Research Article
Home Page Journal: ejournal.umm.ac.id/index.php/fths/about
DOI.
https://doi.org/10.22219/fths.v3i2
Received: April 2020
Accepted: Mei 2020
Available online: July 2020

Physico-Chemical Characteristics of Ice Cream Made from Coconut Milk Cream and Kidney Nut Puree

Sri Winarsih [1]*, Nilam Sitaresmi Cahyono [1] , Sukardi[1], Devi Dwi Siskawardani[1]

[1]Department of Food Technology, Faculty of Agriculture-Animal Science, University of Muhammadiyah Malang, Malang, Indonesia

*Corresponding author email: sriwinarsih@umm.ac.id

Abstract. Coconut milk cream is a vegetable fat to replace animal fat in making ice cream. coconut milk cream not having a fishy odor and is rich antioxidants. While kidney nut have the potential as an emulsifier and also rich antioxidants. the purpose of this study was to obtain an optimum formulation of coconut milk and kidney beans to produce ice cream with good characteristics. The study used a simple randomized block design that was repeated three times. The treatment are the proportion of coconut milk cream and kidney nut puree. the results of this study showed that ice cream have moisture 65.79 to 72.61%, 48.99% antioxidant activity, fat content was in accordance with Indonesian national standards (25.32%),overrun value (36.03%) and melting time (8.72 minutes).
Keyword : antioxidant, fat, overrun

INTRODUCTION

Ice cream is a semi-solid food product made by freezing ice cream flour or a mixture of milk, animal fat or vegetable fat, sugar, and with or without other food ingredients and food ingredients that are permitted (SNI 01-3713-1995). Ice cream is in great demand by the people of Indonesia, both children, adolescents and adults. Based on statistical data the consumption of ice cream in 2015 reached 3.25 small bowls per capita per year. Ice cream sold in Indonesia is based on milk and fat.

In the modern industrial commercial ice cream is made from 10-16% milk fat, 9-12 %solid non-fat, 12-16% sugar, 0.2-0.5% stabilizer and emulsifier, 55-64% milk or other material water based. High fat content in ice cream formulations is a consideration of consumers who have concerns about health effects to limit their consumption of ice cream. According to Huth et al (2012) consuming fresh milk (whole milk) can increase cholesterol and be at risk for cardiovascular disease. This is reinforced by Mattar's opinion (2012) that cow's milk-based ice cream cannot be consumed by people who are unable to digest lactose.Then it is necessary to develop ice cream products made from coconut milk and kidney nut puree to produce functional food. Coconut milk also contains saturated fatty acids that are easy to metabolize in the body also kidney nuts are rich in fiber, protein,

carbohydrates and low in fat. Kidney Nuts also contain vitamins and minerals and bioactive components, such as oligosaccharides, saponins, pitat acids and polyphenol components (Kalogeropoulos et al., 2010).

C.I. Teixeira-Guedes et al (2019) show that boiled kidney beans contain a total phenol of 1.6 mg GAEq g-1, total flavonoids 0.81 mg Ceq g-which acts as an antioxidant. So far there has not been much information about the formulation of coconut milk and kidney beans in making ice cream, so this study can provide information about the effect of formulations on the characteristics of ice cream.

MATERIAL AND METHODS

Material

The material used in the study was red beans, old coconuts marked with dark brown coconut shell, bought from the traditional markets of Malang city. material used for the analysis of 2,2–difenil–1–pikrilhidrazil (DPPH) purchased from SIGMA, ethanol, petroleum ether pro analysis.

Equipment

The equipment used in the study was ice cream maker, Shimadzu spectrophotometer, centrifuges, analytical scales, oven and freezer

Coconut milk cream preparation

Selected old coconut which is marked by the color of the coconut shell which is dark brown. Coconut is cleaned and shredded, then added with water in a ratio of 1: 1,5. Then the coconut milk is filtered using a filter cloth. Coconut milk is stored in the refrigerator for one hour to form coconut milk cream. Separate whey and cream from coconut milk.

Kidney Nut Puree Preparation

Kidney nuts are washed then soaked overnight, and then boil for 10 minutes. Kindey nut are cooled, then crushed with the addition of water in a ratio of 1: 0.5. this product called as puree. kidney nuts puree is stored in the refrigerator before it is substituted in the ice cream mix. Ice cream mix formula showed at Table 1.

Tabel 1. Formulation of Coconut milk cream

component	Formula					
	1	2	3	4	5	6
Coconut milk creams (g)	45	45	45	90	90	90
Kidney nuts puree (g)	30	60	90	30	60	90
Sugar (g)	45	45	45	45	45	45
CMC (g)	0.6	0.6	0.6	0.6	0.6	0.6
Water (g)	179.4	149.4	119.4	134.4	104.4	74.4

Ice Cream Making Procedure

All ingredients are mixed. Pasteurization for 15 minutes at 80°C, then aging overnight at 4°C, then do the foaming and stirring using ICM (Ice Cream Maker) for ± 35 minutes, then freeze at -4°C for 24 hours. Ice cream is put in a cup and stored in the freezer.

Research Parameter

The ice cream has been analyzed for water content (AOAC, 2000), fat (Sudarmaji, 2007), overrun (Whelan et, 2008), meltdown (Masyukri, 2012), DPPH radical scavenging assay (Molyneux,, 2004).

Research Method and Data Analysis

This research used a simple randomized design, repeated 3 times. Data were analyzed using ANOVA and a 5% LSD test if the treatment had a significant effect.

RESULT AND DISCUSSION

Moisture content

Moisture of Ice cream decreased by increasing the addition of coconut milk cream and kidney nuts puree, which ranged from 65.79 to 72.61% (showed figure 1). Ice cream with coconut cream has a moisture content of 64.9% (Corrradini, et al., 2014). Water in the ice cream mixture is used to dissolve non-fat components, which are sugar, skim and stabilizer. water also have functions to form crystals but if that is too high level will give an icy taste and affect consumer acceptance.

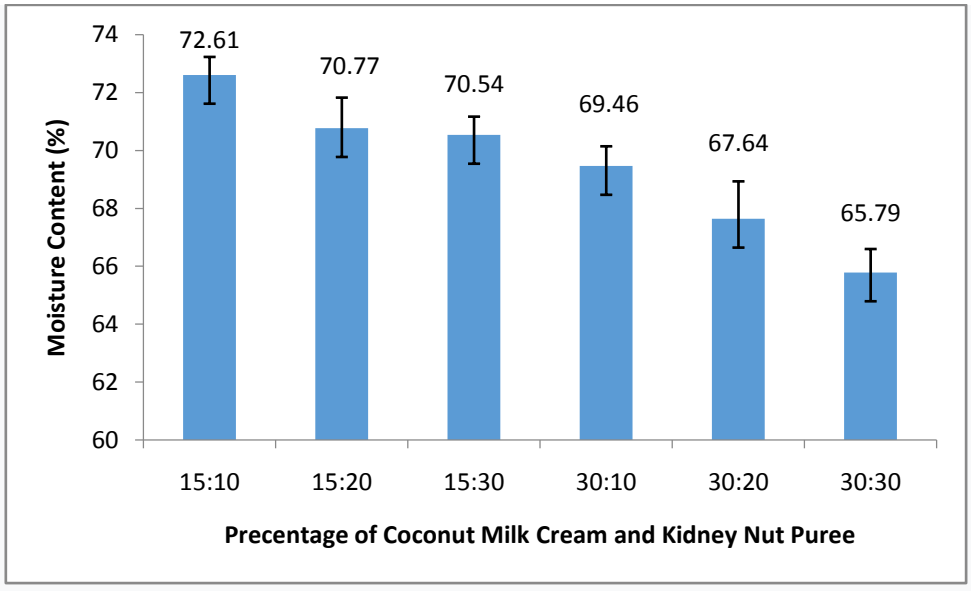

Figure 1. water content of ice cream

High concentration of Kidney nut puree produce low water content of ice cream. Protein in kidney nut puree will bind free water in the ice cream mixture.

Fat Content

The level of ice cream fat increases with increasing amounts of coconut milk cream and red bean puree. Fat content ranges between 17.31-25.32%. The amount of fat in ice cream comes from coconut milk cream. Coconut milk cream used for the main ingredient has a fat content of 35.34%. The results of other studies showed that coconut milk extracted first contained fat at 5.8% with dominant fatty acid lauric acid at 50.1%(Nadeeshani, et al., 2015).

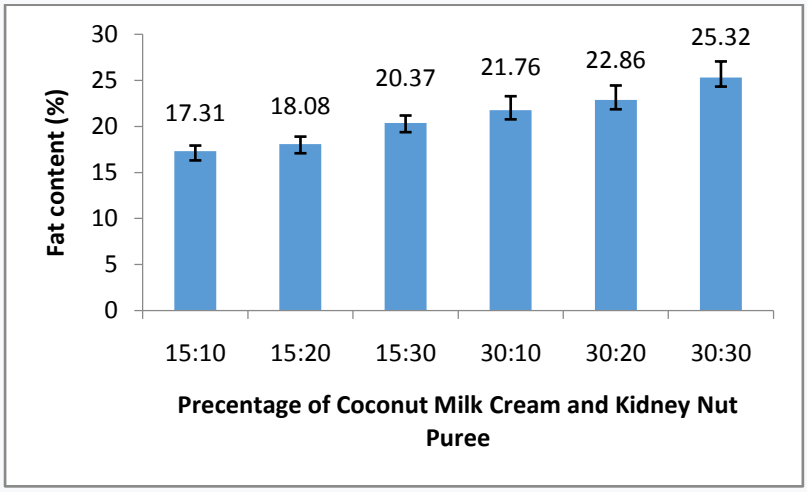

Figure 2. Fat Content of Ice Cream

Based on fat content showed that ice cream coconut milk and kidney nut based have good quality, according to Padaga (2005) standard quality ice cream contains 10-12% fat. Function of fat in ice cream are to form a soft structure , increase viscosity, retain air in a foam system, improve taste and flavor.

Overrun

Overrun is a parameter used to measure the level of development of ice cream mix during crystallization, this is due to the trapping of air in ice crystals.The air trapped in the crystallized ice cream affects to texture, meltdown, and hardness of the ice cream. Based on figure 3 showed that ranged overrun value 21.94 - 36.03%. good quality ice cream has a overrun 70% -80% (Padaga, 2005).

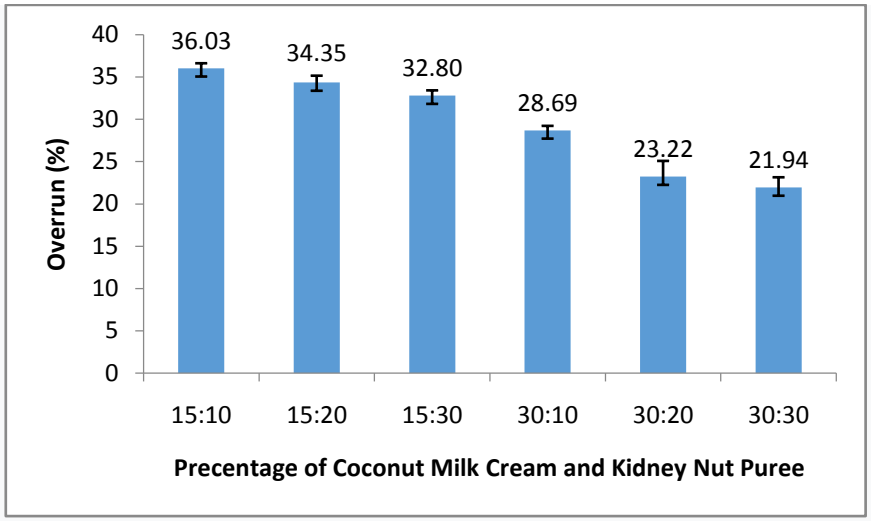

Figure 3. Overrun of Ice Cream

Increased concentration of coconut milk cream and kidney puree have an impact on decreasing the overrun value. both of these ingredients will increase the viscosity of the ice cream mix.. when the viscosity of ice cream increase, air difficult enter into the crystallized ice cream mixture.

DPPH radical scavenging assay

Figure 4 showed that addition of coconut milk cream and kidney nut puree had positive correlation with antioxidant activity. coconut milk cream and kidney nut puree contains polyphenol and flavonoid(Teixeira-Guedes et al, 2019. Coconut milk showed antioxidant activity based on FRAP and ORAC analysis (Ngampeerapong, *et al*, 2019).. The higher concentration of coconut milk cream and kidney nut puree shows an increase in antioxidants activity.

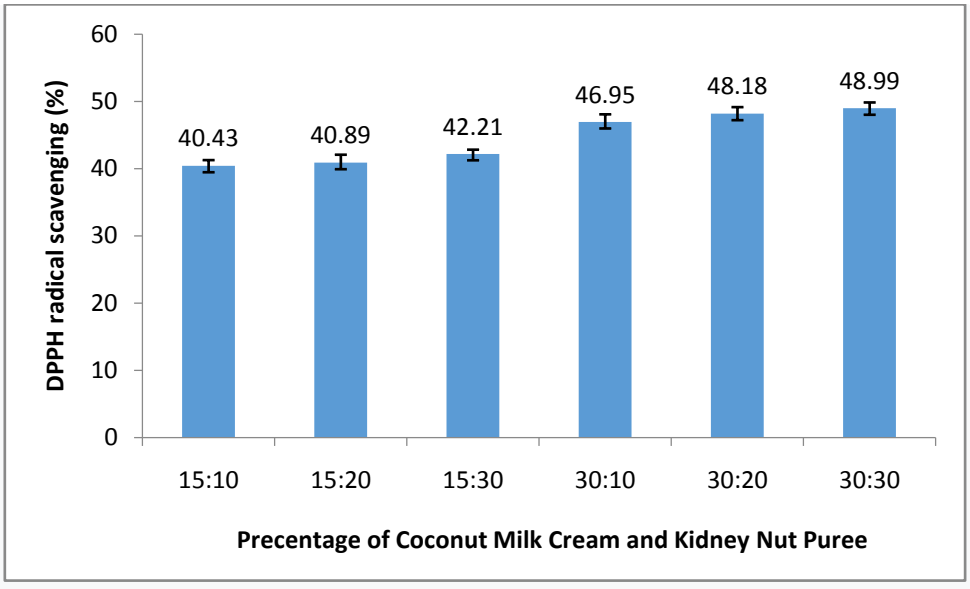

Figure 4. Antioxidant activity based on DPPH radical scavenging assay

Antioxidant activity of ice cream ranges from 40, 43-48,99%, it is influenced by the omposition of raw materials.the antioxidant activity of coconut milk 58.17% and kidney nuts puree 72.00%. A compound has antioxidant activity if the compound is able to donate its electron atoms to bind to DPPH which is characterized by the loss of purple to pale yellow (Molyneux, 2004)

Melting Time

Melting time is related to the size of ice crystals, total solids, size of fat particles and amount of fat in ice cream. the higher amount of solids will increase viscosity and decrease meltdown capacity (Clarke, 2004). The result showed at Figure 5.

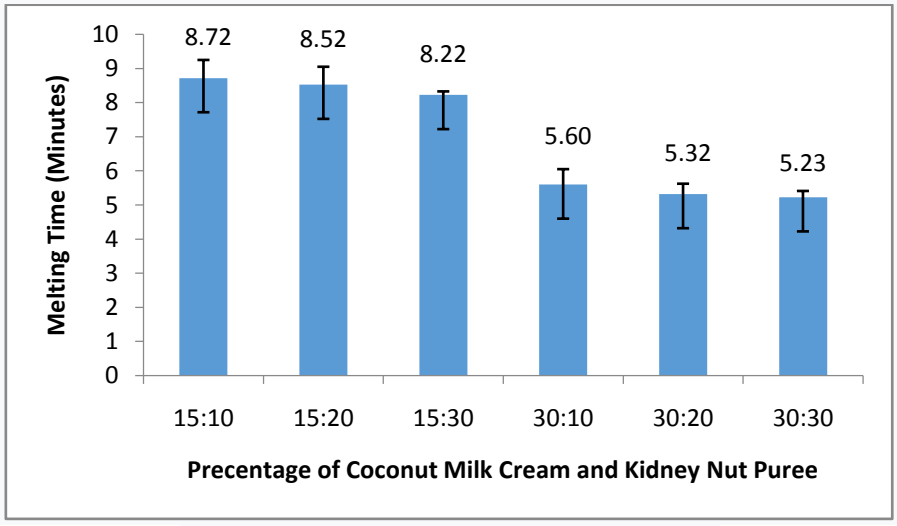

Figure 5. Melting Time of Ice Cream

Increasing concentration coconut milk cream and kidney nut puree will increase total solid and viscosity also its decrease melting time (Clarke, 2004). The higher the total solids can be reduce the freezing point of ice cream mix, that it causes the amount of free water trapped more and less mobility. The increase in the amount of free water trapped will result in a time of melting ice cream that decreases.Good quality ice cream has a melting time of 10-15 minutes at room temperature (Akesowan, 2008).

CONCLUSION

The results of this study showed that ice cream have have moisture 65.79 to 72.61%, 48,99% antioxidant activity, fat content was in accordance with Indonesian national standards (Standar Nasional Indonesia) (25,32%),overrun value (36,03%) and melting time (8,72 minutes). Formulation of ice cream still needed to be improved.

REFERENCES

Akesowon, A. 2008. *Effect of cobined stabilizer sontaining konjac flour and K-carrageenan on ice cream*. AU Journal of Thailnad.12 (2): 81-85

AOAC International. 2000. *Official methods of analysis of AOAC international. (17 ed)*. Gaithersburg, MD.USA:Association of Analytical Communities.

Badan Standarisasi Nasional. 1995. *SNI 01-3713-1995.Es Krim*. Badan Standarisasi Nasional. Jakarta

Catarina I., T. Guedes, D. Oppolzer, A.I. Barros, C. P. Wilson. 2019. *Impact of cooking method on phenolic composition and antioxidant potential of four varieties of Phaseolus vulgaris* L. *and Glycine max* L. LWT - Food Science and Technology 103 .238–246

Clarke, C. (2004). *Ice cream ingredients. In the science of ice cream (pp. 38e57)*. Cambridge: Royal Society of Chemistry Publishing

Corradini, S. A. S., G. S. Madrona, J. V. Visentainer, E. G. Bonafe, C. B. Carvalho, P. M. Roche, I. N. Prado. 2014 .*Sensorial and fatty acid profile of ice cream manufactured with milk of crossbred cows fed palm oil and coconut fat*. J. Dairy Sci. 97 No 11 :6745–6753

Kalogeropoulos, N., Chiou, A., Ioannou, M., Karathanos, V. T., Hassapidou, M., & Andrikopoulos, N. K.. 2010. *Nutritional evaluation and bioactive microconstituents (phytosterols, tocopherols, polyphenols, triterpenic acids) in cooked dry legumes usually consumed in the Mediterranean countries*. Food Chemistry, 121(3), 682–690.

Masykuri, Nurwantoro dan R.A. Wibawa. 2009. *Pengaruh Penggunaan Karagenan sebagai penstabil terhadap kondisi fisik dan tingkat kesukaan pada es krim.* Seminar Kebangkitan Peternaka. Semarang.

Mattar, R., de Campos Mazo, D.F., Carrilho, F.J. 2012. *Lactose intolerance : diagnosis genetic, and cinical factors*. Clinical and experimental gastroenterology,5, 113-121.

Molyneux, P., 2004. *The Use of The Stable Free Radical Diphenylpicryl-hydrazyl (DPPH) for Estimating Antioxidant Activity*. Songklanakarin J. Sci. Technol. , 26(2), 211-21.

Nadeeshani, R., U. N. Wijayaratna , W. C. Prasadani , S. Ekanayake , K. N. Seneviratne , N. Jayathilaka.2015. *Comparison of the Basic Nutritional Characteristics of the First Extract and Second Extract of Coconut Milk*. International Journal of Innovative Research in Science, Engineering and Technology. IJIRSET. Vol. 4, Issue 10.

Ngampeerapong, C. and Visith C. 2019. *Nutritional and Bioactive Compounds in Coconut Meat of Different Sources: Thailand, Indonesia and Vietnam*. Nat. Sci.Vol. 18(4).

Padaga. 2005. *Membuat Es Krim Yang Sehat*.TrubusAgrisana: Surabaya

Richardson, 1985. *Standard Methods for the Examination of Dairy Products, 15th ed*. American Public Health Association, Washington, DC.

Sofjan, R.P., R.W. Hartel, 2004. *Effects of overrun on structural and physical characteristics of ice cream*. International Dairy Journal 14: 255–262

Soukoulis, C., & Tzia, C. 2010. *Response surface mapping of the sensory characteristics and acceptability of chocolate ice cream containing alternate sweetening agents*. Journal of Sensory Studies, 25, 50-75