Local Food Innovation: Taro Dawet Ice

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Abstract: Indonesia is rich with natural resources and has many local food. Local food refers to food and other agricultural products which are grown or produced, processed and then sold within local area. Local food has many potential for culinary product, such as modern and traditional product. One of local food grown in Indonesia is tuber, such as taro, sweet potato, cassava, and etc. But, local food innovation with local ingredients still need to be reproduced for attracting people or tourists to consume local food. Taro is a tuber which contains carbohydrates, fats, protein, some minerals as well as vitamins. Taro flour can be mixed and used as base ingredients of cakes, bakery, and others. In this study, researcher make an experimental study of making Dawet Ice with Taro flour based. As we know Dawet Ice is one of traditional beverages from Java. Dawet Ice commonly made from rice flour. The following methods is about to make a sample of Dawet Ice with subtituting rice flour with taro flour in various percentages such as 20%, 40%, 60%, 80%, and 100%. This research aims to find out the best sample based on the test of sensory analysis (hedonic and hedonic quality test) were judged by the panelists and knowing the content of nutrition fact of Taro Dawet Ice. There were 30 panelists who tested this product. The researcher used ANOVA (Analysis of Multivariance) and Post Hoc Test-Duncan for identifying the differences between various products. The result showed that Taro Flour can be subtituted of rice flour until 100% in the making of Dawet Ice. Based on ANOVA test, all various percentages showed differences in sensory parametric in colour, texture, aroma, and taste of the products. The best product that has been tested is Taro Dawet Ice with 20% Taro flour and the proximat test showed that in 100gr Taro Dawet Ice contains 2,16 kkal energy for fat, 28.08 kkal total energy, 93,26% water content, 0,02% ash, 0,24% total fat, and 6,02% total carbohydrate. The information can be useful as a reference to make another product made from taro or another local food. Hope with innovation of local food can attract local people or tourists to consume local food as their experiences

1 INTRODUCTION

Local culinary is a part of Indonesian culture. Each region has a different and unique local cuisine. To ensure the preservation of local culinary,this needs improvement and development in order to attract the interest of the public to consume it. Local cuisine or so-called traditional Indonesian food is all kind of food that are made by using local ingredients and various processing methods, and has special types of regions, ranging from main foods, snack, and drinks commonly consumed by the community the area.

One of the local raw materials owned by Indonesia is tubers, but the development is still not getting much attention, even though the potential of the tubers is high enough to be used as food and manufacture of processed products. Tuber flour can be used as raw material, both in the form of flour and tuber starch or mixed flour (Suismono, 2011).

One of the taro-producing cities is Bogor, West Java. Taro is usually consumed as staple food and side dish. In addition, taro has a high economic value because almost all parts of taro plants can be used for daily consumption and taro plants also have sufficient nutritional content (Widiyanti, 2008). Taro tuber processing as food in Indonesia is still relatively simple. Generally taro is only used limited to fresh tubers which are processed by boiling, frying, and making into chips. Taro has a high starch content so that it has the potential to be used as a flour-raw material (Richana, et al., 2004).

Based on nutritional content data on the list of food ingredients, the nutritional value contained in 100 fresh taro includes 1.90% protein, 0.20% fat, and 23.70% carbohydrate (Mahmud, et al., 2000). Conversion of fresh taro tubers into a form of flour that is ready to use, especially for the production of processed food by side, encourages the emergence of more diverse products that can also encourage the

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development of the industry and increase the selling value of taro commodities. The taro siege is also expected to avoid losses due to the absorption of fresh taro tubers on the market when the product has over-harvesting (Wita, et al., 2013). Flour is a result through drying process, refining, and sifting. Taro flour has a granule size of about 0.5-5 microns (Setyowati et al., 2007). The opportunity to develop taro as a non-rice-starchy food is high and got supports from the government.

Es Dawet or better known by people in Bogor, Es Cendol, comes from Banjarnegara, area of Central Java. Dawet is one of Indonesia's traditional foods whose main raw materials are cereals. Cendol has a chewy texture and green in colour (Candraningsih, 1997). Generally, cendol is made from rice flour, cassava flour, tapioca flour, hunkwe flour, or other types of flour. Cendol is made by mixing several types of flour. Different types of flour have different characteristics, depending on the type of flour used. Cendol characterisics are commonly chewy, chewy but rather hard, and rather hard (Aggraeni, 2002)

The lack of taro-based product innovation is the basis for making experiments of taro dawet ice. The use of rice flour as the base ingredients of dawet ice was tested to be partially or wholly replaced by taro flour. Then this is expected to be able to provide economic value of local culinary and taro tuber itself.

2 LITERATURE REVIEW

2.1 Taro

Taro (Coloscasia esculenta (L) Schot.) Belongs to the genus Colocasia monocotyledon with the family Araceae. It is known that taro is cultivated in Asia, the Pacific, Central America and Africa. In the South Pacific islands (Papua New Guinea, Solomon Islands, Fiji and Samoa) taro is one of the important food crops, while in Indonesia and other Asian countries better known as food for snacks or vegetable. The role as food product is now only found in several regions, in the Mentawai Islands and Papua (Richana, Widaningrum, and Widowati, 2008).

Both leaves and tubers of taro have good nutritional content. The leaves contain 23% dry weight protein and rich of Calsium (Ca), Phosphor (P0, Ferrum (Fe), vitamin A, riboflavin and niacin. Taro tubers have high content of carbohydrates and protein (Nur Richana, et al., 2008).

2.2 Taro Flour

One of the processed taro products is taro flour. Taro flour is an intermediate product that can be processed into other products such as biscuits, porridge, breakfast cereals, bread, and others. Intermediate products are expected to have a longer shelf life, and the drying stage is one of the factors that can extend the shelf life (Nurdjannah, 2011).

The process of making taro flour follows the Fauzan method (Fauzan, 2005), the stages are stripping, slicing the tubers, soaking in a 3% salt solution to relieve itching, steaming, drying, flouring and sifting. According to Nurdjanah and Dwi (2011), in 100 grams of taro flour contains a total energy of 121.44 kkal, 83.33% moisture content, 0.39% ash content, 0.36% total fat, 2.73% protein, and carbohydrate a total of 26.82%.

2.3 Dawet Ice

Dawet Ice is a traditional drink from Jepara, Central Java. Along with the times, dawet ice spread to all cities on the island of Java, starting from the city of Semarang, Solo, Jakarta, Bandung, and other cities in Indonesia. The taste of this drink is sweet and savory. There is also Dawet Ice which originates from Sunda land.we often encounter this cendol ice in the market and on the street vendor. While the origin of dawet ice itself originated from the land of Java, Banjarnegara.

According to Candraningsih (1997), dawet or cendol is one of traditional Indonesian beverages containing raw materials of grains and nuts, which has been known and favored in Indonesia. Dawet has a chewy texture and generally green in color. Dawet is formed as a result of the starch gelatinization process.

According to Santoso (2000), in the process of making dawet, pour the flour or rice flour and food coloring and water, cook until specific thickness and then formed using cendol mold.

The hypotheses in this study are:

- Ho_1: There is no difference in consumer preference level (color, aroma, taste, texture) of dawet from taro flour with a substitution percentage of 20%, 40%, 60%, 80%, and 100%.
- $H1_1$: There is a difference in consumer preference level (color, aroma, taste, texture) of dawet from taro flour with a substitution percentage of 20%, 40%, 60%, 80%, and 100%.

- Ho_2: There is no difference in sensory quality (color, aroma, taste, texture) of dawet from taro flour with a substitution percentage of 20%, 40%, 60%, 80%, and 100%.
- $H1_2$: There is a difference in sensory quality (color, aroma, taste, texture) of dawet from taro flour with a substitution percentage of 20%, 40%, 60%, 80%, and 100%.

3 METHOD

Methodology in this research is experimental method. The experiments use one standard recipe and the same processing for each sample in the making of products and what distinguishes each sample is the substitution percentage of Taro Flour. The percentage of taro flour used in this experiments are 20%, 40%, 60%, 80%, and 100% from the total flour in the standard recipe. Independent variables in this research are percentage of taro flour substitution and dependent variable is the quality of Taro Dawet as which is measured by sensory analisis (hedonic and hedonic quality test). The number of sample is 15 samples, which are every level of percentage taro flour used in the making of dawet ice are made 3 times to ensure the stability of the product. The examiners who are semi skilled panelists will test the sensory analysis. The researcher used ANOVA (Analysis of Multivariance) and Post Hoc Test-Duncan for analyzing the data to find the differences of quality for each sample. The recipe and the varios percentage of taro flour used can be seen in Table 1.

Table 1: Taro Dawet Basic Recipe

No	Ingredients	Taro Flour Substitution				
		20%	40%	60%	80%	100%
1	Rice Flour	32gr	24gr	16gr	8 gr	-
2	Taro Flour	8 gr	16gr	24gr	32gr	40 gr
3	Tapioca Flour	60gr	60gr	60gr	60gr	60 gr
4	Salt	1 tsp	1 tsp	1 tsp	1 tsp	1 tsp

Source: Processed Data, 2016

4 RESULTS AND DISCUSSIONS

4.1 Results

4.1.1 Hedonic Results (Consumer Preference Level)

From Table 1 the average value of the overall preference test sample, sample of 20% taro flour is the best sample because that sample got the highest average value (3.92), followed by 40%, 60%, 80%, and 100% Taro flour substitution. The best sample, Dawet from 20% taro flour substitutions will be continued with proximate/nutrition test to determine each nutrient content containe. The average hedonic test results can be seen in Table 2 while the ANOVA results for the hedonic test can be seen in Table 3.

Table 2: The Average Value of Hedonic Test of Taro Dawet

Indicator	Taro Flour Substitutions (%)				
	20%	40%	60%	80 %	100 %
Color	4.08	4.07	3.76	3.67	3.32
Flavor	3.97	3.70	3.59	3.46	3.52
Taste	3.66	3.69	3.74	3.54	3.54
Texture	3.92	3.84	3.75	3.66	3.55
Total Average Value	3,91	3,83	3,71	3,58	3,48

Source: Processed Data, 2016

a. Hedonic Test : Color

Color is the result of person's observations using the eyes on an object or things. Substitution of taro flour with the highest value found in the sample of 20% taro flour, then followed by 40%, 60%, 80%, and 100% in making Taro Dawet Ice.

Because it has significance values <0.05 and <0.01, Fcount> Ftable, then H01 is rejected and H11 is accepted. There are differences in color preferences level between the dawet with different taro flour substitutions. Then the hedonic color test can be continued to the Duncan test to see the differences in preference for each variant of taro flour. It can be seen from Table 4, the level of consumer preferences of the samples between 20% and 40% are the same, 60% and 80% are the same as well.However there's a difference from the sample 100 % which has the lowest favorite level value.

Table 3: Statistical Result of ANOVA Hedonic Test

Anova				
	Sum of Squares	Df	F	Sig.
Color	1,176	4	18,787	,000
	,157	10		
	1,333	14		
Flavor	,479	4	7,946	,004
	,151	10		
	,630	14		
Taste	,092	4	,988	,457
	,232	10		
	,324	14		
Texture	,063	4	1,102	,407
	,143	10		
	,206	14		

Source : Processed Data, 2016
:Alpha = 0.05
Sig > 0.0, Fcounted < Ftable: H0 accepted, H1refused
Sig < 0.05 Fcounted >Ftable: H0 refused, H1 accepted

Table 4: Duncan Test Result of Hedonic Color

Percentage of Substution	Notation	
	α<0.05	α <0.01
100%	C	c
80%	C	b
60%	C	ab
40%	A	a
20%	A	a

b. Hedonic Test : Flavor

Flavor is one of the main indicators which provide odor stimulation so that it can be smelled by humans. The flavor can provide a perception of the product. In addition, flavor can influence person to consume products. The data shows the average value of flavor preference, with the highest value is the sample of 20% Taro flour, then followed by sample 40%, 60% 100%, and 80%. Based on ANOVA results in Table 3, the significance values <0.05 and <0.01, Fcount> Ftable, then $H0_1$ is rejected and $H1_1$ is accepted, that there is a difference in flavor preferences level, between dawet products with different taro flour substitutions. And then directly proceed with Duncan Test. From Table 5 of Duncan's test results, based on α <0.05, samples 20% and 40% are not significantly different but different with samples 60%, 80%, and 100% while in the error rate α <0.01 sample 20% are different from all other samples.

Table 5: Duncan Test Result of Hedonic Color

Percentage of Substution	Notation	
	α < 0.05	α<0.01
100%	c	b
80%	bc	b
60%	bc	b
40%	a	ab
20%	a	a

c. Hedonic Test : Taste

Taste is the result of stimulation from the sense of taste, tongue. Taste preference for a particular product is also closely related to the flavor and look of the product so that, it can cause someone like or dislike a product. Taste is defined as stimulus that is received by tongue into our mouth and the tongue can sense different type of taste then provide a perception of the product.

The highest average value of flavor preference is the sample contain 60% taro flour, then followed by 40%, 20%, 80%, 100% of taro flour subtitutions. Judging from the Anova statistical result in Table 2, the taste preference test states that the significance value> 0.05, or the value of Fcount <Ftable, then $H0_1$ is accepted and $H1_1$ is rejected which can be interpreted that the taste preference level is not significantly different in Dawet with different substitution of taro flour.

d. Hedonic Test : Texture

Texture is an attribute of sensory that can be felt by touch. The characteristics of the texture itself can be accepted by sight and touch. The average texture value of sample 20% and 80% has the same value which is the highest value of the hedonic test of texture preferences, as for the sample of 40% and 60% these also have the same and the value are less than the highest one. then the least value is dawet with 100% taro flour sample. The results of the statistical analysis in Table 2 show the significance value> 0.05, or the value of Fcount <Ftable, then $H0_1$ is accepted and $H1_1$ is rejected. It can be interpreted that the level of texture preference is not significantly different in Dawet with different substitution of taro flour.

4.1.2 Sensory/Hedonic Quality Test

Quality test or hedonic quality test is carried out to determine the difference in quality of each sample tested. The average results of Taro Dawet hedonic quality test can be seen in Table 6 and Anova test results can be seen in Table 6.

Table 6: Taro Dawet Hedonic Quality Test

Anova				
	Sum of Squares	df	F	Sig.
Color	2.582	4	32.572	,000
	.198	10		
	2.781	14		
Flavor	.605	4	7.741	,004
	.195	10		
	.801	14		
Texture	.986	4	27.741	,000
	.089	10		
	1.075	14		

Table 7: Statistical Reslut of ANOVA Hedonic Quality Test

Percentage of Substitutions	Notation	
	α <0.05	α <0.01
100%	d	d
80%	d	cd
60%	c	bc
40%	b	ab
20%	a	a

Source : Processed Data, 2016

:Alpha = 0.05

Sig > 0.0, Fcounted < Ftable: H0 accepted, H1refused

Sig < 0.05 Fcounted >Ftable: H0 refused, H1 accepted

a. Hedonic Quality Test : Color

Table 6 show the result of the hedonic quality test of the Taro Dawet color which has the highest average value found in the sample of 20%, then followed by sample 40%, 60%, 80%, then 100 % taro flour substitution. The results of color measurements with a scale from pure white to not too white. Dawet whose color is pure white when made from rice flour, the color changes when adding taro flour. The color is increasingly turning to turbid white or gray as the level of substitution increases, this is due to the dominant color of taro starch which is gray. Anova statistical results of hedonic quality in Table 7 state that the color indicators have significance value <0.05 or Fcount> Ftable, then $H0_2$ is rejected and $H1_2$ is accepted. It can be interpreted there are significantly different color quality levels on Dawet flour with different percentage of Taro Flour substitutions. Then, proceed to the Duncan Test which can be seen in Table 8. Table 8 show in the level of α<0.05, sample 80% and 100% taro flour substitution have no color difference. Then in the sample of 20%, 40%, 60% and 80% there is a real color difference. Whereas at α <0.01, only 20% and 100% samples had significant color differences from other samples.

Table 8: Duncan Test Result of Hedonic Quality Color

Indicator	Taro Flour Substitutions (%)				
	20 %	40 %	60 %	80 %	100 %
Color	4.57	4.21	3.88	3.59	3.42
Flavor	3.59	3.40	3.07	3.15	3.10
Texture	3.88	3.69	3.44	3.31	3.17
Total Average Value	4.01	3.76	3.46	3.35	3.30

b. Hedonic Quality Test : Flavor

Table 6 show the result of the hedonic quality test of the Taro Dawet flavor which has the highest average value found in the sample of 20%, then followed by 40%, 60%, 80%, and 100%. Measurement scale from very not unpleasant to very unpleasant. Along with the increase of taro flour substitution induces unpleasant flavor. From the result of the ANOVA analysis which can be seen in Table 7. The significance value of flavor hedonic quality test is <0.05 or Fcount> Ftable, then $H0_2$ is rejected and $H1_2$ is accepted. It can be interpreted there are significantly different level of flavor quality among Dawet Ice with Taro flour substitutions. And then the sample continued with the Duncan Test that can be seen in Table 9.

Duncan test result showed the value of the flavor hedonic quality with a significant difference at α <0.05 shown between samples 20%, 60%, and 100%. Whereas at α <0.01, it is shown that sample 20% has a marked difference between the others.

Table 9: Duncan Test Result of Hedonic Quality Flavor

Percentage of Subtitutions	Notation	
	α <0.05	α <0.01
100%	c	b
80%	bc	b
60%	c	b
40%	ab	ab
20%	a	a

c. Hedonic Quality Test : Texture

Table 6 show the result of the hedonic quality test of the Taro Dawet texture which has the highest average value found in the sample of 20%, then followed by 40%, 60%, 80%, and 100%. This dawet texture seen from its elasticity, the higher substitution of taro flour, texture are softer. In other words, the sample in which has the highest value in the elasticity level is sample 20%. Based on Table 7, the Anova statistical result of the texture quality test stated that the significance value <0.05 or Fcount> Ftable, then $H0_2$ was rejected and $H1_2$ was accepted. It can be interpreted that the level of hedonic texture quality is significantly different in dawet samples with different taro flour substitutions. Duncan test result of hedonic texture quality can be seen on table 10

Table 10: Duncan Test Result of Hedonic Quality Texture

Percentage of Substitution	Notations	
	α <0.05	α <0.01
100%	d	c
80%	cd	bc
60%	c	b
40%	b	a
20%	a	a

Duncan test results of the hedonic quality of texture at the level of α <0.05 indicate that the sample 80% and 100% have no texture differences. So are the sample 60%, and 80%. But among samples 20%, 40%, 60% and 100%, there were textural differences. Whereas at α <0.0, Duncan test shows that the 20% and 40% samples are not different, but both are different based on sample 60%, 80%, and 100%. But there were no significant texture differences in the sample of 80% and 100% dawet with taro flour substitution.

d. The Best Formulation

Based on Table 2, the average value of total sensory indicators (color, flavor, texture, and taste) of the overall preference tests can be seen that the substitution of 20% of taro flour in making dawet becoming the most favorite sample of panelists, then followed by samples 40%, 60%, 80% and 100%. Then sample 20% will be continued to have nutrition test to know the amount of each nutrient contained in it. This 20% sample has the characteristics of white color, slightly unpleasant flavor, and rather chewy in texture. Then, Dawet can be serve with palm sugar and coconut milk that can be added adjusted to consumer taste.

4.1.3 Proximate/Nutrition Fact Analysis

Sample 20% which is the best sample based on panelists have been tested in Saraswanti Indo Genetech Bogor. The results can be seen in Table 11, each 100 grams of dawet ice which contains 20% taro flour has a total energy calculation of 28 calories, The serve suggestion is just adding a little portion of palm sugar and coconut milk.

Table 11: Nutrition Fact of Taro Dawet Ice (Without Sugar and Coconut Milk)

No	Parameter	Unit	Result
1	Calories form fat	kkal / 100g	2.16
2	Total Calories	kkal / 100g	28.08
3	Water content	%	93.26
4	Ash content	%	0.02
5	Total fat	%	0.24
6	Protein	%	0.46
7	Total carbohydrate	%	6.02

Source: Result of proximate test in Saraswanti Indo Genetech, 2016

5 DISCCUSSION

5.1 Taro Dawet Ice as Local Food Innovation and It's Potential as Tourist Attraction

Based on the result of sensory test, Taro Flour can be substituted in making dawet up to 100%. However, after going through a preference test, 20% is the most preferred and best sample in terms of

quality. The characteristics of dawet made from taro are white, the aroma is rather unpleasant, and the texture is chewy. This product also has a low calorie so that it can be consumed by people who are on a diet. According to Nurdjannah and Amiarsi (2011), taro flour has health benefits, including energy sources, both for digestive health, improving the body's immune system, carbohydrate substitute for people with diabetes, blood pressure and heart health, as well as increasing vision. But not all people can enjoy processed products from taro, for example, obese people, and allergic sufferers who are sensitive to the mucus and oxalate content contained in taro

Generally, taro tubers are only consumed by boiling, frying, or by other conventional methods. And dawet is generally made with rice flour. Both rice flour and taro flour are Indonesian local raw materials. The differentiation of dawet products is also expected to be a surprise for consumers or tourists, so they are interested in getting new experiences trying new flavors from local culinary products. Taro is mostly found in Bogor, West Java. The identity of various culinary cities in Indonesia need to be strengthened with innovative products based on local products.

Local cuisine is currently being concern in tourism. Because eating is basic needs of tourists. According to Chang, Hall & Mitchell, and Scarpato (in Mak et.al, 2012) there are increasing numbers of destinations for their culinary resources in promoting and differentiating themselves from others, for example, Australia, New Zealand, Italy, and Singapore. Today, many tourist destinations use food as one of the tourist attractions in their tourism marketing (Lin, Pearson & Chai, 2011). Furthermore, Telfer and Wall (in Mak, et.al, 2012) state that tourist expenditure for food reaches one third of total tourist expenditure, therefore the economic benefits resulting from the consumption of tourist meals can give impact on the economic sustainability, competitive destinations, and development of hospitality business. in that area. Local culinary innovation products such as Taro Dawet ice is very potential to be developed as regional tourism attractions.

6 CONCLUSION

Taro flour can be substituted in making dawet up to 100%, but the best sample is 20% percentage of subtitutions. It’s position is in the first rank of the test of preference. The characteristics is good in color (white), flavor (rather unpleasant, but not too) and texture (chewy) and all is accepted by the examiner in sensory evaluation. The difference in the level of preference for the sample tested are in the hedonic test of color and flavor, while it does not differ in texture and taste. Whereas in the hedonic quality test, all samples have significant differences in terms of color, taste, and texture. After doing the proximate test taro resulting dawet is low in calories. Suggestions for the use of sugar to be added sufficiently so that it is safe for Diabetics sufferers. It can also added with other natural sweeteners such as honey. Suggestions for further research is to be able to do the experiments on other local culinary products varied from taro tubers, other tubers, and other culinary products made by local commodities.

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