

Substitution of *Eucheuma cottonii* Seaweed Flour Against Acceptability and Hardness of Steamed Brownies

Proyustitia Indri Purwonegoro* and Titik Dwi Sulistiyati**

*Department of Fisheries Technology,
Faculty of Fisheries and Marine Science,
University of Brawijaya,
Indonesia.
indrititia@gmail.com

**Department of Fisheries Technology,
Faculty of Fisheries and Marine Science,
University of Brawijaya,
Indonesia.
titik_ds@ub.ac.id

DOI: 10.29322/IJSRP.9.06.2019.p9018
<http://dx.doi.org/10.29322/IJSRP.9.06.2019.p9018>

Abstract- Brownies are one type of cake that has a characteristic blackish brown color. Brownies are made from a mixture of flour, eggs, margarine, chocolate powder and chocolate bars. The purpose of this study is to determine the level of acceptance of panelists and hardness in brownies substituted with seaweed flour *Eucheuma cottonii*. Variations in substitution of seaweed flour at the manufacture of steamed brownies had carried out with the percentage of seaweed flour at 0%, 5%, 10% and 15%. The research method used a completely randomized design of 4 treatments and 5 replication. Data were analyzed using the Kruskal-wallis test and the hardness analysis was analyzed using the One Way ANOVA test. The results showed that the substitution of *Eucheuma cottonii* seaweed flour has a significant effect on the hardness of brownies. The 10% concentration has a higher acceptability with a score of 3.54 with a hardness value of 48.48N.

Keyword: steamed brownies, organoleptic, *Hardness*, *Eucheuma cottonii* seaweed flour

I. INTRODUCTION

Brownies has a different texture than other cakes that has a denser and softer texture. There are two types of brownies, steamed brownies and baked brownies. Generally steamed brownies are not too different with baked brownies. Water content in steamed brownies are higher than baked brownies. therefore, the shelf life are shorter¹. The principle of making steamed brownies are using water vapor from 100 ° C hot water for ± 30 minutes, while make baked brownies are using an oven at 175 ° C for ± 30 minutes².

The main raw material of brownies are wheat flour. Brownies do not require developing of volume that is too large so some of the flour as the main raw material can be substituted with flour non-wheat. Seaweed flour can be substituted wheat flour in making brownies. *Eucheuma cottonii* is one type of red algae that has a variety of colors, has cylindrical thallus, slippery surface, contains carrageenan agar and its widely used in the food industry³. Up to now efforts to increase the use of seaweed flour in bakery products are still very minimal. One of diversification effort to develop of seaweed is processing it into flour as an ingredient for making steamed brownies.

Organoleptic testing is an assessment by utilizing the human senses to observe appearance, flavor, texture and taste and to determine the level of preference of a product. Hardness is one of the texture properties that has an important component in determining product valuation. Although the food produced are tasty, but the texture of the food is hard, it will cause someone to lose their appetite when they consume it. So it is necessary to do research to find out the level of acceptability of panelists and hardness in steamed brownies which substituted into seaweed flour *Eucheuma cottonii*.

II. MATERIALS AND METHOD

Material

The materials used in this study are *Eucheuma cottonii* seaweed flour, water, flour, chocolate powder, dark chocolate, margarine, sugar, sp and baking powder. While the tools used are digital scales, mixers, pans, bowls, spoons, steamer. The tool used to test the hardness of steamed brownies is Lloyd texture analyzer instrument.

Method

The method used in this research is the experimental method. The treatments are used in this study was a simple complete randomized design with 4 treatments and 5 replications. The concentration of *Eucheuma cottonii* seaweed flour used was MB1 0%, MB2 5%, MB3 10% and MB4 15%. Results were analyzed using the Kruskal-wallis test, and the hardness analysis was analyzed using the One Way ANOVA performed by SPSS 25.0 for Windows.

Processing of *Eucheuma cottonii* flour

The process of making seaweed flour are begins with cutting dried seaweed with a size of ± 2 cm. Then its grinded with flour grinder. Furthermore, sieved by 80 mesh flour filter.

Processing of Steamed Brownies

The process of making brownies begins with preparing all the ingredients, then the ingredients are weighed according to needs. Then mixing materials such as sugar, eggs and sp, using a mixer at high speed until thickened for ± 5 minutes. Wheat flour, seaweed flour and chocolate powder are sifted together. Then put it in the mixture together with baking powder and stir it using the mixer again at medium speed. Melted margarine and chocolate bars in rather cold conditions are put into the mixture that has been mixed before. Stirring is evenly distributed. Then the finished mixture is put in a pan that has been smeared with a little margarine. Steam the mixture over low heat for 30 minutes.

III. RESULT

Assessment of hedonic organoleptic tests carried out by 30 panelists. The components assessed are appearance, flavor, taste and texture. Organoleptic test used to determine panelist preference level and acceptance of brownies by seaweed flour *Eucheuma cottonii* substitution. The organoleptic test results on brownies with substitution of *Eucheuma cottonii* seaweed flour can be seen in Table 1.

Table 1. Organoleptic test of steamed brownies of *Eucheuma cottonii* seaweed flour

Treatment	Appearance	Flavor	Taste	Texture	Total
MB1	3,46	3,34	3,56	3,50	3,47
MB2	3,48	3,32	3,50	3,26	3,39
MB3	3,54	3,50	3,64	3,46	3,54
MB4	3,40	3,46	3,50	3,38	3,44

In assessing organoleptic appearance parameters, flavor, taste, the highest values obtained in MB3 treatment and the lowest in MB4 treatment. In texture parameters, the highest value obtained of MB1 and the lowest value obtained MB2. Overall the panelists' acceptance of brownies with the substitution of *Eucheuma cottonii* seaweed flour obtained in MB3 treatment with a value of 3.54.

Hardness values are expressed in units of N (Newton). The smaller the texture value, the softer the product and the higher the texture value, the harder the product is. The results of the study show that the more addition of seaweed flour to the brownies will cause the product become harder and the value of the hardness increased. The highest hardness value obtained in MB4 treatment (15% substitution of seaweed flour) is 56,54 N while the lowest hardness value in MB1 treatment (0% substitution of seaweed flour) is 27.86 N. Hardness test results on steamed brownies of *Eucheuma cottonii* substitution can be seen in Table 2 and hardness test results graphic can be seen in Figure 1.

Table 2. Hardness

Treatment	Unit	Result
MB1	N	27,86
MB2	N	33,92
MB3	N	48,48
MB4	N	56,54

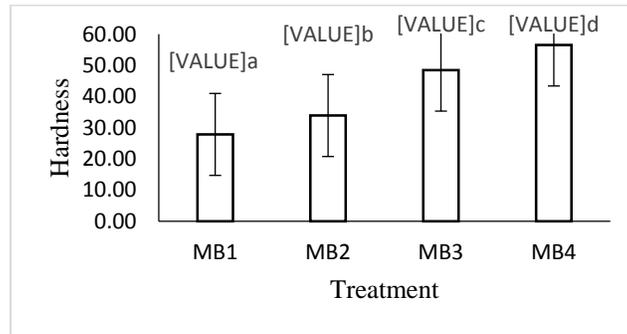


Figure 1. Graphic of *Hardness*

IV. DISCUSSION

Based on the ANOVA results it can be analyzed that the substitution treatment of *Eucheuma cottonii* seaweed flour significantly affected ($p < 0.05$) on the hardness of seaweed flour brownies. Then continued with Tukey's further test. The MB1 treatment obtained a hardness value of $(27.86 \text{ N} \pm 1.05)$, the MB2 treatment obtained a hardness value of $(33.92 \text{ N} \pm 0.94)$, the MB3 treatment obtained a hardness value of $(48.48 \text{ N} \pm 2.99)$ and the MB4 treatment obtained a hardness value of $(56.54 \text{ N} \pm 6.49)$.

The more seaweed added, the texture of the brownies will become hard. its caused by existance of carrageenan on seaweed which has a role as a stabilizer, binder, thickener and gel formation so the high of seaweed flour will form a gel and cause the texture become hard. This is presumably because the particle size of seaweed flour is quite large and the fiber content in seaweed is high⁴.

The high content of cellulose and lignin in seaweed flour can be causing the products produced has a high level of hardness and less softness. brownies of Seaweed flour has a strong absorption of water. Higher values of hardness are possible because seaweed contains carrageenan which has a high ability to bind water⁵. Hydrocolloids found in seaweed can increase the hardness and compactness. This is because hydrocolloids can interact with charged macromolecules such as proteins that are capable of producing various influences including forming gels⁶. The texture of steamed brownies without using seaweed flour has a soft texture and not too hard. This is because the flour which used can be caused gluten increase So the ability of the dough expand will also increase and produce brownies that are not too hard. The amount of gluten in brownies dough which slightly causes the dough to be less able to hold the gas so the pores formed in the dough will shrink which makes the brownies become hard.

CONCLUSION

Brownies substituted with *Eucheuma cottonii* seaweed flour can have a significant effect ($p < 0.05$) on hardness. In addition, the difference in substitution concentration of *Eucheuma cottonii* seaweed flour also had an influence on the level of preference of panelists. The preferred substitution concentration of *Eucheuma cottonii* seaweed is MB3 treatment (10%).

REFERENCES

- [1] Prayitno,S.A., R.Tjiptaningdyah., & F.K.Hartati. 2018. Sifat kimia dan organoleptik brownies kukus dari proporsi tepung mocaf dan terigu. *Jurnal Teknologi dan Industri Pertanian Indonesia*. 10, 21-27.
- [2] Setyani,S.,S.Nurdjanah., & A.D.P. Permatahati. 2017. Formulasi tepung tempe jagung (*Zea mays.*) dan tepung terigu terhadap sifat kimia,fisik dan sensory brownies panggang. *Jurnal Teknologi Industri dan Hasil Pertanian*. 22, 73-84.
- [3] Parenrengi, A., dan Sulaeman. 2007. Mengenal rumput laut, *Kappaphycus alvarezii*. *Media Akuakultur*. 2, 142-146.
- [4] Kesuma, C.P., A.C.Adi., dan L. Muniroh. 2015. Pengaruh substitusi rumput laut (*Eucheuma cottonii*) dan jamur tiram (*Pleurotus ostreatus*) terhadap daya terima dan kandungan serat pada biskuit. *Media Gizi Indonesia*. 10, 146-150.

- [5] Riyanto,B., & M. Wilakstanti. 2006. Cookies berkadar serat tinggi substitusi tepung ampas rumput laut dari pengolahan agar-agar kertas. Buletin Teknologi Hasil Perikanan. 9, 47-57.
- [6] Maslin,S., S.Wahyuni., & Ansharullah. 2017. Pengaruh penambahan rumput laut (*Eucheuma cottonii*) terhadap penilaian organoleptik mie wikau maombo. Jurnal Sains dan Teknologi Pangan. 2, 873-888.

AUTHORS

First Author – Proyustitia Indri Purwonegoro, Department of Fisheries Technology, Faculty of Fisheries and Marine Science, University of Brawijaya, indrititia@gmail.com.

Second Author – Titik Dwi Sulistiyati, Department of Fisheries Technology, Faculty of Fisheries and Marine Science, University of Brawijaya, titik_ds@ub.ac.id.