JISIP (Jurnal Ilmu Sosial dan Pendidikan)
Vol. 10 No. 3 Juli 2026
e-ISSN : 2656-6753, p-ISSN: 2598-9944
DOI: *10.36312/jisip.v10i3.7255/http://ejournal.mandalanursa.org/index.php/JISIP/index*

The Effect of Adding Carrot Flour (*Dacus Corota L)* on the Water Content and Sensory Quality of Dry Pour Cakes

Bunga Switaloca[1] , Mahdiyah[2] , Ridawati[3]
[123]Pendidikan Tata Boga, Fakultas Teknik, Universitas Negeri Jakarta

Article Info
Article history:
Received: 20 June 2026
Publish: 3 July 2026

Keywords:
Dry Milk;
Carrot Flour;
Sensory Quality Water Content.

Abstract
This study aims to determine and analyze the effect of adding carrot flour on the moisture content and sensory quality of dried milk. The study was conducted at the Pastry and Bakery Processing Laboratory of the Culinary Arts Education Program at Jakarta State University. The study period ran from May 2025 to June 2026. The method used in this study was the experimental method. The research samples consisted of dried sus with 2%, 4%, and 6% added carrot flour, which were then tested by 45 moderately trained panelists—15 panelists each—who evaluated the dried sus products with added carrot flour (2%, 4%, and 6%) in terms of their sensory quality. Based on the results of the statistical hypothesis test for moisture content using an ANOVA test, it was shown that, overall, there was no effect of adding 2% (2.03), 4% (2.04), and 6% (2.05) carrot flour to the dried milk on moisture content. Based on the results of the statistical hypothesis test for sensory quality using the Kruskal-Wallis test, it was shown that the addition of 2%, 4%, and 6% carrot flour to the dried milk had no effect on the aspects of carrot flour aroma, savory taste, carrot flour taste, and texture. Based on the results of the Kruskal-Wallis test, it was shown that only the color aspect differed significantly, with the addition of 2% carrot flour yielding the best results. Thus, the author recommends that dried milk with 2% carrot flour be further.

This is an open access article under the Lisensi Creative Commons Atribusi-BerbagiSerupa 4.0 Internasional

Corresponding Author:
Bunga Switaloca
Universitas Negeri Jakarta
Email Coresspoden: bungaswit@gmail.com

1. INTRODUCTION

The habit of snacking, or what is commonly known as "ngingku," seems to be deeply ingrained in society. This habit tends to be difficult to break and has become a lifestyle, especially for people in big cities. Business opportunities for snack production with the latest innovations are increasing in line with changing habits in Indonesian society. A wide variety of snacks are available in Indonesia, with flavors ranging from salty, sweet, savory, and sour. The criteria for a healthy snack are that it contains vitamins, protein, and dietary fiber, and has a low glycemic index (GI). One example of a healthy snack is dry milk (Astawan, 2009).

Dry milk is a type of product, *choux paste,* with light and large volume characteristics and strongly developed (*strongly leavened*) with large cells. *Choux paste* is a soft-boiled dough that produces a light and fluffy cake but is hollow in the middle (Ismayani, 2007). Dry sus itself is a modification of choux paste dough, which is already well-known in Indonesia for its savory and crunchy taste. This small, brownish snack has a crispy, hollow texture and a distinctive savory taste (Betari, 2016). Dry sus is a type of snack that is popular with the public, especially because of its crunchy texture and savory taste. This product is generally made from wheat flour-based dough that is then fried or baked until dry. However, conventional dry sus has limitations in terms of nutritional value, especially vitamin and

fiber content. Along with increasing public awareness of the importance of balanced nutrition, the need has arisen to develop food products that are not only delicious but also functional.

Of the many vegetables, one that might be an alternative ingredient is carrot flour. Research by Ari Fadiati, Mahdiyah, and Widowati shows that carrots contain provitamin A, high-quality carotene, and a certain amount of fiber (Ari, 2009).

Carrot (*Daucus carota L*) is widely known as a high source of vitamin A (in the form of beta-carotene), dietary fiber, and other antioxidants. Carrot production in Indonesia from 2017 to 2021 showed fluctuations. Carrot production started at 537,340 tons in 2017 and peaked at 674,630 tons in 2019. Carrots have a high-water content, which can lead to the growth of bacteria, mold, and yeast, making it necessary to process carrots into flour. Carrot flour is a processed product from fresh carrots and is a semi-finished product.

Carrot flour is a processed carrot product that involves drying and grinding. Carrot flour offers advantages such as easier storage, added value due to its wider use, and added *orange* color on *cookies* Krisna's modification, (2024). In 100 grams of carrot flour, 4 contains 25% fiber and 42 μg/gram β-carotene (Essa, 2022).

Several studies have been conducted on the use of gembili flour, namely in making bagelen (Monikha and Azizah, 2020), *snack bar* (Cahyani and Rosiana, 2020), and putu ayu cake (Dwi Febrita, 2024). Therefore, gembili flour has the potential to be used in the manufacture of food products, such as roti canai. Gembili has several functional properties similar to wheat flour, such as the ability to dissolve in water, absorb water, absorb fat, and so on (Oktavianasari et al., 2023). In addition, the amount of starch in gembili flour is sufficient. equals the starch contained in wheat flour. Therefore, wheat flour can be replaced with gembili flour as a dough framework.

Based on the descriptions above, this research is expected to provide scientific information regarding the potential use of carrot flour as a functional raw material in the development of healthier and more nutritious dry milk, without sacrificing the sensory attributes preferred by consumers.

2. RESEARCH METHODS

2.1 Research methods

The research method used in this study was an experimental method to determine the effect of carrot flour addition on water content and sensory quality in dry milk. The population in this study was dry milk with carrot flour addition, with samples consisting of dry milk with carrot flour addition percentages of 2%, 4%, and 6%. The sampling technique was *random sampling*, where each sample is given a random three-digit code known only to the researcher.

2.2 Data Collection and Analysis Techniques

Data collection in this study was conducted in stages, beginning with product validation by five expert panelists, namely lecturers from the Culinary Arts Education Study Program, Jakarta State University. Next, samples were tested by 45 somewhat trained panelists, namely students from the Culinary Arts Education Study Program, Jakarta State University, to assess the sensory quality aspects of aroma, color, savory taste, carrot flour flavor, and texture using a Likert scale. Then the sample is tested for water content using a scale.

Sensory quality test data analysis was carried out using the test *Kruskal-Wallis* continued with testing *Tuckey's*. Analysis of water content test data was carried out with an ANOVA test to determine the influence on each treatment. If there is an

influence, it will be continued with the *Duncan test*.

2.3 Making Carrot Flour

According to Nurbilah (2012), the process of making carrot flour requires several processes, including sorting, washing, grating, drying using an oven at 100˚C for 2 hours, grinding or crushing, and sieving. In this study, carrots were dried using a drying *dehydrator* machine so that the water content can be reduced more optimally and the color of the carrots is maintained. Use *dehydrator* It is expected to be able to produce carrot flour with a lower water content and better storage stability and color than the previous method.

Figure 1 Flowchart of Carrot Flour Production

2.4 Making Dry Milk

Table 1 Dry Milk Formula with Carrot Flour

Material	Addition **Addition**					
	2%		**4%**		**6%**	
	Gram	**%**	**Gram**	**%**	**Gram**	**%**
Flour	80	100	80	100	80	100
Carrot Flour	1,6	2	3,2	4	4,8	6
Margarine	60	75	60	75	60	75
Air	160	200	160	200	160	200
Egg	98	122,5	98	122,5	98	122,5
Baking Powder	1	1,25	1	1,25	1	1,25
Salt	1	1,25	1	1,25	1	1,25

Making dry cream puffs begins with preparing equipment and ingredients such as wheat flour, eggs, salt, water, margarine, and *baking powder*. All ingredients are weighed, then water, salt, and margarine are cooked until boiling. Then, flour is added and stirred until well combined. The thoroughly mixed dough is rested until warm. After resting, eggs and *baking powder are* mixed until smooth. Next, the mixture is put into a *piping bag*. After that, the dough is pressed using a syringe with a dough weighing 3 grams each onto the baking sheet. The molded dough is baked in an oven at an initial temperature of 160˚ for 25 minutes, then the temperature is reduced to 120˚ for 75 minutes. The dry cream puffs are baked in two stages to achieve a crispy and dry texture.

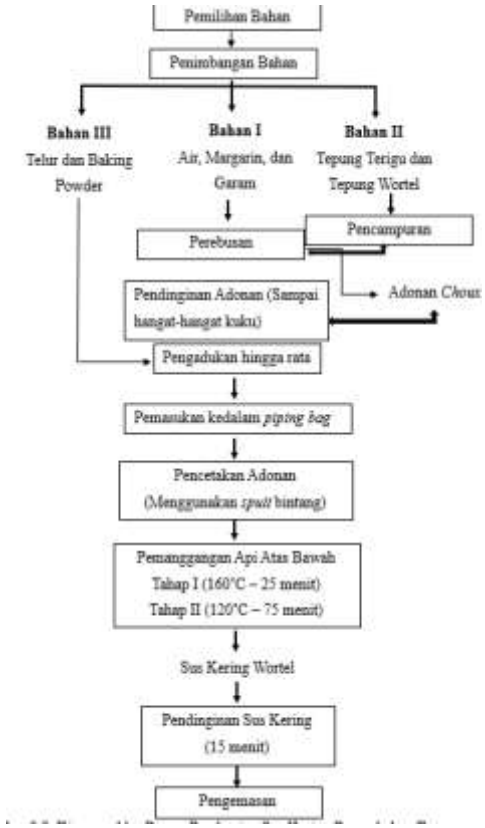
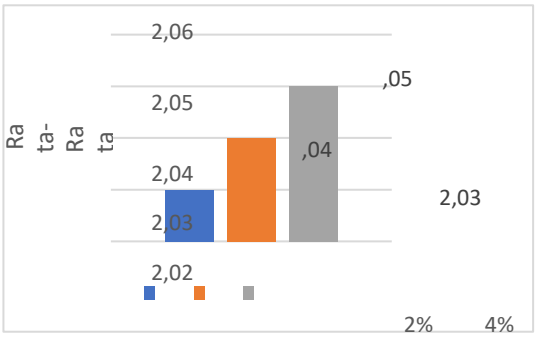


Figure 2 Process Diagram for Making Dry Milk

3. RESULTS AND DISCUSSION

3.1. Water Rate



Picture 3 Average Water Rate Graph

The results show that the F count is 2.12 with α = 0.05, the degree of freedom of treatment (dbp) is 2, and the degree of freedom of error (dbg) is 6; the F table is 5.14. These results indicate that F count < F table, which means H_0 is accepted and H_1 rejected; then there is no effect on the water content of dry sponge cake with the addition of gembili carrot flour in the 2%, 4%, and 6% treatments.

Based on the results of the K*ruskal-Wall's* test, the results showed that only the color aspect was significantly different, with the addition of 2% carrot flour being the best. Therefore, the authors recommend further development of dry milk with the addition of 2% carrot flour as a product with sales value, as well as efforts

to use carrot flour as a local food ingredient.

3.2. Sensory Quality

Table 2 Average Results of Sensory Quality Test

Testing Criteria	2%	4%	6%
Aroma	4,33[a]	4,40[a]	4,27[a]
Color	4,93[a]	4,33[b]	4,27[c]
Carrot Flavor	4,67[a]	4,33[a]	4,27[a]
Texture	4,93[a]	4,80[a]	4,60[a]
Savory Taste	4[a]	4,13[a]	4,47[a]

Note: The same notation on the same line has no significantly different meaning.

Aroma

Based on test assessment data, *Kruskal– Wallis* shows that the addition of carrot flour does not affect the aroma aspect. This is shown in x^2calculate = 0.0958, which is smaller than x^2Table = 5.991. Research (Nurwidah, 2024) on carrot bread showed similar results. Although the color changed significantly, the aroma of the bread showed no significant difference because most of the carrot's volatile compounds were lost during baking. This supports the findings of this study.

Color

In the results of testing the color aspect hypothesis in obtaining x^2calculate = 10,664, which is greater than x^2table = 5.991. This shows that there is an effect of adding carrot flour on the color aspect of dry milk, so a test was carried out *tuckey's*.

These results align with research conducted by Dewi & Bahar (2024), which found that adding carrot flour to biscuits significantly changes color because the β-carotene content remains stable during processing. Similarly, research by Sari et al. (2024) showed that macaroni added with carrot flour experienced a significant increase in yellow-orange color intensity as the percentage of carrot flour used increased.

Savory Taste

In hypothesis testing, the *Kruskal-Wallis test* obtained x^2count = 3.361. So, we get that x^2calculate is smaller than x^2Table = 5.991. This indicates that the addition of carrot flour does not affect the savory taste. This can be explained because the savory taste of choux pastry comes primarily from the basic ingredients, such as butter, eggs, and the low salt content. Carrot flour does not contain savory (umami) flavor enhancers such as glutamate or nucleotides, so its addition does not significantly contribute to the savory taste. Research conducted by Cicilia et al., 2021, supports this phenomenon through their study of carrot flour chiffon cake.

Carrot Flavor

Based on the test results obtained x^2The calculated value is 2.821, so it can

be concluded that there is no effect of adding carrot flour on the carrot flavor aspect. The results of this study are consistent with the findings of (Dewi & Bahar, 2024), who reported that the carrot flavor in biscuit products is only significantly felt when the concentration exceeds 10%. At lower concentrations, panelists are generally unable to clearly recognize the carrot flavor. This finding is very relevant and supports the explanation why, in this study, carrot flavor showed no significant difference between treatments.

Texture

Based on the test *Kruskal-Wallis* obtained x^2 the calculated value is 0.454, which means that the addition of carrot flour to dry cream puffs has no effect on the texture. This finding aligns with research (Sari et al., 2024) which reported that the addition of small amounts of carrot flour to macaroni products did not cause significant changes in texture. These results confirm that carrot flour is safe for use in flour-based product formulations without compromising texture quality, as long as its use is within recommended limits.

4. CONCLUSION

The results of the hypothesis testing using the Kruskal-Wallis test showed that there was no effect of adding carrot flour to dry puff pastry on the aroma, savory taste, carrot flour flavor, and texture. In contrast to the color aspect, the results of the hypothesis testing using the Kruskal-Wallis test showed that there was an effect of adding carrot flour to dry puff pastry. Meanwhile, the results of the physical quality test using the ANOVA test showed a significant effect of adding carrot flour to dry puff pastry on the water content aspect.

The determination of the best dry milk with the addition of carrot flour was obtained based on the highest average value of all aspects of the sensory quality test, namely dry milk with the addition of carrot flour with a treatment of 2%, so the researcher recommends dry milk with the addition of carrot flour with a treatment of 2% to be further developed as a product that has sales value and efforts to use carrot flour as a local food ingredient.

5. ACKNOWLEDGEMENT

The researcher would like to thank all parties who provided assistance and support throughout the research process and the preparation of this article. He hopes this article will broaden the horizons and provide benefits to both the researcher and readers.

6. BIBLIOGRAPHY

Ari Fadiati, M. I. W. (2009). Pengaruh Perbedaan Persentase Tepung Komposit terhadap Kualitas Hasil Pemasakan Kwetiau Instan.

Astawan. (2009, Juni 29). Ngemil Gak Bikin Gemuk. Kompas.Id.https://nasional.kompas.com/read/2009/06/29/18520722/ngemil.gak.bikin.gemuk

Cahyono, B. (2002). Wortel Teknik Budidaya dan Analisis Usaha Tani. Kanisius.

Chaerah Amiruddin. (2013). Pembuatan Tepung Wortel (*Daucus carrota L*) Dengan Variasi Suhu Pengering.

Cicilia, Tuju, & Maya. (2021). Pengaruh substitusi tepung wortel (Daucus carota L) terhadap kualitas sensoris, fisik, dan kimia *chiffon cake*. Jurnal Teknologi Pertanian (*Agricultural Technology Journal*, 12(2), 73–79.

Dewi & Bahar. (2024). Daya Terima Dan Nilai Gizi Biskuit Dengan Substitusi Tepung

Garbanzo (Cicer arietinum L.) Dan Penambahan Wortel. Jurnal Gizi Dan Pangan Soedirman; Vol 8 No 2 (2024): Jurnal Gizi Dan Pangan Soedirman - 10.20884/1.Jgipas.2024.8.2.12772 .

Dr. Ir. Christine F. dan Mamuaja, M. (2016). Pengawasan Mutu dan Keamanan Pangan. Unsrat Press. Dwi Bagus Rendy Astid Putera. (2023). Buku Ajar Praktikum Kimia Rumah Tangga. Bayfa Cendekia Indonesia .

Essa Annisa Syadiah, R. R. F. A. (2022). Pengaruh Penambahan Tepung Wortel terhadap Daya Terima dan Kandungan Gizi Nugget Ikan Kakap Putih (*Lates calcarifer).* Media Teknologi Hasil Perikanan.

Febri Endra Budi Setyawan. (2017). Pengantar Metodologi Penelitian. Zifatama Jawara.

Fines Dwi Martanda. (2019). Identifikasi *Salmonella sp.* dan *Staphylococcus* aureus serta Hitung Jumlah Total Bakteri Pada Margarin. *Sain Health.*

Ida Ayu Putu Hemy Ekayani. (2011). Efisiensi Penggunaan Telur Dalam Pembuatan *Sponge Cake*.

Ir. Astutik Pudjirahaju, M. Si. (2018). Pengawasan Mutu Pangan (M. S. Ir. Anang Suhardianto, Ed.; Edisi Tahun 2017). Pusat Pendidikan Sumber Daya Manusia Kesehatan.

Ir. Made Suladra, M. Pengaruh Penambahan Ubi Jalar Ungu (Ipomea Babatas L.) Terhadap Sifat Organoleptik dan Aktivitas Antioksidan Pada Kue Yangko.

Kementerian Kesehatan, T. R., Indonesia Kementerian Kesehatan Direktorat Jenderal Kesehatan Masyarakat Tabel Komposisi Pangan Indonesia. (2020). Katalog dalam.

Kementrian Kesehatan RI. (2020). Tabel Komposisi Pangan Indonesia.

Khusnul Dwi Betari. (2016). Pemanfaatan Tepung Tiwul Tawar Instan Sebagai Substitusi Tepung Terigu dalam Pembuatan Sus Kering. Volume 5, No. 1. file:///C:/Users/switt/Downloads/admin,+21.+khusnul+dwi+betari+1105054432.pdf

Kurniawan, A., Lestariadi, Kurniaty, Prayodo, Dewi, Amin, Yanuar, & Salamah. (2020). Analisis Indeks Kesesuaian Lokasi Garam (IKG) di Kawasan Sentra Produksi Garam Jawa Timur. Rekayasa, 13(3), 225–233. https://doi.org/10.21107/rekayasa.v13i3.9130

Mira Lesmana. (2015). Buku Pintar Wortel: Membahas secara lengkap tentang hal-hal yang bersangkutan dengan wortel dan cara pembudidayaanya (Fitri Kurniasih, Ed.). Lembar Langit Indonesia.

Mulyahati. (2005). Saluran Pemasaran Wortel di kawasan Agropolitan Cinajur.

Nurwidah. (2024). Pengaruh Substitusi Tepung Wortel *(Daucus carota L.*) Terhadap Kualitas Roti Tawar. Jurnal Sains Dan Teknologi Pangan, 9(4).

Rahayu, (2012). Evaluasi Sensori. Universitas Terbuka.

Ratnakandi Febriyanti. Pemanfaatan *Puree* Labu Kuning Pada Masakan Kontinental.

Risda Yulianti, (2022). Keamanan dan Ketahanan Pangan PT. Global Eksekutif Teknologi No. 033/SBA/2022.

S Nurbillah. (2012). Penambahan Persentase Tepung Wortel (*Daucus Carota L*) Pada Pembuatan Kerupuk Tepung Tapioka (Kerupuk Kampung) Terhadap Daya Terima Konsumen.

Safitri, T. S. (2013). Pembuatan Sus Kering dengan Substitusi Tepung Ikan Tuna.

Sari, E. Y., Prabowo, S., Candra, K. P., & Suprapto, H. (2024). Karakteristik fisikokimia dan organoleptik makaroni substitusi tepung terigu dengan tepung wortel (Daucus carota L.). Journal of Tropical AgriFood, 6(2), 97–107.

Tintin Rayner. (2017). *Simple & Moist Cake*. PT. Kawan Pustaka.

Vika Azkiya Dihni. (2022). Produksi Wortel di Indonesia (2017-

2021).https://databoks.katadata.co.id/agroindustri/statistik/11e0fc489e0067c/ini-pertumbuhan-produksi-wortel-di-indonesia-sampai-2021

Wade, C. T. C. (2007). Psikologi (Edisi 9, Jilid 1). Erlangga.

Yeni Ismayani. (2007). Variasi Kue Sus. Gramedia Pustaka Utama. https://books.google.co.id/books?id=9I9eDwAAQBAJ&hl=id&source=gbs_navlinks_s