



## Fat Content and Antioxidant Activity in Coconut Milk-Based Ice Cream with Cashew Milk Combination

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### Abstract

Among frozen dairy products, ice cream is a product that is produced and consumed in large quantities. Coconut milk contains different types of fats, such as saturated fats, polyunsaturated fats, omega-3 fats, omega-6 fats, and monounsaturated fats. To improve the quality of ice cream in terms of taste, aroma, texture, and flavor, one can combine two ingredients, namely coconut milk and cashew milk. Cashews contain 40-57% fat and 21% protein. The purpose of this study is to measure fat content and antioxidant activity and determine the effect of cashew milk combination on fat content and antioxidant activity of coconut milk-based ice cream. This study is an experimental study with a factorial design in the form of a Completely Randomized Design (CRD). It consists of three treatments with different percentage compositions of coconut milk and cashew milk: A (60%:40%), B (50%:50%), and C (40%:60%). The experiment was conducted with two replications. The parameters analyzed were fat content and antioxidant activity. The data obtained were processed using editing, coding, tabulating, and entry procedures. Furthermore, the data were analyzed using statistical tests in the form of One-Way ANOVA and the Kruskal-Wallis test to determine the effect of the combination of coconut milk and cashew milk on ice cream products. The results showed that there was a significant difference in the use of coconut milk and cashew milk on fat content with  $p = 0.000$  ( $p \leq 0.05$ ) and antioxidant activity with  $p = 0.001$  ( $p \leq 0.05$ ).

## Introduction

Ice cream is one of the most popular and beloved food products in the community. Among frozen dairy products, ice cream is produced and consumed in large quantities. In addition to having a delicious taste, ice cream also has a fairly good nutritional value because it uses milk and coconut milk as its main raw materials. Ice cream is also a relatively high source of energy. The fat content in ice cream is three to four times higher than that in milk, and half of its total solids are sugars (lactose, sucrose, and others). Therefore, ice cream can serve as a refreshing and nutritious food for the body (Meutia Sari et al., 2019). Cow's milk has a nutritional content of 66 kcal, 3.2 grams of protein, 3.7 grams of fat, 4.6 grams of lactose, and 0.1 milligrams of iron Navyanti (2015). However, there are also consumers in Indonesia who dislike or avoid consuming cow's milk, especially those who are lactose intolerant or sensitive to the milk's characteristic odor (Sitompul, 2023).

As an alternative to cow's milk, ice cream can be made using plant-based ingredients that do not contain lactose. One of the vegetable ingredients often used to make ice cream is coconut milk. Indonesian people are familiar with ice cream made from coconut milk, which is often called "es dung dung" or "ice putar.". Ice cream made from coconut milk has a distinctive taste and aroma. In addition to these characteristics, coconut milk has a nutritional content that is comparable to cow's milk, making it a suitable substitute in ice cream production.

Coconut milk has the advantage of not having the dairy odor associated with fresh milk. Additionally, coconut milk is less expensive compared to cow's milk. Furthermore, the fat content in coconut milk is vegetable fat that does not contain cholesterol, unlike the animal fats in cow's milk. The percentage of fat in coconut milk varies between 2.4% and 5.5%. Coconut milk contains different types of fats, such as saturated fats, polyunsaturated fats, omega-3 fats, omega-6 fats, and monounsaturated fats (Sitompul, 2023).

Antioxidants are chemical compounds or components that, at certain levels or amounts, are able to inhibit or slow down damage caused by the oxidation process (Putu & Satriyani, 2021). Natural sources of antioxidants include polyphenols. Polyphenols are typically defined as a group of natural compounds that contain multiple phenolic structures (Muchsin et al., 2016). Coconut milk contains several small compounds, including phenolic substances. The antioxidant properties were evaluated by the Ferric Reducing Antioxidant Power (FRAP) test and the 2,2-diphenyl-1-picrylhydrazyl (DPPH) test. These tests showed that coconut milk exhibited higher antioxidant activity of 68.39% compared to cow's milk at 60.81% (Karunasiri et al., 2020).

Coconut milk ice cream has now become increasingly popular and is being developed, especially for vegan and non-dairy ice cream products (Rahim & Sarbon, 2019). In addition to using coconut milk as a basic ingredient, it is necessary to modify other ingredients, specifically through additional ingredient formulations, to produce ice cream products with high nutritional value that can be consumed by all age groups. One such modification is the addition of plant-based milk. Plant-based milk substitutes can basically be defined as homogeneous extracts from a plant-based matrix, such as cereals (oats, rice), pseudo-cereals (quinoa), vegetables (soybeans, chickpeas), nuts (almonds, cashews, Brazil nuts), and whole grains (sesame and sunflower) (Aydar et al., 2020). In this study, plant-based milk from cashews will be used.

Cashews are a fruit produced from cashew pohom which has the Latin name *Anacardium occidentale* L. which has many nutrients in it. The fat contained in cashews is in the form of monounsaturated and polyunsaturated fatty acids, in addition to the phenolic content (flavonoids, anthocyanins, and tannins) and fiber that are quite high (Choirunnisa et al., 2022). Phenolic compounds are secondary metabolite compounds derived from plants with the characteristic of having an aromatic ring containing a hydroxyl group. This compound is useful as an antioxidant, anti-cancer, anti-inflammatory, antimicrobial, protecting against heart disease, and so on (Mahardani & Yuanita, 2021). Cashews can be used as a healthy alternative food, especially for people on a vegetarian diet, because the protein content in 20 grams of cashews provides about 6 grams of protein, according to the Adult Nutritional Adequacy Number (AKG). One of the processed grain products that is quite easy to make and does not significantly reduce the nutritional content during the process is dairy products. (Choirunnisa et al., 2022).

## Methods

The method used in this study is experimental research with a factorial design within a completely randomized design (CRD), consisting of three treatments based on the percentage composition of coconut milk and cashew milk: A (60%:40%), B (50%:50%), and C (40%:60%), each conducted twice. This research was carried out in June 2024 at the Food Science Laboratory, Nutrition Science Study Program, Faculty of Health Sciences, University of Muhammadiyah Surakarta.

The parameters analyzed were fat content and antioxidant activity in coconut milk-based ice cream with a combination of cashew milk. The tools used in this study are digital scales, stoves,

basins, spatula spoons, thermometers, baking pans, freezers, mixers, pots, measuring cups, plates, glasses, erlenmeyer, spatula, filter paper, ovens, soxhlets, test tubes, incubation, blanks. The ingredients used in this study are coconut milk with water, cashew milk, sugar, CMC, ovalette, vanilli, aquades, HCL 25%, ethanol, parent solution, and DPPH solution.

The research procedure in this study includes several stages: (1) the ice cream making stage, and (2) the stage of testing the fat content and antioxidant activity of the ice cream. The data obtained will be processed using editing, coding, tabulating, and entry processes. Furthermore, the data will be analyzed using statistical tests, specifically the One-Way ANOVA test and the Kruskal-Wallis test, to determine the effect of the combination of coconut milk and cashew milk on the ice cream products.

## Results and Discussion

### Fat Content

The data from the fat test results are then carried out a normality test. Based on the normality test of the One Sample Shapiro Wilk Test, the result was  $p = 0.084$  ( $p > 0.05$ ) which means that the data is normally distributed. Therefore, it was continued with testing using the One Way Anova test. The results of the fat content test can be seen in table 1.

Table 1. Fat Content of Coconut Milk Ice Cream and Cashew Milk

Percentage of coconut milk and cashew milk (%)	Fat (%)	Sig value (p)
A (60:40)	$8.008 \pm 0.072^a$	0.000
B (50:50)	$7.345 \pm 0.100^b$	
C (40:60)	$6.947 \pm 0.173^c$	

Remarks: Different letter notations show a noticeable difference in the results of Duncan's analysis

Based on the results of the One-Way ANOVA test, the value of  $p = 0.000$  ( $p \leq 0.05$ ), which means that there is a significant difference in the treatments A, B, and C on the fat content in ice cream made from a combination of coconut milk and cashew milk. To determine which groups have differences, the Duncan test was conducted. Duncan's results showed that the fat content of group A was significantly different from that of groups B and C. The fat content in group B is significantly different from that in groups A and C. Similarly, the fat content in group C is significantly different from that in groups A and B.

The results of the fat content test of ice cream made from coconut milk with a combination of cashew milk prove that the higher the percentage of coconut milk, the higher the fat content in ice cream. This is because 100 grams of coconut milk with water has a fat content of 10 grams (Kemenkes, 2019). Meanwhile, the fat content in 100 grams of cashew milk is 3.16% or equal to 6 grams (Chalupa-Krebzdak et al., 2018). It can be concluded that the fat content in coconut milk is higher than cashew milk.

According to research (Mahrita et al., 2022) about coconut milk and yellow pumpkin which have an influence on the fat content in each formulation. This result in line with the fat content test in ice cream which has an effect on each percentage difference.

The fat contained in ice cream is sourced from coconut milk and cashew milk. The fat content in ice cream affects the physical quality of ice cream, especially the texture of ice cream. Based on the Indonesian National Standard (SNI) 01-3713-1995, the minimum fat content in ice cream is 5%. The results of this study are in accordance with SNI where the fat content in ice

cream is above 5%. The increase in fat content along with the increase in the percentage of coconut milk in each formulation proves that there is a source of fat in coconut milk-based ice cream with a combination of cashew milk.

### Antioxidant Activity

The data from the antioxidant test results were then subjected to a normality test. Based on the One Sample Shapiro-Wilk test, the result was  $p = 0.014$  ( $p < 0.05$ ), which means that the data is abnormally distributed. Therefore, the abnormally distributed data was further analyzed using the Kruskal-Wallis test. The results of the antioxidant activity test can be seen in Table 2.

Tabel 2. Antioxidant Activity of Coconut Milk Ice Cream and Cashew Milk

Percentage of coconut milk and cashew milk (%)	Antioxidant Activity (ppm)	Sig value (p)
A (60:40)	$5.428 \pm 0.056^a$	0.001
B (50:50)	$4.887 \pm 0.099^b$	
C (40:60)	$4.275 \pm 0.037^c$	

Remarks: Different letter notations show real differences in the results of the Mann-Whitney analysis

Based on the Kruskal-Wallis test, the result was  $p = 0.001$  ( $p \leq 0.05$ ), which means that there is a significant difference in the treatments A, B, and C on the fat content in coconut milk-based ice cream combined with cashew milk. To determine which groups have differences, the Mann-Whitney test was carried out. The results of the Mann-Whitney test show that the antioxidant activity of group A is significantly different from the antioxidant activity of groups B and C. Antioxidant activity B is significantly different from antioxidant activity A and C. Antioxidant activity C is significantly different from antioxidant activity A and B.

The results of the antioxidant activity test of coconut milk-based ice cream with a combination of cashew milk demonstrate an increase in antioxidant activity with the addition of cashew milk. This increase is attributed to the presence of phenolic compounds in cashews, which are known for their potent antioxidant properties. Cashew milk contains these phenolic compounds, contributing to its cardioprotective effects and overall strong antioxidant capabilities (Waskito, 2019). Antioxidants are compounds that can absorb or neutralize free radicals so that they are able to prevent degenerative diseases such as cardiovascular, carcinogenesis, and other diseases. Antioxidant compounds are substances that the body needs to neutralize free radicals and prevent damage caused by free radicals to normal cells, proteins, and fats (Mahrita et al., 2022).

Specifically, a compound is considered a very strong antioxidant if its IC50 value ranges from 0 to 50 ppm, strong if the IC50 value ranges from 51 to 100 ppm, moderate if the IC50 value ranges from 101 to 150 ppm, and weak if the IC50 value ranges from 151 to 200 ppm (Romadanu et al., 2014). Treatment A, B and C get antioxidant activity results below 50 ppm so that ice cream with coconut milk, which is combined with additional ingredients, namely cashew milk, has very strong antioxidant activity.

### Conclusion

Based on the results of data processing and analysis, the conclusion of this study is that there is an effect of each treatment involving different combinations of coconut milk and cashew milk (60%:40%, 50%:50%, and 40%:60%) on both fat content and antioxidant activity. The

fat content in all three treatments met the ice cream quality standards, which require a minimum of 5%. The highest fat content was found in treatment A with a percentage of coconut milk and cashew milk of 60%:40%, which was 8.008%. The best antioxidants of ice cream are found in treatment C with a percentage of coconut milk and cashew milk of 40%:60%, which is 4,275 ppm.

### Suggestion

Based on the results and discussion, ice cream products made from coconut milk with a combination of cashew nut milk with different treatments have an influence on nutritional substances, namely fat content and antioxidant activity. So further research needs to be done with more specific parameters.

### References

- Aydar, E. F., Tutuncu, S., & Ozcelik, B. (2020). Plant-based milk substitutes: Bioactive compounds, conventional and novel processes, bioavailability studies, and health effects. In *Journal of Functional Foods* (Vol. 70). Elsevier Ltd. <https://doi.org/10.1016/j.jff.2020.103975>
- Chalupa-Krebzdak, S., Long, C. J., & Bohrer, B. M. (2018). Nutrient density and nutritional value of milk and plant-based milk alternatives. *International Dairy Journal*, 87, 84–92. <https://doi.org/10.1016/j.idairyj.2018.07.018>
- Choirunnisa, Y., Kurnia, P., Sofyan, A., & Wardana, A. S. (2022). Protein Content and Overrun Value of Ice Cream made from Cashew Nut Milk Substitution with the Addition of Sorghum Flour. *University Research Colloquium*.
- Karunasiri, A. N., Gunawardane, M., Senanayake, C. M., Jayathilaka, N., & Seneviratne, K. N. (2020). Antioxidant and Nutritional Properties of Domestic and Commercial Coconut Milk Preparations. *International Journal of Food Science*, 2020, 1–9. <https://doi.org/10.1155/2020/3489605>
- Kemenkes. (2019). *Tabel Komposisi Pangan Indonesia (TKPI)*.
- Mahardani, O. T., & Yuanita, L. (2021). Efek Metode Pengolahan Dan Penyimpanan Terhadap Kadar Senyawa Fenolik Dan Aktivitas Antioksidan. *UNESA Journal of Chemistry*, 10(1).
- Mahrita, S., Faridawaty, E., & Feri, C. (2022). Pengaruh Formulasi Santan Dan Labu Kuning (Cucurbita Moschata) Terhadap Sifat Fisik Dan Kimia Es Krim. *Jurnal Cakrawala Ilmiah*, 2(4).
- Meutia Sari, P., Industri Pertanian, T., Teknologi Pertanian, F., & Serambi Mekkah, U. (2019). S J A T Effect Of Beetroot Extract (Beta vulgaris L) and CMC (Carboxyl Methyl Cellulose) Concentration On Ice Cream Quality. / *80 Serambi Journal of Agricultural Technology*, 1(2), 80–91. <http://ojs.serambimekkah.ac.id/index.php/sjat>
- Muchsin, R., Fatimah, F., & Rorong, J. A. (2016). Aktivitas Antioksidan Dari Santan Kelapa Di Sulawesi Utara. *Chem. Prog*, 9(2). <https://doi.org/10.35799/cp.9.2.2016.27985>
- Navyanti, F. dan R. A. (2015). Higiene Sanitasi, Kualitas Fisik Dan Bakteriologi Susu Sapi Segar Perusahaan Susu X Di Surabaya. *Jurnal Kesehatan Lingkungan*, 8(1), 36–47.
- Putu, D., & Satriyani, P. (2021). *Review Artikel: Aktivitas Antioksidan Ekstrak Daun Kelor (Moringa oleifera Lam.)* (Vol. 4, Issue 1).

- Rahim, N. A., & Sarbon, N. M. (2019). Acacia honey lime ice cream: physicochemical and sensory characterization as effected by different hydrocolloids. *International Food Research Journal*, 26(3): 883-891 (June 2019), 883–891.
- Romadanu, R., Hanggita, S., & Lestari, S. D. (2014). Pengujian Aktivitas Antioksidan Ekstrak Bunga Lotus (*Nelumbo nucifera*). *Jurnal Fishtech*, 3(1), 1–7. <https://doi.org/10.36706/fishtech.v3i1.3523>
- Sitompul, A. O. (2023). *Pengaruh Penambahan Ekstrak Kulit Kayu Manis (Cinnamomum burmanii) terhadap Karakteristik Es Krim Santan Kelapa*. Universitas Jambi.
- Waskito, M. R. (2019). *Variasi Lama Microwave Assisted Extraction Kacang Mete (Anacardium occidentale L.) Terhadap Total Fenolik, Flavanoid, Tanin Dan Aktivitas Antioksidan*. Universitas Semarang.