution of green bean juice, this is because the texture of green bean extract more light and delicate that the water holding capacity is lower so the ice cream melts quickly. This is according to research Failisnur

(2013) that the ice cream melt yam fastest among other treatments is the use of liquid soy milk was 5.6 minutes. It influences by finer texture soy milk so that its water holding capacity is lower. Speed melted ice cream is inversely proportional to the percentage overrun. Ice cream quickly melts less preferred because the ice cream will melt quickly once served. Old ice cream melts at room temperature is also less preferable because of the shape of ice cream remains solid so presented that gives the impression too many solids are used (Padaga and Savitri, 2005). According to Flores, et al (1992), that the ice cream was good resistance melt ranged from 10-15 minutes. All treatments at the pumpkin ice cream meets the standards and melting ice cream was good.

### 3.6 Sensory analysis The Yellow Pumpkin Ice Cream

#### 3.6.1 Color

From the analysis of variance showed that the substitution effect of green beans was not significantly different ( $P < 0,05$ ) to the colors of pumpkin ice cream produced, so the test was discontinued. The average value of the color preference level pumpkin ice cream can be seen in Table 8.

Table 8. Average Color Yellow Pumpkin Ice Cream Substitutes Sari Green Beans

Treatment (Sari substitution Green Beans)	Color
E (100%)	5.0555
D (75%)	5.0889
A (0%)	5.1222
B (25%)	5.1889
C (50%)	5.3000
KK	3.0692 %

Note : 1) The figures in the same lane no significant according DNMRT test at 5%. 2) Description of color values include 1 = Extremely dislike 2 = Strongly dislike 3 = No 4 = Somewhat Like 5 = Likes 6 = Very Like 7 = Extremely Like

The test results of sensory panelists conducted against 15 types of samples were



obtained an average value of color on ice pumpkins ranged between 5.0555-5.3000 (love). Average panelists liked the color of the ice cream. In addition, the analysis results showed that of the five treatment of different pumpkin ice cream is not statistically significant at the 5% level.

The color produced on pumpkin ice cream is not much different. The different concentrations of green beans do not give effect to the color of pumpkin ice cream because the color is affected by the content of carotene in pumpkin kuning. Beta Beta carotene is a yellow-orange color pigments which, if ingested in our bodies will be transformed into vitamin A. The function of vitamin A and beta among other useful carotene for healthy eyes and skin (Brotodjojo, 2010).

**3.6.2 Aroma**

Results of analysis of variance showed that the substitution of green beans provides a significantly different effect ( $P < 0,05$ ) to the speed of melting ice cream pumpkin generated. The average value of the level of preference the scent of pumpkin ice cream can be seen in Table 9.

Table 9. Average Aroma Yellow Pumpkin Ice Cream

Treatment (Sari substitution Green Beans)	Aroma
E (0% : 100%)	4.6667 a
D (25% : 75%)	4.9889 b
B (75% : 100%)	5.1778 b
C (50% : 50%)	5.2000 b
A (100% : 0%)	5.2000 b
KK	2.6592%

Note : 1) The figures in the same column followed by the same lowercase not significant according DNMRT test at 5%. 2) Description of color values include 1 = Extremely dislike 2 = Strongly dislike 3 = Not Like 4 = Somewhat Like 5 = Likes 6 = Very Like 7 = Extremely Like

Table 9 shows that the treatment E was significantly different from treatment D, B, C and A. Treatment D did not differ significantly

with treatment B, C and A. Treatment B was not significantly different from C and C A. The treatment was not significantly different with treatment A. Rated highest aroma of pumpkin ice cream are on treatment A (100% green beans) amounted to 5,200 and the lowest in treatment E (100% green beans) that is equal to 4.6667.

E in fact different treatment to other treatments because the treatment of the use of 100% green beans so that the ice cream had an unpleasant aroma. Unpleasant aromas appear when do the grinding treatment, the occurrence of unpleasant odor is due to the action of the enzyme lipoxygenase, which is still working actively, the enzyme is thought to react with fat during the cell walls break when grinding. The hot water used in the immersion process and pasteurization are not able to deactivate the lipoxygenase enzyme overall. The results of these reactions produce at least eight volatile compounds (volatile), which compounds that generate the most unpleasant odor is ethyl phenyl ketone. Such compounds in low concentration can already cause unpleasant odor (Koswara, 1995). This is according to research Pamungkasari (2008) that the increasing use of soybeans in the manufacture of ice cream of sweet potato caused a decline in A panelist on flavor ice cream.

**3.6.3. Texture**

From the analysis of variance showed that the substitution of green beans provides a significantly different effect ( $P < 0,05$ ) on the texture of ice cream produced pumpkins. The average value of preference level pumpkin ice cream texture can be seen in Table 10.

Table 10 shows that the treatment was not significantly different E D treatment and significantly different with treatment C, B and A. At D treatment was not significantly different and significantly different treatment C with treatment A. Treatment B and C did not differ significantly with treatment B and A. treatment B was not significantly different with treatment A. Rated highest texture of pumpkin ice cream are on treatment A (100% green beans) amounted to 5,300 and the lowest in treatment E (100% green beans) that is equal to 4.5333.

The greater the substitution of green bean juice will reduce the level of acceptance of the

panelists. This is because the higher the substitution of green bean extract the texture will be softer. This is because with increasing substitution of green bean extract causes increased fat content and overrun large. However, with a large overrun caused the ice cream will melt faster.

Table 10. Average Texture Yellow Pumpkin Ice Cream

Treatment (Sari substitution Green Beans)	Texture
E (0% : 100%)	4.5333 a
D (25% : 75%)	4.7111 ab
C (50% : 50%)	5.1444 bc
B (75% : 25%)	5.2667 c
A (100% :0%)	5.3000 c
KK	4.9889 %

Note : 1) The figures in the same column followed by the same lowercase not significant according DNMRT test at 5%. 2) Description of color values include 1 = Extremely dislike 2 = Strongly dislike 3 = Not Like 4 = Somewhat Like 5 = Likes 6 = Very Like 7 = Extremely Like

Kartika, et al (1988), mentions that the texture associated with the fat in food. Fat can increase the thickness of ice cream which will then affect the texture of ice cream produced.

### 3.6.4. Taste

From the analysis of variance showed that the substitution of green beans provides a significantly different effect ( $P < 0,05$ ) to pumpkin ice cream flavors are produced. The average value of preference level pumpkin ice cream flavors is presented in Table 11.

Table 11 shows that the treatment was not significantly different E treatment D, C and B and significantly different with treatment A. Treatment D did not differ significantly with treatment C and B and significantly different with treatment A. Treatment C was not significantly different with treatment B and A. treatment B was not significantly different with treatment A. Rated highest flavor of pumpkin ice cream are on treatment A (100% green beans) at 5.5445 and the lowest in treatment E (100% green beans) that is equal

to 4.8889.

Table 11. Average Yellow Pumpkin Ice Cream Flavor

Treatment (Sari substitution Green Beans)	Taste
E (0% : 100%)	4.8889 a
D (25% : 75%)	4.9111 a
C (50% : 50%)	5.1667 ab
B (75% : 25%)	5.2556 ab
A (100% : 0%)	5.5445 b
KK	4.0245%

Note : 1) The figures in the same column followed by the same lowercase not significant according DNMRT test at 5% 2) Description of color values include 1 = Extremely dislike 2 = Strongly dislike 3 = No 4 = Somewhat Like 5 = Likes 6 = Very Likes 7 = Extremely Like

A decrease in the level of panelists against the ice cream because of the increasing number of substitutions green bean extract is added will further increase the intensity characteristic flavor of green beans (beany flavor). The cause of the unpleasant taste is a compound containing kabanil groups that are volatile, such as n-hexanal. These compounds are formed as a result of oxidation of unsaturated fatty acids contained in green beans due to the activity of the enzyme lipoxygenase. This enzyme is active when the green beans broke on the shelling and grinding process due to contact with air (oxygen). In addition, the green bean seeds also are the compounds cause a bitter taste and sepet originating from the glycoside and chalky taste caused by isoflavone and aglycone-aglikonnya (Cahyono, B., 2010). Fresh green beans contain isoflavones 70.74 mg / 100 g (bk) (Iswandri, 2006).

### CONCLUSIONS

1. Substitution green beans affect the chemical and physical properties, but does not affect the sensory properties of ice cream pumpkin.

2. The number of substitution optimal bean extract as a substitute skim milk in ice cream making pumpkin obtained in treatment D (25% skim milk and green beans 75%) with the level of acceptance of organoleptic and microbial content with the SNI, the quality characteristics are protein 3, 0526%, 5.7970% fat content, total sugar 14.3442, 85.0000% Overrun and melt speed of 14.25 minutes.

## SUGGESTION

1. The aroma and flavor resulting from the substitution of pumpkin ice cream green bean juice to skim milk lowers the level of preference panelists. To improve the level of preference of panelists, can be added Flavor (flavor) so unpleasant of green beans can be reduced.
2. It is recommended for people and businesses in order to develop ice cream ice cream products pumpkin with green bean juice substitution of 75% so that the ice cream produced meet quality standards have been set and also ice cream containing vitamin A in addition to the use of green beans can also lower production cost.
3. Further research on the techniques and the proper batter stirring time required to obtain an ice cream that has a texture and mouth feel better.
4. The combination of types of emulsifiers and stabilizers in ice cream pumpkin also need to be developed in order to produce higher quality ice cream.

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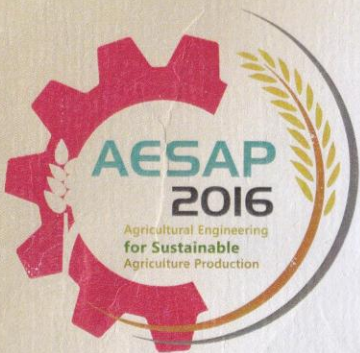
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