CHAPTER 1

INTRODUCTION

1.1 Background

Indonesia is a country that has a variety customs and culture. The variety of people and nature has brought Indonesia to have various culinary according to the places as well. One of the most popular food in Indonesia was Indonesian traditional snack. Each part of Indonesia has their own kind of food and its uniqueness.

Indonesian traditional snack or we called as *jajanan pasar* is a traditional food that we could get from the market, especially in the traditional market. Usually the foods are small snacks, it could be sweets or savoury snack. It was called as *jajanan pasar* since it was traditionally sold in the market.

There are many types of Indonesian traditional snack. They were made from various kind of main ingredients and various kind of technique. Each part of Indonesia has their own popular snacks. One of the popular snacks is pukis.

Pukis was Indonesian traditional snack that was made from wheat flour, margarine, eggs, yeast, coconut milk, vanilla paste, and sugar. Pukis have a half-round shape with brown colour on the outside and yellow on the inside. People usually add cheese or chocolate sprinkle as the topping to add flavour, and it was usually served when it was still hot to make sure it was still soft when served. People could find it in the traditional market and it was usually sold in the morning. People usually have pukis for their breakfast along with coffee or tea.

Pukis was very popular among Indonesians, and pukis was a food that can be enjoyed by anyone. Starting from children until elderly, they all enjoy pukis as their snack. Pukis has a sweet taste and unique aroma that was from the margarine and fermentation of the yeast. The uniqueness of pukis might be the reason that pukis is very popular in Indonesia. Because of the popularity of pukis as a traditional snack, nowadays pukis can be easily found anywhere in Indonesia, starting from traditional market, malls, until online food shopping are selling pukis.

Indonesians use wheat flour a lot in the food making process. But a lot of people didn't know that Indonesia has been importing wheat from Australia and since 2018 Indonesia has been the biggest wheat importer in the world (Soesilowati, 2020). The number of imported wheats will not go down since the number of needs was still very high. Therefore, in this research, writer was trying to substitute wheat flour with coconut flour to help minimalizing imported foodstuff in Indonesia and change it with Indonesian-made foodstuff like coconut flour.

The import number in Indonesia was still very high, therefore Indonesians need to find a way to substitute the imported items and foodstuffs with a local product to help local entrepreneur and local farmer to grow and develop more.

Coconut flour can be an option for wheat flour substitution since Indonesia has produced their own coconut flour and coconut flour has been distributed and exported to another country, so it could help to decrease the import number of wheat by substituting wheat with coconut flour.

Coconut flour was mostly produced in North Sulawesi. Indonesia has been exporting coconut flour to various country such as Israel, China, Taiwan, and

Malaysia. By exporting coconut flour to another country, it could increase Indonesia's foreign exchange. By using coconut flour as a substitution of another flour, it could increase the demand of coconut flour, and it could lead to increasing production of coconut flour as well.

Besides on the culinary side, Indonesia was also famous for its nature. Indonesia has a huge natural site and Indonesia was known as a tropical country. Coconut plantation has been the second biggest plantation in Indonesia after palm oil plantation. Therefore, Indonesia have a lot of coconut and foodstuffs made of coconut as well.

Coconut flour was a type of flour that was made from desiccated coconut. Coconut flour was made by grating the coconut, and take out all the coconut milk until it was dry, and then the grated coconut will be dehydrated until there is no water in the coconut anymore. Then the coconut will be grinded one more time to make sure it was soft as flour, then coconut flour was ready to use.

Coconut flour has a lot of health benefits because it contains a lot of nutritious ingredients in it. It has a high content of fibre, and it was good for digestion system. Another benefit is that it could help to lose weight because coconut flour contains high fibre and proteins which could help to reduce hunger. Coconut flour also contains good fat that create a good metabolism. Coconut flour also contains low carbohydrate, so that it was a better choice for people who has diabetes, because it helps with managing blood sugar level. According to health, coconut flour was much healthier than wheat flour.

Substituting wheat flour into coconut flour could bring a huge advantage in many aspects. It is good for the country and for the consumer's health as well. Besides pukis, coconut flour could also be a substitute for other snacks that use wheat flour. With substituting wheat flour into coconut flour the number of wheat imports will decrease as well, and we could help Indonesian local farmers to grow bigger.

According to the analysis above, then a research will be carried out under the title of "Coconut Flour as A Substitution for Wheat Flour in Pukis Making Process".

1.2 Problems

According to the background, writer has found a few problems which is:

1. Is there any different texture, taste, and colour on the pukis after it was substituted with coconut flour?
2. How was people's response on the pukis after it was substituted with coconut flour?

1.3 Purposes of Research

The purpose of this research is:

1. To find the texture, taste, and colour differences on the pukis after it was substituted with coconut flour.
2. To know people's response on the pukis after it was substituted with coconut flour.

1.4 Benefits of Research

1. For writer, it helps writer to gain more information and create a new innovation that could help people in the future.
2. For the society, it allows the society to understand more about coconut flour and could give information about creating foods using coconut flour as the substitute of wheat flour.
3. For the next researcher, it could give information and references in their next research.

1.5 Writing System

In the preparation of this final project, a systematic writing and description of the problem is needed to avoid overlapping information. Therefore, this final project was spelled out into 5 chapters, which is:

CHAPTER 1 INTRODUCTION

This chapter explain about the background reason of choosing the title, the problems that become the base of this research, the purposes of the research, the benefits of the research, and the writing system of the research.

CHAPTER II LITERATURE REVIEW

This chapter consists of theory that examine the research subject and hypothesis of the research.

CHAPTER III RESEARCH METHODOLOGY

This chapter explain about the ingredients and tools needed in the research, research method, research time and place, and the procedure of ingredients preparation, treatment, and observation of the result, and analyzing the data.

CHAPTER IV RESULTS AND DISCUSSION

This chapter discuss about all the information gathered and the results of the data collection in the research and linked to the problem solving.

CHAPTER V CONCLUSION AND SUGGESTION

This chapter consists of the conclusion about the research and the suggestion for the research problems so that the research could be developed more.

CHAPTER 2

LITERATURE REVIEW

2.1 Pukis

Pukis is one of Indonesian traditional snack originally from Central Java specifically Banyumas. Pukis has been spreading through all over Indonesia and now we can find pukis in every area in Indonesia easily. Pukis was made with wheat flour as the main ingredients, and other ingredients such as egg, yeast, coconut milk, vanilla paste, sugar, and margarine. Pukis usually served as a snack to eat with coffee or tea in the morning. Pukis has a unique shape and colour. It was in a half-moon shape and has brown colour on the outside and yellow on the inside. (Ningrum, 2017). Pukis seller usually cook the pukis right before it was served to make sure the pukis is still warm to make it taste better. There are a lot of types of pukis which is *kue pukis*, *kue pancong*, and *kue rangi*. Although they have the same shape, and technique, they are differentiated by the ingredients used. *Kue pancong* was made from rice flour, shredded coconut, suji leave, and sugar. *Kue rangi* was made from tapioca flour and shredded coconut. Usually kue rangi was served with palm sugar sauce to add sweetness.

According to nibble.id, pukis was originally from China. The history of pukis started when some young man from a village in Kebumen were working to a Chinese man that sells a snack that now we called as pukis. The seller keeps the recipe as a secret, but then the young man that works there finally knows the secret recipe of the cake and finally they started a business and named the snack as pukis

that are known as one of Indonesia traditional snacks now ("9 Sejarah Unik dari Kue Jajanan Pasar - Nibble.id | Foodies Guide to F&B Industry", 2019).

The characteristic of pukis is that pukis has a soft texture (Chrestella, 2020). For the taste, pukis originally have a sweet taste that comes from the sugar, and a little savoury flavour from the coconut milk and margarine. The colour of original pukis is brown on the outside and yellow on the top, and the shape is half round same as the pukis mold that make pukis shape is unique (Peenelitian et al., 2019).

In the making process, pukis use sponge technique where egg and sugar were beaten up until it was foaming, then add dry ingredients and wet ingredients gradually and keep mixing until there are no lumps.

2.1.1 Wheat Flour

Wheat flour is a flour that is made of wheat through milling or grinding process. Wheat flour usually was used to make cake, biscuits, noodles, bread, and others. Wheat flour has a high starch content which is insoluble carbohydrate. Wheat flour also contains protein in the form of gluten. Gluten is a rubbery mass that keeps remaining when wheat dough is washed by water (Wieser, 2007). Gluten is a protein that has higher stability that could give a better food quality (Syarbini, 2016). Wheat flour's characteristic is soft, have a white colour, and have no specific scent. Some bakers called flour as patent flour, which means flour that was used for bread. There are a few types of patent flour which is:

1. Bread flour

   Bread flour was made with a good-quality gluten to make it great for bread yeast. Usually patent bread flour contains 11-13,5% of protein.

2. High-gluten flour

   High-gluten flour was usually used to make a hard-crusted bread, and some special products such as pizza dough and bagels. Usually high-gluten flour contains 14% of protein.

3. Cake flour

   Cake flour has a lower gluten content. It has a smooth texture and white colour and usually was used to make cakes that require low gluten content. This type of flour contains approximately 8% of protein.

4. Pastry flour

   Pastry flour was also a low-gluten flour like cake flour, but it has a slightly higher protein than cake flour. It contains about 9% of protein and usually used to make pie dough, cookies, biscuits, and muffins (Gisslen, 2017).

Another type of wheat flour that is often used is:

1. All-purpose flour

   All-purpose flour is often used as a general-purpose flour. The protein content is slightly lower than bread flour, therefore, it can be used for pastry as well. It contains about 10-11,5% of protein.

2. Self-rising flour

   Self-rising flour is a wheat flour that was mixed with baking powder, and sometimes salt as well.

3. Whole wheat flour

   Whole wheat flour is a type of flour that uses the entire wheat kernel (whole wheat). The protein content in whole wheat flour is usually around 12-13% (Gisslen, 2017).

To make pukis, the type of wheat flour used was a wheat flour that contains 10-11% of protein from Bogasari “Segitiga Biru”. Wheat flour in pukis was used to unify all the ingredients, create texture, and to add softness in the batter. To avoid clumps in the batter, the wheat flour should be sifted before mixed with other ingredients.

Wheat flour making process is divided into two steps, which is preparation and milling. Preparation process was the step to prepare the wheat before it was milled to make sure the wheat has a good quality. The process includes cleaning process to make sure the wheat is clean and spared from any dirt. There are three cleaning steps before the wheat is ready to continue to milling process, which is pre-cleaning, first cleaning, and second cleaning. After the wheat was cleaned, wheat will go through dampening and conditioning process. After the cleaning process is done, the milling process will start. It started with grinding and sifting for 2-5 times then continues with purifying steps. After going through all these process, wheat flour are ready to packed and used (Christine;dkk, 2012).

Table 2.1

Nutrient content of wheat flour per 100 grams

Components	Amount
Calories	350kkal
Fat	1gr
Protein	10gr
Carbohydrate	75gr
Natrium	0mg

Source: (Bogasari: Segitiga Biru Flour packaging)

Table 2.2

Comparison content of wheat flour and coconut flour

Components	Wheat Flour	Coconut Flour
Calories	350kkal	356kkal
Fat	1gr	33gr
Carbohydrate	75gr	15gr
Protein	10gr	3,3gr

Source: (Bogasari: Segitiga Biru Flour packaging & Khas Nusantara Original Desiccated Coconut packaging)

Compared to coconut flour, wheat flour has lower number of calories and fat which would be better for people who has high cholesterol, but for to the carbohydrate and protein, coconut flour has a lower amount of carbohydrate and protein which would be better for people who has a high blood sugar level.

2.1.2 Egg

The type of egg used in pukis making process was chicken egg. Egg contains nutritious elements that human needs such as protein, fat, vitamin, and mineral. Eggs could be used in a various way because the price is relatively cheap according to another animal protein sources (Indrawan et al., 1970). Besides good for health, egg also helps to bind all the ingredients together because egg has an emulsion function.

Eggs used in pukis making process needs to be in a good condition, and in a room temperature to make sure the pukis are developing well. In cake making process, egg was also used as a cake developer to make the cake is airy and soft, to add aroma, to add flavour and make the flavour is richer, to add yellow colour from the egg yolk, and to add nutrition as well since egg has a lot of nutritious content in it.

Table 2.3

Nutrient content of egg per 100 grams

Components	Amount
Calories	162kkal
Protein	12,8gr
Fat	11,5gr
Carbohydrate	0,7gr
Calcium	54gr
Phosphor	180gr

Vitamin A	900SI
Vitamin B	0,1SI

Source: (Sataloff et al., n.d.)

2.1.3 Yeast

Yeast is one of leavening agents type that create CO_2 in a cake or bread making process. Most yeast was made from a microbe called *Saccharomyces Cerevisiae.* When yeast meet sugar, there will be fermentation process and it will create carbon dioxide and alcohol. Carbon dioxide will be trapped inside the dough and will make the dough expand. Yeast will affect flavour, texture, and colour of the bread (Sitepu, 2019). Yeast was divided into 3 forms which is:

1. Fresh yeast or compressed yeast is a type of yeast that is moist and perishable. Professional baker usually will used fresh yeast in the baking process. Some bakers will crumble the compressed yeast and add it directly to the dough using straight method.
2. Active dry yeast is a form of a yeast that is dry and granular. It must be rehydrated with warm water before it was used. It was rarely used in professional baker since it contains around 25% dead yeast due to the drying process, and the dead yeast cell can have a negative impact to the dough quality.
3. Instant dry yeast or rapid-rise or quick-rise yeast is similar to active dry yeast, it is dry and in a granular form. The difference is instant dry yeast didn't need to be rehydrated first and it could be added to the dough in

a dry form since it absorb water faster than active dry yeast (Gisslen, 2017).

In pukis making process, instant dry yeast was used as the leavening agent. Choosing yeast was crucial in any cooking process using yeast, yeast has to be in a good condition in order to work. Yeast need to be kept well, and it needs to avoid moist to make sure it's still works when mixed with other ingredients and can help the cake to develop better. Besides helping the batter to develop, yeast also add a unique aroma that make the pukis smell and taste better.

2.1.4 Coconut Milk

Coconut milk is a milky-white liquid made of matured coconut. Coconut milk is a traditional food ingredient used in any country especially tropical and subtropical country. Coconut milk was made by grating coconut meat and squeeze it until the water come out. Coconut milk is an oil-in-water emulsion which means the liquid contains oil and milk at the same time. The nutrition content in coconut milk is depending on the coconut meat and the process whether it is made with added water or not (Patil & Benjakul, 2018). The older the coconut meat is, the less oil content in it. Therefore, older coconut meat will create dryer coconut milk than young coconut milk and have less flavour compared to young coconut meat.

There are two types of coconut milk, which is fresh coconut milk, and instant coconut milk. Fresh coconut milk is a coconut milk that was made freshly by squeezing the coconut meat and it was used right away after the squeezing process. Instant coconut milk is a coconut milk that is sold in the grocery stores and

already go through some process and was package so customers can use it anytime they want. The fresh coconut milk has the thickness level according to the amount of water added in the making process. The type of coconut milk used in pukis making process is medium coconut milk with 1:1 ratio of coconut milk and water. Adding coconut milk helps to enhance the flavour of pukis, and to be the substitution of water.

Table 2.4

Nutrient content of coconut milk per 100 grams

Components	Coconut milk without added water	Coconut milk with added water
Calories	324kkal	122kkal
Protein	4,2gr	2gr
Fat	34,3gr	10gr
Carbohydrate	5,6gr	7,6gr
Calcium	14mg	25mg
Phosphor	45mg	30mg
Iron	1,9mg	0,1mg
Water	54,9gr	80gr

Source: (Rukmana & Yudirachman, 2016)

2.1.5 Vanilla

Vanilla is an extract of vanilla beans that was processed until it has a strong flavour and scent of vanilla and it was usually used in the food industry. Vanilla is used to enhance flavour in dairy products (milk), beverages, and bake goods. Vanilla also add an aroma to the products (*Lako_and_Hazelman_2014.Pdf*, n.d.). Vanilla could be processed to various form such as paste, essence, and powder. There are a few types of vanilla that can be used in cooking process which is vanilla beans, vanilla extract, vanilla paste, vanilla essence, and vanilla powder.

In pukis making process, writer added vanilla paste into the batter. Vanilla paste was used to enhance the flavour and to add vanilla scent to make the pukis more appetizing.

2.1.6 Sugar

Sugar is one of the most important ingredients in baking and cooking. Sugar is a simple carbohydrate that we could find naturally in plants. Sugar cane and sugar beets are plants that have the highest sucrose content and it became the main ingredients in making commercial sugar. There are two types of sugar in general:

1. Monosaccharide consist of only one molecular unit such as glucose (dextrose), galactose, fructose, and mannose. It was usually found in a nature such as honey, and fruit juice.
2. Disaccharides consists of more than one unit from monosaccharide such as glucose and fructose which is

component of sucrose. Another example is lactose, which is composed of galactose and glucose where occurs in milk (Goldfein & Slavin, 2015).

In baking, sugar was important to activate the yeast so that the yeast could work in the dough. Besides that, sugar was also used to add flavour and give colour (caramelized) to the products. There are various type of sugar and each of them has their own function. People use any type of sugar according to their needs. Some type of sugar is:

1. Granulated sugar is a regular sugar that usually used in a household. Granulated sugar looks like a fine crystal with a rough texture. It was made from a crystalized sugar cane extract. It can be used in a various way from making caramel, as a drink sweetener, added to foods, and others.
2. Castor sugar is a very fine sugar, it was grinded until it has a very smooth texture. Usually it was used to make whipped cream or icing to create a smooth texture in the whipped cream and icing.
3. Rock sugar is a type of sugar that looks like crystal. It has a very hard texture and was hard to be dissolved in water.
4. Brown sugar is a mixture of granulated sugar and molasses. The colour is brown and has a sticky and moist texture. It has a unique caramel aroma. It was usually used to make cake and cookies to add fragrance to the cake and cookies.

5. Palm sugar is a sugar that is made from palm fruit. The colour of the sugar is brown and the texture is hard. It has a unique flavour and usually used in traditional food such as *dodol, bolu kukus*, and others ("Mengenal 7 Jenis Gula dan Kegunaannya", 2018).

In pukis making process, writer use granulated sugar as the sweetener. Besides to add sweetness, writer use sugar to activate the yeast and to extend the expiry period.

2.1.7 Margarine

Fats are one of the mostly used ingredients in baking, fats are used to add moist and richness of the product, to increase the tenderness, to increase keeping quality (extend the expired date), to add flavour, and to assist in leavening. Another function is to add flakiness to some products such as puff pastry, pie dough, and others. There are a lot of types of fats that is usually used in baking such as shortening, butter, margarine, oil, and lard (Gisslen, 2017). Each of them has their own characteristic and could be used according to the needs.

In pukis making process, writer use margarine as the source of fat. Melted margarine used in the pukis batter, and it was also used to cook the batter in the mold to prevent pukis into sticking to the mold. Margarine adds flavour and aroma to the pukis that enhance the quality of the pukis.

Margarine is one of the sources of fat in baking/cooking process. Margarine was made from vegetable fats added by flavouring ingredients, emulsifier, colouring agents and other ingredients. Margarine contains around 80-85% fat and

10-15% moisture, around 5% of salt, and other components. There are 2 categories of margarine that is usually used in professional bakery:

1. Cake and baker's margarines are a type of margarine that have good creaming ability and soft. They could be used in cakes and other products.
2. Pastry margarines is tougher and more elastic comparing to cake margarine. Pastry margarine was specialized for layered dough such as Danish dough and puff pastry. Pastry margarines itself was divided into 2 type which is puff pastry margarine and roll-in margarine. Puff pastry margarine helps the dough to rise higher, but this type of fat doesn't melt in the mouth so it was not really good to eat. Roll-in margarine has a lower melting point, and it can be used in Danish pastries, croissant, and puff pastry (Gisslen, 2017).

2.2 Coconut Flour

Coconut flour is a type of flour made from desiccated coconut meat and processed with a hygiene system to provide edible food for human. Coconut flour uses an 11-month-old coconut that have a thick coconut meat to produce a good flavour.

Coconut flour making process started with selecting old coconut that have thick coconut meat, then separate the coconut meat and skin until only white coconut meat left. After the coconut meat is ready, the coconut meat will go to grinding process. Grinded coconut meat will be steamed and then it will be dried

with dryer. In the drying process, changes of colour should be avoided so that the coconut flour will remain white. Drying process is really important to avoid changing colours and growing microorganism in the coconut flour. To maintain the colour of coconut flour, during the drying and storing process, coconut meat will be soaked in a bleaching agent (SO_2) that continues with steaming process (Toreh, 2010).

There are a few types of coconut flour and it was identified by the mesh size and the ability of the flour's particle to get through the mesh.

Table 2.5

Types of Coconut Flour

Types of coconut flour	Mesh size (mm)
Extra fine	1,00
Fine	1,68
Medium	2,80
Coarse	4,76

Source: (Toreh, 2010)

In this research, writer uses Khas Nusantara Original Desiccated Coconut which is considered as fine coconut flour. The nutrient content of the coconut flour could be seen in the table below.

Table 2.6

Nutrient Content of Coconut Flour per 100 grams

Components	Amount
Calories	356kkal
Fat	33gr
Cholesterol	0mg
Sodium	20mg
Potassium	356mg
Carbohydrate	15gr
Protein	3,3gr

Source: (Khas Nusantara Original Desiccated Coconut packaging)

2.2.1 Coconut (*Cocos nucifera*)

Coconut (*Cocos nucifera*) is a fruit that grows in a tropical and subtropical countries. Indonesia is one of the largest coconuts producing country in the world. Coconut is one of an important fruit for this world that provides food for millions of people. It also provide a healthy value and could be used as a medicine (DebMandal & Mandal, 2011). Coconut has a round shape with the size bigger than human's head. Coconut consist of outer sell (*Epicarp*), fibre (*Mesocarp*), inner shell (*Endocarp*), coconut meat, and coconut water (Toreh, 2010). Every part of coconut could be used in everyday life starting from the outer shell, it was usually used as a substitution of firewood, the fibre could be used as an organic fertilizer because it has a mineral content that could help plant to grow. Coconut meat could be eaten fresh and could be processed into

coconut milk, coconut flour, and other coconut products. Coconut water could be used as a natural beverage, and as a medicine as well (Prades et al., 2012).

Table 2.7

Nutrient Content of Coconut Meat

Components	Amount
Water	52%
Oil	34%
Protein	3%
Sugar substance	1,5%
Ash substance	1%

Source: (Toreh, 2010)

2.2.2 Benefits of Coconut Flour

Coconut flour has a lot of benefits comparing to wheat flour, because it has a lot of nutritious content in it. These are the benefits of coconut flour according to *hello sehat* article (Iswandiari, 2020).

1. Controlling blood sugar level

   Coconut flour has a high content of fibre, and it helps to control blood sugar level. According to British Journal of Nutrition from 2003, substituting wheat flour into coconut flour reduce the *glycemic index* (a measurement of the impact of food on sugar level).

2. Lose weight

   Coconut flour contains high fibre, and high fibre content also helps to maintain hunger and helps to stay full longer. Therefore, consuming coconut flour helps to control appetite and to control weight as well.

3. Helps with metabolism

   Besides high in fibre and protein, coconut flour is high in nutrient as well. One of the highest nutrients in coconut flour is saturated fat in the form of medium chain fatty acid (MCFA). Medium chain fatty acid was used in the body to produce energy and helps to have a healthy metabolism.

4. Helps with digestion system

   Coconut flour is very nutritious and it was best to consume for people with high cholesterol level to reduce cholesterol and triglycerides level. The fibre contents help to maintain the healthiness of intestines that leads to healthy digestion system.

2.3 Mixing Methods

Mixing method was one of the most crucial things in making a cake, using a wrong method could result in cake with bad texture and volume. The goals in mixing cake batter is to combine all ingredients into one mixture, to form air cells in the batter, and to develop the texture of the finished product. There are 2 types of mixing method which is (Gisslen, 2017):

1. High-fat or shortened cakes itself are divided into 4 methods:

   a. Creaming method is a method that is usually used for mixing high-fat cakes. The method is to cream the butter and sugar first then add eggs

one by one and lastly add the dry ingredients. It is often used to make butter cakes.

b. Two-stage method has two stage of adding liquid into the batter. The first step is to add dry ingredients and shortening and mix it, then add other liquid such as eggs into the mixture.

c. One-stage method is a method that mix all the ingredients at once. The step is to add liquid first to the bowl, then top it with dry ingredients and then mix everything together.

d. Flour-batter method is used for special items. The step is to add all dry ingredients and fat except sugar and mix it. Then whip the sugar and eggs together, lastly mix flour-fat mixture and sugar-egg mixture together.

2. Egg foam cakes are also divided into 4 methods:

a. Sponge method is a method where eggs and sugar are whipped into a thick foam, then dry ingredients was added to the whipped egg and mixed together.

b. Angel food method are based on egg-white foams and contains no fat. Egg white and sugar was whipped until it reaches medium peak, then fold flour-sugar mixture until it was mixed well.

c. Chiffon method is similar to angel food method, but the difference is that a batter contains of flour, egg yolk, oil, and water is folded into the egg-white foam.

d. Combination creaming/sponge method is a method that combines creaming and sponge method. It begins with creaming method, then whipped egg was folded into the batter.

In this pukis making process, writer uses sponge method as the mixing method. Writer whipped eggs and sugar first until it was thick, then dry ingredients and other liquid was added gradually until the batter was mixed well.

2.4 Hypothesis

Hypothesis was originally a Greece word from a word "*hupo*" which means temporary, and "*thesis*" which means statement or theory. Hypothesis is an assumption about something that is not certain and the truth need to be explained or it required to be checked. A good hypothesis needs to be developed with an existing theory, logical explanation, or with researches before. It needs to have a clear purposes, and it should be able to be tested to prove the truth (Dr. Harnovinsah, 1992).

There are two types of hypothesis, which is:

1. Working hypothesis or alternative hypothesis (Ha) is a hypothesis that shows the connection between variable X and Y, or shows the differences between two groups.
2. Zero hypothesis or Null Hypothesis (Ho) is a hypothesis that shows no difference between two variables, or there is no influence from variable X to variable Y (Anonim, 2013).

According to the explanation above, for Coconut Flour as A Substitution for Wheat Flour in Pukis Making Process research, writer take a hypothesis as follows:

Levels of pleasure

Ho: Pukis substituted with coconut flour can be accepted by panellist.

H1: Pukis substituted with coconut flour cannot be accepted by panellist.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Ingredients and Tools

The ingredients used during the research of Coconut Flour as A Substitution for Wheat Flour in Pukis Making Process are as follow:

3.1.1 Ingredients

Here is the explanation about the ingredients needed in pukis control product making process and pukis with coconut flour substitution 30%, 60%, and 90% which can be seen in the table below:

Table 3.1

Pukis Ingredients

Ingredients	Weight
Wheat Flour	250gr
Egg	2
Yeast	1tsp
Coconut Milk	350ml
Vanilla Paste	1tsp
Sugar	180gr
Margarine	75gr

Source: ("Kue Pukis Pancong Wangi Empuk Coklat Meises - Resep | ResepKoki", 2021)

The treatment used of substituting wheat four with coconut flour in pukis making process are divided in 3 treatment, which is treatment 30%, 60%, and 90%. The ingredients needed in every treatment is as follow:

Table 3.2

Treatment in Pukis Making Process

No.	Ingredients	K (100%)	A (30%)	B (60%)	C (90%)
1.	Wheat Flour	250gr	175gr	100gr	25gr
2.	Coconut Flour	-	75gr	150gr	225gr
3.	Egg	2	2	2	2
4.	Yeast	1tsp	1tsp	1tsp	1tsp
5.	Coconut Milk	350ml	350ml	350ml	350ml
6.	Vanilla Paste	1tsp	1tsp	1tsp	1tsp
7.	Sugar	180gr	180gr	180gr	180gr
8.	Margarine	75gr	75gr	75gr	75gr

1. Wheat flour

   Wheat flour used was the wheat flour that was bought in the market at a price of Rp11.000/pack.

2. Coconut flour

   Coconut flour used was the coconut flour that was bought from online shop at a price of Rp24.500/pack.

3. Egg

   The egg used was chicken egg and bought in the market at a price of Rp24.000/kg.

4. Yeast

   The yeast used was yeast that was bought in the market at a price of Rp8000/pack.

5. Coconut milk

   Coconut milk used was fresh coconut milk that was bought in the market at a price of Rp14.000/pack.

6. Vanilla paste

   The vanilla paste used was vanilla that was bought in the market at a price of Rp67.500/bottle.

7. Sugar

   Sugar used was sugar that was bought in the market at a price of Rp12.500/pack.

8. Margarine

   The margarine used was margarine that was bought in the market at a price of Rp9.000/pack.

3.1.2 Tools

To make a good quality pukis and to help the making process become more efficient, a lot of adequate tools is required. The tools needed in this research are as follow:

Table 3.3

Tools Needed

No.	Tools	Explanation	Image
1.	Bowl	Stainless	
2.	Spoon	Stainless steel	
3.	Medium pot	Stainless steel	
4.	Hand mixer	-	

5.	Digital scale	-	
6.	Stove	-	
7.	Gas	-	
8.	Measuring glass	Plastic	

9.	Rubber spatula	Rubber	
10.	Silicone brush	Silicone	
11.	Pukis mold	Steel	
12.	Mixing bowl	Plastic	

13.	Hook	Steel	

1. Bowl

   Bowl was used to prepare and put all ingredients and to measure all the ingredients needed.

2. Spoon

   Spoon was used to take ingredients such as flour, sugar, margarine, etc and to move it to the mixing bowl.

3. Medium pot

   Medium pot was used to heat up coconut milk until it became warm enough before it was mixed to the yeast. It is also used to melt the margarine.

4. Hand mixer

   Hand mixer was used to beat up the egg until it was foamy, and to mix all other ingredients together until it became a batter.

5. Digital scale

   Digital scale was used to scale up the ingredients needed in pukis making process.

6. Stove

   Stove was used as a heat conductor to heat up coconut milk and margarine.

7. Gas

   Gas was used as a fuel for the stove to create heat to heat up coconut milk and margarine.

8. Measuring glass

   Measuring glass was used to measure liquid needed in pukis making process such as coconut milk.

9. Rubber spatula

   Rubber spatula was used to scrape the bowl and to stir and mix the batter.

10. Silicone brush

    Silicone brush was used to brush the margarine into the pukis mold to prevent pukis to stick to the mold.

11. Pukis mold

    Pukis mold was used to cook the pukis and to create the unique pukis shape. The mold will be heated up in the stove to create brown colour on the pukis.

12. Mixing bowl

    Mixing bowl was used to mix all the ingredients together in batter making process.

13. Hook

    Hook was a tool that is used to take the pukis out of the mold without damaging the pukis. It comes as a set with the pukis mold and cover.

3.2 Research Place and Time

Product making for research Coconut Flour as A Substitution for Wheat Flour in Pukis Making Process was done in February 2021 in Writer's house Villa Melati Mas blok I 2 no 2, Serpong, Tangerang Selatan. This research was done from February until June 2021.

No.	Activities	February			
		I	II	III	IV
1.	Deciding substitution product	√			
2.	Making control product	√			
3.	Making treatment product	√			
4.	Data processing			√	
5.	Writing final project			√	√

3.3 Research Procedure

3.3.1 How to Make Pukis

Here is the step by step to make pukis with coconut flour:

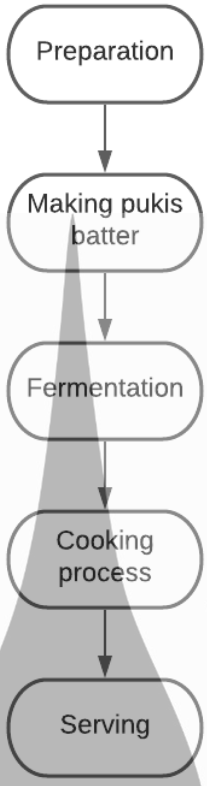


Image 3.1

How to make pukis

Here is the explanation of image 3.1:

1. Preparation
   a. The first step in making pukis is to prepare all ingredients and tools.

      In this step, tools should be prepared and cleaned so it will be ready

to use. Ingredients should be prepared and make sure it is in a good condition.

b. The second step is measuring all ingredients using digital scale. Ingredients should be measured according to the recipe. Ingredients that need to be warm such as coconut milk should be heated up, and margarine should be melted.

2. Making pukis batter

a. Starting with whisking the egg and sugar until its foamy. Eggs needs to be in room temperature and needs to be whisk using hand mixer in high speed until it expands and add sugar gradually until the egg mixture colour is pale yellow.

b. Add dry ingredients (flour and yeast) and coconut milk gradually. Add dry ingredients little by little alternating with the coconut milk until all the ingredients is mixed well. Adding flour step is adjusted to the treatment. Treatment A is using 70% of wheat flour and 30% of coconut flour. Treatment B is using 40% of wheat flour and 60% of coconut flour. Treatment C is using 10% of wheat flour and 90% of coconut flour.

c. Add melted margarine and vanilla paste slowly in the low speed so the batter will be softer. Mix until the mixture was smooth and have no lumps.

3. Fermentation

Let it rest for around 30 minutes and let the batter ferment and become double the size.

4. Cooking process
    a. In the cooking step, cook it using pukis mold. Heat up the pukis mold in medium heat, spread some margarine into the mold using silicone brush and wait until the mold is hot. Stir the batter slowly to remove bubbles from the batter, then add the batter slowly until it reaches ¾ of the mold's height.
    b. Cover the batter using the cover, then cook for 10-12 minutes in low heat until the bottom of the cake is not wet anymore. To add flavour, toppings such as cheese and chocolate could be added when the batter is still half cooked.
    c. After the bottom of the pukis change into brown colour, take out the pukis from the mold.
5. Serving

    Cool down the pukis a little bit and then serve it while the pukis is still warm.

3.3.2 Sensory Test Technique

Sensory test method using human sensory organ will use human as a measuring tool. The principal in deciding test method is depending on the purpose of the research. In deciding organoleptic test, selecting the right panellist and analysing the statistic is as important as choosing the right method (Maharani et al., 2015).

Here is the process of sensory test:

1. The making process of pukis that will be served to the panellist.
2. Choosing panellist randomly.
3. Sensory test process, the panellist will be given a control product dan treatment product (30%, 60%, 90%) randomly, and then panellist will try each product given.
4. After testing the products, panellist will fill in the questionnaire about the product.

3.4 Experimental Design

Experimental design is a procedure used in order to collect data in a research. In another word, experimental design is a procedure to use a treatment in an experiment unit with the purpose of getting a data that fulfil the scientific requirements.

There are 3 main elements in experimental design which is (Harsojuwono, B.A.; Ayu, I.W.A.G.; Puspawati, 2011):

1. Repetition is doing the experiment for more than one time. The function of repetition is to get the precise presumption or the possibilities of mistakes or errors. Writer do the repetition for 2 times in order to get the best quality of coconut flour and pukis.
2. Randomization is important in doing an experiment in order to avoid subjectivity because in a scientific research, logic and objectivity is needed. The best way to do randomization is to use a table with random

number and name the experiment units with random code. In randomization elements, writer use a random code for the products which is K for control product, A for treatment product with 30% of coconut flour substitution, B for treatment product with 60% of coconut flour substitution, and C for treatment product with 90% of coconut flour substitution.

3. Error trial is a failure or error from experiment units or mistake happens during the experiment. In another words, error trial is a variability that happens because of the inability of the experimental materials that got the same treatment to produce the same result. The function of error trials is to test the presence or absence of influence from the treatment. Another function is to show the efficiency of the experimental design to minimalize other mistakes in the next experiment.

In this research, writer use experiment as the research method. The purpose of experiment research is to test the hypothesis written down in the research, and to see the relation between variables.

The experimental design used in this research is manipulating pukis by using coconut flour as the substitution of wheat flour. The treatment use is:

1. Control product which is pukis that uses 100% wheat flour
2. Treatment A which is pukis that uses 30% of coconut flour and 70% of wheat flour

3. Treatment B which is pukis that uses 60% of coconut flour and 40% of wheat flour
4. Treatment C which is pukis that uses 90% of coconut flour and 10% of wheat flour

Table 3.4

Experimental design of coconut flour pukis

Ingredients	K (100%)	A (30%)	B (60%)	C (90%)
Wheat flour	250gr	175gr	100gr	25gr
Coconut flour	0	75gr	150gr	225gr

3.4.1 Descriptive Test

Descriptive test was used to identify important sensory characteristic in a product and give information about the intensity of the characteristic. Descriptive information could help to identify the ingredients variable or the process that is responsible for certain characteristic. Descriptive test could also be interpreted as a test that differentiate product according to the sensory characteristic and determining the product description quantitatively. Descriptive test method involves sensory attribute objectively, descriptively, and quantitatively about the product that is analysed by trained panellist (Maharani et al., 2015). In descriptive test, 5 trained panellists will rate the sensory characteristic in the products.

Below this is an explanation about distinction test scale that writer use:

Table 3.5

Descriptive test

Variables	Operational definition	Measurement scale
Texture	The level of softness	4= very soft 3= soft 2= not too soft 1= not soft at all
Taste	The level of coconut flavour to the product	4= just have sweet flavour 3= sweet and don't have savoury flavour 2= not too sweet and have a little savoury flavour 1= not sweet and have savoury flavour
Colour	The colour differences	4= the colour is yellow 3= the colour is pale yellow 2= the colour is quite white 1= the colour is very white

3.4.2 Hedonic Test

Hedonic test was the most widely used test to measure the level of pleasure of a product. In hedonic test 25 untrained panellist and 5 trained panellists will rate simple characteristic such as level of pleasure of the product. The level of pleasure is called hedonic scale such as really like, like, don't like, really don't like.

Hedonic scale could be adjusted as the researcher want and could be changed into numeric scale according to the level of pleasure. By using numeric scale, analysis can be done statistically to find out the level of pleasure of the product. Hedonic test is commonly used to rate final product.

Table 3.6

Hedonic test

Variable	Operational definition	Measuring scale
Texture	The level of pleasure to the texture of the product	4= really like 3= like 2= don't like 1= really don't like
Taste	The level of pleasure to the taste of the product	4= really like 3= like 2= don't like 1= really don't like

Colour	The level of pleasure to the colour changes of the product	4= really like 3= like 2= don't like 1= really don't like

3.5 Interval Scale

In interval scale, the numbers provided have levels and the consecutive numbers have the same range (interval). The main characteristic of interval scale is that it doesn't have an absolute base point (zero) so it was impossible to do the comparison operation (IPB, 1990). The Likert scale was used to identify the agreement level, frequency level, importance level, or the likelihood level (Pimentel, 2019)

Table 3.7

Evaluation Criteria for 4 Point Likert Scale

Likert Scale	Interval	Description
1	1.00-1.50	Strongly dislike
2	1.51-2.50	Dislike
3	2.51-3.50	Like
4	3.51-4.00	Strongly like

Source: (Pimentel, 2019)

3.6 Data Analysis

The data collected from the questionnaire that has been filled by the panellist through organoleptic test will be analysed using SPSS 28 to prove the hypothesis written in chapter II.

One way analysis of variance (ANOVA) is the analysis method that writer will use to determine whether there are any differences exist in the means of 3 or more groups (Kim, 2017).

The criteria in the testing is as follow:

- If sig > 0,05, then Ho is accepted, which means there is no difference from the control product and the treatment product according to texture, taste, and colour.
- If sig < 0,05, then H_1 is accepted, which means there are some differences from the control product and the treatment product according to texture, taste, and colour.

If Ho is accepted, it means that the product could be accepted by panellist. If H_1 is accepted, it means that the product could not be accepted by panellist.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Result and Discussion

Research about pukis using coconut flour as the substitution of wheat flour using one control product and three treatment product which is:

1. Control product (control) using 100% wheat flour
2. Treatment 1 (A) using 70% wheat flour and 30% coconut flour
3. Treatment 2 (B) using 40% wheat flour and 60% coconut flour
4. Treatment 3 (C) using 10% wheat flour and 90% coconut flour

This research was conducted on 30 panellist which is consist of 25 untrained panellist and 5 trained panellist which is men and women that has the age range from 13-75 years old by using questionnaire. The questionnaire was consisting of some aspects such as texture, taste, and colour between pukis using wheat flour and pukis substituted with coconut flour with the percentage of 30%, 60%, and 90%.

The result from the questionnaire shows the level of pleasure of the panellist about the pukis, and to know whether there are any differences in the aspect of texture, taste, and colour between pukis using wheat flour and pukis substituted with coconut flour.

To find out the level of pleasure of the panellist about each treatment product, writer do some test which is hedonic test to know the level of pleasure and

descriptive test to know if there are any differences in the aspect of texture, taste, and colour. The result of the test was:

4.1.1 Hedonic Test Result

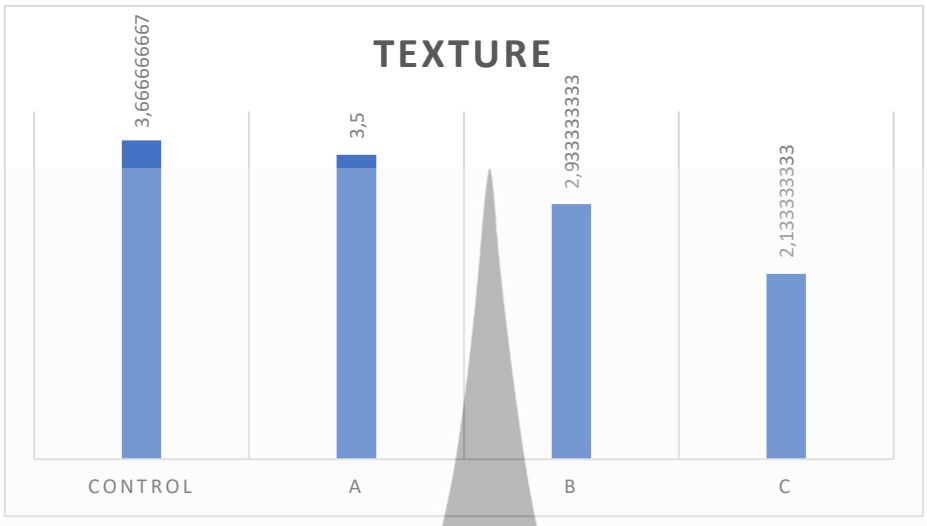


Image 4.1

Hedonic Test Result Chart According to Texture

According to chart 4.1, pukis control product has an average score of 3.66, treatment A has an average of 3.5, treatment B has an average of 2.93, and treatment C has an average of 2.13. Can be concluded that the control product has the highest average which is 3.66 in level of pleasure according to the texture, which means panellists like the control product the most according to the texture.

Image 4.2

Hedonic Test Result Chart According to Taste

According to chart 4.2, pukis control product has an average score of 3.53, treatment A has an average of 3.43, treatment B has an average of 3.2, and treatment C has an average of 2.57. Can be concluded that the control product has the highest average which is 3.53 in level of pleasure according to the taste, which means panellists like the control product the most according to the taste.

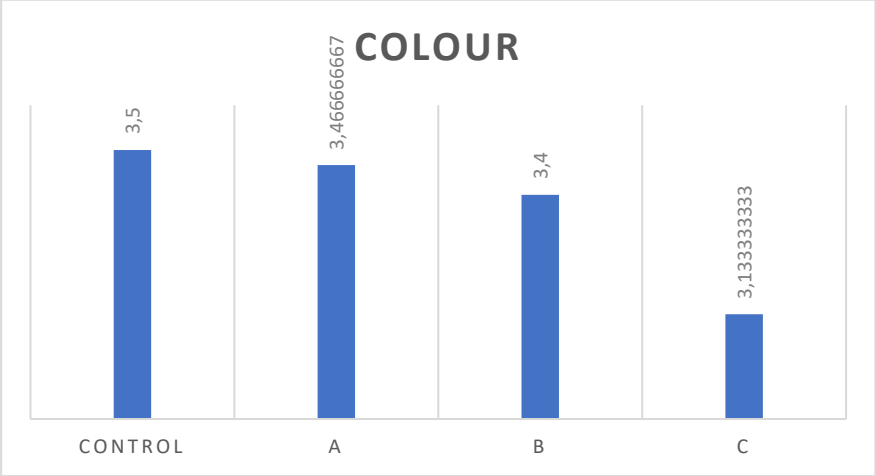


Image 4.3

Hedonic Test Result Chart According to Colour

According to chart 4.3, pukis control product has an average score of 3.5, treatment A has an average of 3.47, treatment B has an average of 3.2, and treatment C has an average of 3.4. Can be concluded that the control product has the highest average which is 3.13 in level of pleasure according to the colour, which means panellists like the control product the most according to the colour.

Table 4.4

Hedonic Test Result Pukis with Coconut Flour as substitution

Treatment	**Hedonic Sample Score**		
	Texture	**Taste**	**Colour**
Control	3.67^{c}	3.53^{b}	3.50^{a}
A	3.50^{c}	3.43^{b}	3.47^{a}
B	2.93^{b}	3.20^{b}	3.40^{a}
C	2.13^{a}	2.57^{a}	3.13^{a}

Description:

- Result from 25 untrained panellist and 5 trained panellists.
- α= 5%
- Same notation means there are no significant differences
- Interval scale of texture:

  1.00-1.50 = Strongly dislike

  1.51-2.50 = Dislike

  2.51-3.50 = Like

  3.51-4.00 = Strongly like

  Interval scale of taste:

  1.00-1.50 = Strongly dislike

  1.51-2.50 = Dislike

  2.51-3.50 = Like

  3.51-4.00 = Strongly like

  Interval scale of colour:

  1.00-1.50 = Strongly dislike

  1.51-2.50 = Dislike

  2.51-3.50 = Like

  3.51-4.00 = Strongly like

According to the table above, in texture aspect most likely pukis is the control product with the score of 3.67, product with treatment A with score 3.50, and the least likely pukis is the product with treatment B with score 2.93 and C with score 2.13. In the aspect of taste, the most likely pukis are the control product with

the score of 3.53, treatment A with score 3.43, and the least likely product is product with treatment B with score 3.20, and C with score 2.57. In the aspect of colour, the most likely pukis are the control product with the score of 3.50, treatment A with score 3.47, and the least likely product is product with treatment B with score 3.40, and C with score 3.13.

4.1.2 Descriptive Test Result

Table 4.5

Homogeneity of Variances Descriptive Test

Test of Homogeneity of Variances				
	Levene Statistic	**df1**	**df2**	**Sig.**
Texture	1.185	3	16	0.347
Taste	1.185	3	16	0.347
Colour	32.000	3	16	<0.001

Table 4.6

Multiple Comparison Descriptive Test

Multiple Comparison Descriptive Test					
Dependent Variable	**Treatment (I)**	**Treatment**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**
Texture	Control	A	0.200	0.332	0.930
		B	1.000	0.332	0.037
		C	1.800	0.332	<0.001
Taste	Control	A	0.000	0.332	1.000
		B	1.o00	0.332	0.037
		C	1.200	0.332	0.011
Colour	Control	A	0.000	0.300	1.000
		B	0.600	0.300	0.229
		C	1.000	0.300	0.020

*The mean difference is significant at the 0.05 level

From multi comparison table, according to the texture aspect, there are no significant difference between control product and treatment A because the significant level is 0.930 which is higher than 0.05, while for treatment B and C there are significant difference because the significant level of treatment B is 0.037, and C is <0.001 which is lower than 0.05.

According to the taste, there are no significant difference between control product and treatment A because the significance level of treatment A is 1.000

which is higher than 0.05. The significance level of treatment B is 0.037 and C is 0.011 which is lower than 0.05, which means there is a significant difference between control product and treatment B and C.

According to the colour, there are no significant difference between control product and treatment A and B because the significant level of treatment A is 1.000, B is 0.229 which is higher than 0.05, while for treatment C there are significant difference because the significant level is 0.020 which is lower than 0.05.

Table 4.7

ANOVA Descriptive Test Hypothesis

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Texture	Between Groups	10.150	3	3.383	12.303	<0.001
	Within Groups	4.400	16	0.275		
	Total	14.550	19			
Taste	Between Groups	6.150	3	2.050	7.455	0.002
	Within Groups	4.400	16	0.275		
	Total	10.550	19			

Colour	Between Groups	3.600	3	1.200	5.333	0.010
	Within Groups	3.600	16	0.225		
	Total	7.200	19			

Description:

- The calculation result using SPSS 28.0 one-way ANOVA to 4 sample of pukis
- Significant level α= 5% (0.05), sig. > 0.05 = Ho is accepted; sig. < 0.05 = Ho is rejected. After ANOVA test using SPSS 28.0 was done, the result is:
    1. Ho = there is no difference in the aspect of texture, taste, and colour between pukis using wheat flour as the main ingredients with pukis using coconut flour as the substitution
    2. H_1 = there are differences in the aspect of texture, taste, and colour between pukis using wheat flour as the main ingredients with pukis using coconut flour as the substitution

From table 4.7 above, it could be seen that according to the texture, the significance level is <0.001 which is lower than 0.05 that means Ho is rejected and H_1 is accepted. It means that there is significant difference between pukis using wheat flour and pukis using coconut flour as the substitution. According to the taste, the significance level is 0.002 which is lower than 0.05 that means Ho is rejected and H_1 is accepted. It means that there is significant difference between pukis using wheat flour and pukis using coconut flour as the substitution. According to the

colour, the significance level is 0.010 which is lower than 0.05 that means Ho is rejected and H_1 is accepted. It means that there is significant difference between pukis using wheat flour and pukis using coconut flour as the substitution.

Table 4.8

Hypothesis Test Table

Aspects	**Comparison**	**Sig.**	**Hypothesis**
Texture	Control – A – B - C	<0.001	Ho rejected, H_1 accepted
Taste	Control – A – B - C	0.002	Ho rejected, H_1 accepted
Colour	Control – A – B - C	0.010	Ho rejected, H_1 accepted

Table 4.9

Descriptive Test Result of Pukis with Coconut Flour as Substitution

Treatment	**Descriptive Sample Score**		
	Texture	**Taste**	**Colour**
Control	3.60^{c}	3.40^{b}	3.60^{b}
A	3.40^{bc}	3.40^{b}	3.60^{b}
B	2.60^{ab}	2.40^{a}	3.00^{ab}
C	1.80^{a}	2.20^{a}	2.60^{a}

Description:

- Result from 5 trained panellist
- α= 5%
- Same notation means there are no significant differences
- Interval scale of texture:

  1.00-1.50 = Not soft at all

  1.51-2.50 = Not too soft

  2.51-3.50 = Soft

  3.51-4.00 = Very soft

  Interval scale of taste:

  1.00-1.50 = Not sweet and have savoury flavour

  1.51-2.50 = Not too sweet and have a little savoury flavour

  2.51-3.50 = Sweet and don't have savoury flavour

  3.51-4.00 = Just have sweet flavour

  Interval scale of colour:

  1.00-1.50 = The colour is very white

  1.51-2.50 = The colour is quite white

  2.51-3.50 = The colour is pale yellow

  3.51-4.00 = The colour is yellow

According to the table above, on the texture aspect the result of control product is 3.60 which means the texture is very soft, treatment A is 3.40 which means the texture is soft, and B is 2.60 which means the texture is soft, but for treatment C the score is 1.80 which means the texture is not too soft. To conclude,

panellist choose that control product is very soft, treatment A, and B texture have soft texture, and treatment C texture is not too soft.

According to the taste aspect, the result of control product and treatment A is 3.40 which means the taste is sweet and don't have savoury flavour on it. The result of treatment B is 2.40 and for treatment C is 2.20 which means the flavour is not too sweet and have a little savoury flavour. To conclude, the control product and treatment A have sweet flavour and have no savoury flavour at all, and for treatment B and C flavour is not too sweet and have a little savoury flavour on it.

According to the colour aspect, the result of control product, and treatment A is 3.60 which means the product has yellow colour, and for treatment B the score is 3.00 and for treatment C the score is 2.60 which means it has pale yellow colour. To conclude, control product and treatment A the colour is yellow which means there are no changes in the aspect of colour, but for treatment B and C the colour change into pale yellow colour.

4.2 Discussion

According to the hedonic result, from the overall result, the most likely product was the control product which use 100% wheat flour. According to the texture the most likely pukis was the control product with the score of 3.67, and treatment A scored 3.50 which means panellist strongly like the control product and A (30%) the most compared to other treatment product. This result can be caused by the texture of treatment B and C has a rougher texture compared to treatment A because of the grain in coconut flour, and the texture are less chewy because treatment B

and C have less gluten compared to treatment A. According to the taste, the score for control product was 3.53 which means the panellist strongly like the taste, and for A, B, and C the score is 3.43, 3.20, and 2.57 which means the panellist like the taste of the pukis. The reason is probably because the coconut flour adds coconut flavour to the pukis and it create new taste of the pukis. According to the colour, the score for control product, A, B, and C is 3.50, 3.47, 3.40, and 3.13 which means the panellist like the colour of all the product. Panellist like the colour of all product probably because the colour didn't change much compared to the control product.

From the notation, it could be seen that in the aspect of texture the notation for control product and treatment A are the same, while for treatment B and C the notation is different. It means there are significant difference in the like level of the product because treatment B and C have more coconut flour in it. For taste the notation of control product are the same with treatment A and B but different with treatment C which means the like level of control product is similar with treatment A and B but have significant difference with treatment C. The colour has the same notation which means the like level of the treatment product are similar to the control product.

For treatment product A, B, and C the gluten level was lower than the control product since coconut flour has no gluten content so the texture will be rougher than the control product. Panellists like the texture of control product and treatment product A probably because the texture is soft and not grainy unlike the treatment product C which has rough and grainy texture because of the coconut flour. For the taste, panellists like the taste of all of the product probably because the coconut

flour adds flavour to the pukis, and coconut flour doesn't change the characteristic of pukis flavour. Panellists like the colour of both control product and product with treatment probably because the coconut flour doesn't change the colour of the pukis.

According to the descriptive result, the texture between treatment product and control product has a significant difference. Treatment product A and B has a soft texture, and for treatment C the texture is not too soft. There is significant difference probably because the coconut flour used has a grainy texture therefore, the coconut flour changes the texture of the product significantly. The taste of the product has a significant difference between control product and the treatment product. Treatment A have sweet flavour and no savoury flavour at all, but treatment B and C have not too sweet flavour and a little bit of savoury flavour. There is a significant difference in the aspect of taste probably because the coconut flour adds a coconut flavour in the pukis, and coconut has a little bit of savoury taste that could change the original sweet flavour of pukis into having a little bit of savoury flavour.

The colour of the product has a significant difference between control product and treatment product. For treatment product A, the colour is yellow, and for treatment B and C the colour is pale yellow. There is significant difference in the aspect of colour probably because the coconut flour added white colour and change the original white colour of the pukis.

CHAPTER 5

CONCLUSION AND SUGGESTION

5.1 Conclusion

According to the result of level of pleasure or hedonic test that was done by 25 untrained panellist and 5 trained panellists, writer could conclude that:

1. From the aspect of texture, treatment product with the code A which is product that uses 30% of coconut flour got the highest score compared to the control product. Treatment product A scored 3.50 which means panellist like the texture of the product. Treatment product C got the lowest score which is 2.13 which means panellist dislike the texture of the product.
2. From the aspect of taste, treatment product with the code A which is product that uses 30% of coconut flour got the highest score compared to the control product. Treatment product A scored 3.43 which means panellist like the taste of the product. Treatment product C got the lowest score which is 2.57 which means panellist dislike the taste of the product.
3. From the aspect of colour, treatment product with the code A which is product that uses 30% of coconut flour got the highest score compared to the control product. Treatment product A scored 3.47 which means panellist like the colour of the product. Treatment product C got the lowest score which is 3.13 which means panellist still like the colour of the product.

For the overall result, the product that panellists like the most is treatment product A in the aspect of texture, taste, and colour.

According to the result of differentiation test or descriptive test that was done by 5 trained panellists, writer could conclude that:

1. There is significant difference in the aspect of texture because the significant level is <0.001 which is lower than 0.05.
2. There is a significant difference in the aspect of taste because the significant level is 0.002 which is lower than 0.05.
3. There is significant difference in the aspect of colour because the significant level is 0.010 which is lower than 0.05.

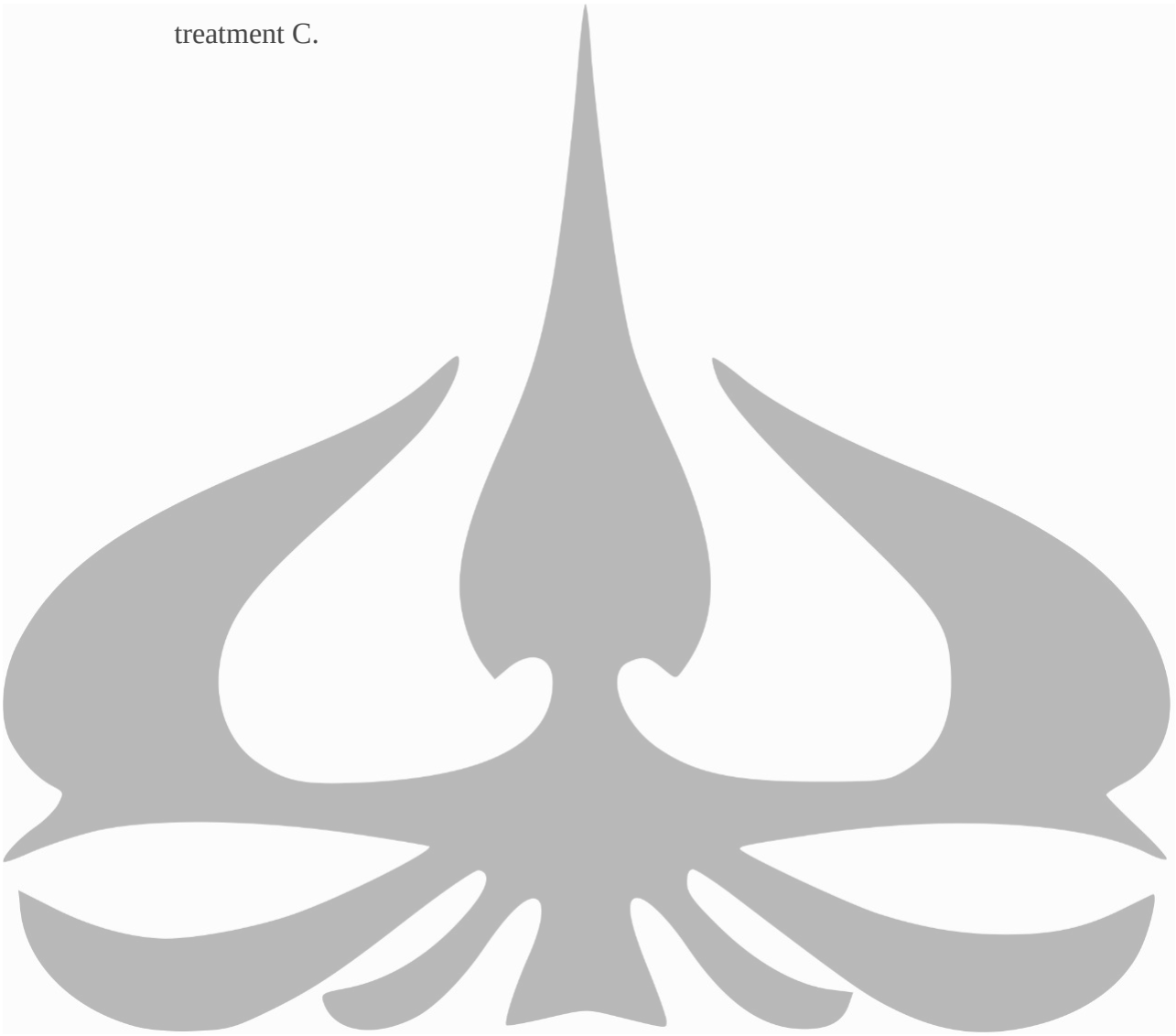
There is significant difference in texture because coconut flour has a grainy texture unlike wheat flour which is very soft. There is significant difference in taste because coconut flour adds coconut flavour to the pukis, and coconut flour has a little savoury flavour which change the original sweet taste of pukis. For the colour, coconut flour changes the colour of pukis because coconut four adds white colour to the pukis and change the original yellow colour of pukis.

5.2 Suggestion

According to the result and conclusion from the research, here are the suggestion from writer for the further research:

1. From the hedonic test result, the most likely pukis are pukis with treatment A according to the aspect of texture, taste, and colour. Therefore, it would be best to use 30% of coconut flour to substitute wheat flour in order to meet people's preference.

2. From the descriptive test result, product with treatment A has no significant difference with control product in the aspect of texture, taste, and colour. therefore, it would be best to substitute wheat flour with 30% of coconut flour.
3. Add more fermentation time could be done for pukis with treatment C in order to make the texture smoother.
4. Use extra fine coconut flour in order to have smoother texture in pukis with treatment C.



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