

## Potential Test of Acceptability, Elasticity, Nutritional Content and Cyanide Acid: Wet Noodles Cassava Leaves

### *Uji Potensi Aseptabilitas, Elastisitas, Kandungan Nutrisi dan Asam Sianida: Mie Basah Daun Singkong*

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#### ABSTRACT

*Noodles is one of the foods favored by the people of Indonesia and economical and practical, so it is necessary to processing alternatives that qualify nutritionally with the addition of fiber from cassava leaves. This study aims to find out the acceptableness, elasticity, iron content, protein, fiber and hydrogen cyanide. This type of research is an experiment that is the manufacture of noodles using the addition of cassava leaves (15%, 30% and 50%) then conducted an analysis of protein, iron, fiber using gravimetry, analysis of hydrogen cyanide levels using volumetri with tools - ingredients are scales, sieves, molds, measuring cups, filters, wheat flour, egg whites, garlic, cassava leaves and salt. The results of the research from the preferred hedonic aspect are a concentration of 15%. Noodles with cassava leaves concentration of 15% have the elasticity value closest to wet noodles without cassava leaves which is 3.3 cm with medium category, the highest iron content with cassava leaves concentration of 50% as much as 0.5 mg / 100 grams, the highest fiber content as much as 9.67 grams per 100 grams, the highest HCN content as much as 15.7 mg per 100 grams, the highest protein content of noodles with cassava leaves concentration of 15% obtained as much as 8,222 grams / 100 grams. In conclusion, preferred acceptableness and elasticity as well as the highest protein content with 15% cassava leaves, the highest iron, fiber and HCN levels with a concentration of 50%.*

**Keyword:** Cassava leaves, nutrition, HCN, noodles

#### ABSTRAK

Mie adalah salah satu makanan yang digemari masyarakat Indonesia serta ekonomis dan praktis, sehingga diperlukan alternatif pengolahan yang memenuhi syarat gizi dengan penambahan serat dari daun singkong. Penelitian ini bertujuan untuk mengetahui daya terima, elastisitas, kandungan zat besi, protein, serat dan hidrogen sianida. Jenis penelitian adalah eksperimen yaitu pembuatan mie menggunakan penambahan daun singkong (15%, 30% dan 50%) kemudian melakukan analisis protein, zat besi, serat menggunakan gravimetri, analisis kadar hidrogen sianida menggunakan volumetri dengan alat - bahan adalah timbangan, ayakan, cetakan, gelas ukur, saringan, tepung terigu, putih telur, bawang putih, daun singkong dan garam. Hasil penelitian dari aspek hedonik yang disukai yaitu konsentrasi 15%. Mie dengan daun singkong konsentrasi 15% memiliki nilai elastisitas yang paling mendekati mie basah tanpa daun singkong yaitu 3,3 cm dengan kategori sedang, kadar besi tertinggi dengan daun singkong konsentrasi 50% sebanyak 0,5 mg/100 gram, kadar serat tertinggi sebanyak 9,67 gram per 100 gram, kadar HCN tertinggi sebanyak 15,7 mg per 100 gram, kadar protein tertinggi mie dengan daun singkong konsentrasi 15% diperoleh sebanyak 8,222 gram/100 gram. Kesimpulan, daya terima dan elastisitas yang disukai serta kadar protein tertinggi dengan daun singkong 15%, kadar zat besi, serat dan HCN tertinggi dengan konsentrasi 50%.

**Kata kunci:** Daun singkong, gizi, HCN, mie

#### Introduction

Various types of noodles are often found in the market or known by the public, among others fresh noodles, wet noodles and instant noodles. From various types of noodles, processed wet noodles become a product that is widely used by the public in

the daily menu, among others for meatball noodles, dumpling noodles, fried noodles, and so on (Astuti, 2019; Alamu, Chileshe, Bukola, Marymolola, Olanike, David, and Busie, 2021). Based on riskesdas results in 2018, it shows that the average Indonesian population with an age of  $\geq 3$  years

consumes wet noodles as much as 7.8%, and especially in the South Sulawesi region, consumes wet noodles as much as 15.3% (Kemenkes, 2018). Wet noodles are noodles made from a mixture of wheat flour, eggs, water and other additives. With the main ingredients of wheat flour, noodles contain high carbohydrates but low in fiber, protein, vitamins and minerals (Astuti, 2019). As in the Indonesian Food Composition Table (TKPI) in 2017 shows that wet noodles per one hundred grams of bdd contain among others protein (0.6 grams), carbohydrates (14.0 grams), fiber (0.1 grams), iron (6.8 mg) and other vitamins and mineral (Kemenkes, 2017).

Vegetables are a source of various vitamins, minerals, and dietary fiber. Some vitamins and minerals contained in vegetables act as antioxidants or antidotes to free radicals that can trigger the occurrence of cancer (Purnamasari, 2018). Fiber in vegetables plays a role in smoothing digestion and can make a person full longer due to a longer transit time in the stomach (Astuti, 2019; Kemenkes, 2018; Alamu, Ntawuruhunga, Chileshe, Olaniyan, Mukuka & Maziya. 2019b).

The type of vegetable that can be used to increase the nutritional value of noodles is cassava leaves (*Manihot esculenta*). Cassava leaves are derived from cassava plants. Cassava leaves have some higher nutrient content when compared to wet noodles such as protein and fiber as well as vitamins and minerals such as vitamin C, calcium, iron, phosphorus, potassium, and zinc. In addition, cassava leaves contain high beta carotene (Kemenkes, 2017; Raden, Taufik, Ainia, Nurhaidar, Rohmah, 2017; Ihemeje, Uneanya, Odimegwu and Echefu, 2017). Cassava leaves are also useful in meeting the nutritional needs of protein. The protein content in cassava leaves turned out to be quite high. In fact, the total amount of essential amino acids in cassava leaf protein is the same as that found in chicken eggs. That is, the protein content in cassava leaves is greater than spinach, soybean, oat, to rice grains. No wonder if cassava leaves are predicted to meet the needs of protein (Natalie and Mingan, 2016; Oresegun, Fagbenro, Ilona, Edah, 2016; Cahyanti, Alfiah, Hartini, 2018). Cassava leaves that contain fiber, very useful for the intestines. Fiber can facilitate the digestive process and can prevent constipation. Thus, the digestive system

works smoothly and healthier. In addition to fiber, cassava leaves also contain a lot of iron. Iron is needed by the body to produce red blood cells. Iron also serves to channel the supply of oxygen throughout the body through red blood cells (Saragih, Febi, Pradita, Krishna, Aswita, 2020; Abraham, Buhrke & Lampen, 2016; Ginting, 2018). This study aims to enrich the nutritional value of wet noodles by adding cassava leaves.

## Methods

This type of research is an experiment that is making wet noodles using several variations of cassava leaves (0%, 15%, 30% and 50%) then analyze protein levels, iron, fiber using gravimetry method, analysis of hydrogen cyanide (HCN) levels using volumetric method. This type of research is also a pre-experimental study that conducts quality tests of wet noodles in the laboratory. The four types of wet noodles are carried out organoleptic tests using hedonic scales, then performed elasticity tests.

The research was conducted in January – July 2020. The manufacture of wet noodles with the addition of cassava leaves and elasticity tests were conducted in the Food Laboratory of the Department of Nutrition, Makassar of Health Polytechnic. The receipt was conducted in the Organoleptic Test Laboratory of the Department of Nutrition, Makassar of Health Polytechnic. Analysis of iron, protein, fiber and HCN levels was conducted in the Quality Control Laboratory of SMK-SMTI Makassar.

## Tools and Materials

Tools and materials used in the manufacture of cassava leaf pulp are scales, bowls, stoves, pans, and blenders, cassava leaves and water. Tools and materials used in the manufacture of wet noodles are scales, plastic basins, sieve, tablespoons, noodle molds, measuring glasses, stoves, pans, sieve, wheat flour, egg whites, garlic, water, cassava leaves and salt.

## Working Procedure

### Cassava Leaf Porridge Making

Separate the cassava leaves from the stalks and wash them thoroughly. Blanching the cassava leaves for 3 minutes. Remove and drain the cassava leaves then puree using a blender by adding 25 ml of water that will produce a pulp texture.

### Making Wet Noodles Cassava Leaves

Prepare wet noodle making materials such as wheat flour, eggs, salt, garlic, water and oil. Combine all the ingredients and add cassava leaf pulp (37.5 g, 75 g, 125 g). Knead until the dough is smooth and let the dough stand for 30 minutes. Grind the dough on the noodle making machine using the size of level 1 on the tool repeatedly. After that flatten the dough again at the size of levels 2, 3 and 4 in a row and form homogeneous sheets. Install a printer or noodle dough sheet cutter.

Print the sheet into a noodle shape and cut the size of the noodles that are too long. Boil the noodles for 5 minutes in boiling water. Add 20 ml of cooking oil to the boiled water. Remove and drain the noodles.

### Types and Ways of Data Collection

#### Data Type

The acceptability is obtained from the form filled out by the panelist. The form contains 4 aspects of assessment namely color, aroma, taste and texture. Elasticity in wet noodles with the addition of cassava leaves based on the results of elasticity test with a long measurement method. Iron, protein, fiber and hydrogen cyanide in wet noodles obtained from the results of the

### Laboratory of Quality Control SMK-SMTI Makassar.

#### How Data Is Collected

The acceptability was obtained by organoleptic test method using a form filled by a rather trained panelist as many as 25 in the Organoleptic Test Laboratory of the Department of Nutrition Poltekkes Kemenkes Makassar. Elasticity data obtained by long measurement method using the slider in the Food Technology Laboratory of the Department of Nutrition Poltekkes Kemenkes Makassar.

Iron content is obtained by AAS (Atomic Absorption Spectrophotometer) method with repetition twice (Duplo) in quality control laboratory SMK-SMTI Makassar. Protein content data obtained by Micro Kjeldahl test method with repetition twice (Duplo) in the Quality Control Laboratory. Collection of fiber levels by gravimetry and hydrogen cyanide levels using volumetric method in Quality Control. Research ethics issued by the Health Research Ethics Committee of Makassar Health Polytechnic with Number: 012/KEPK-PTKMKS/II/2020 which was passed on February 7, 2020.

### Results

The receipt of wet noodles with the addition of cassava leaves in all formulations was carried out in the Organoleptic Laboratory of the Department of Nutrition Poltekkes Kemenkes Makassar with a total of 25 panelists on March 10, 2020 obtained the following results.

#### 3.1. Acceptability of Color, Aroma, Texture, and Taste Aspects

Table 1, shows that the highest average rating is wet noodles with the addition of cassava leaves that have a concentration of 15% of 3.08, while the lowest average rating value is the one with a concentration of 50%. Friedman's test results showed that there was a difference in preference to wet noodles with the addition of cassava leaves on color aspects with a value of  $p < 0.05$  (0.000). Further tests using Wilcoxon advanced test results showed a difference between concentrations of 0% with concentrations of 30% and 50%, concentrations of 15% with concentrations of 30% and 50%. While the concentration of 0% with a concentration of 15% and a concentration of 30% with a concentration of 50% showed no difference.

Acceptability to the color aspect. Color is the impression produced by the sense of vision that is the eye against the light reflected by the object (Purnamasari, 2018; Natalie K.Morgan & Mingan Choct, 2016; Ambarsari, Endrasari and Oktaningrum, 2017). The color of wet noodles is generally yellow. The results showed that there was a difference ( $p < 0.05$ ) in the acceptability of wet noodles with the addition of cassava leaves to the color aspect. Wet noodles are preferred by panelists is a concentration of 15%, while wet noodles with the lowest level of panelist preference is a concentration of 50%. This is due to the concentration of 50% resulting in wet noodles with a darker green color (dark green) and less interest by panelists. Wet noodles with the addition of cassava leaves produce a green color obtained from chlorophyll on cassava leaves. Chlorophyll is a green chemical compound in plants that plays a role in metabolic functions such as plant

growth and respiration (Kemenkes, 2017; Diarra and Anand, 2020; Herminiati, Rahman, Turmala and Fitriany, 2017).

Acceptability to the aroma aspect. Aroma is a stimulus derived from the substance of substances that evaporate or dissolve in the air and contact or contact with sensitive cells in the nasal cavity "olfactory" so as to give a certain impression. Organoleptic test results showed that there was a difference ( $p < 0.05$ ) in the acceptability of wet noodles with the addition of cassava leaves to the aroma aspect. Wet noodles with the addition of cassava leaves concentration of 15% showed a higher favor value than concentrations of 0%, 30%, and 50%. The more cassava leaves added, the panelist's acceptability to the aroma aspect will decrease (Natalie & Mingan, 2016; Diarra and Anand, 2020; Megersa, 2019; Piengtawan, Supajit, Nattaya, Peng, Huaxin, Kanokporn, 2020).

According to the results of the above data shows also the aroma aspect of fondness with the addition of cassava leaves with a concentration of 15% with an average rating value of 3.16 and the lowest rating value at a concentration of 50% which is an average rating of 1.70%. Friedman's test results showed that there was a difference in preference to wet noodles with the addition of cassava leaves in the aroma aspect with a value of  $p < 0.05$  (0.006). Wilcoxon advanced test results showed a difference between concentration 0% with concentration 50%, concentration 15% with concentration 50%. While the concentration does not show any difference, namely concentration 0% with concentration 15% and 30%, concentration 15% with concentration 30%, and concentration 30% with concentration 50%.

Acceptability to the texture aspect. Texture is an image that shows the ability of a food product to maintain a pressure [6]. Organoleptic test results showed that there was a difference ( $p < 0.05$ ) between the acceptability of wet noodles and the addition of cassava leaves in the texture aspect. Wet noodles with the addition of cassava leaves are 15% preferred compared to concentrations of 0%, 30%, and 50%. The addition of cassava leaves more than 15% will decrease the

panelist's acceptability to aspects of texture. This is due to the addition of cassava leaves, resulting in wet noodles with a mushy texture.

Based on the texture aspect shows the average rating with the highest value is with the addition of cassava leaves by 15% with a value of 3.16 and the lowest average rating is wet noodles with a concentration of cassava leaves addition of 50% which is worth 1.50. Friedman's test results showed that there was a difference in the texture aspect of wet noodles with the addition of cassava leaves with a value of  $p < 0.05$  (0.000). Wilcoxon advanced test results showed a difference between concentrations of 0% with concentrations of 30% and 50%, concentrations of 15% with concentrations of 30% and 50%. While the concentration of 0% with a concentration of 15% and a concentration of 30% with a concentration of 50% showed no difference.

The flavor aspect showed the results of the hedonic test with the highest average rating value was with the addition of cassava leaves by 15% with a value of 3.36 and the lowest average rating value was wet noodles with a concentration of cassava leaf addition of 50% which was worth 1.48. Friedman's test results showed that there was a difference in preference to wet noodles with the addition of cassava leaves to the flavor aspect with a value of  $p < 0.05$  (0.006). Wilcoxon advanced test results showed a difference between concentrations of 0% with concentrations of 30% and 50%, concentrations of 15% with concentrations of 30% and 50%. While the concentration of 0% with a concentration of 15% and a concentration of 30% with a concentration of 50% showed no difference.

Acceptability to the aspect of flavor. Flavor is characteristic of a substance caused by the presence of a part of the substance that is soluble in water or oil or fat and comes into contact or contact with the taster sense (tongue and oral cavity), thus giving a certain impression [19]. Organoleptic test results showed that there was a difference ( $p < 0.05$ ) in the acceptability of wet noodles with the addition of cassava leaves to the flavor

aspect. Wet noodles with the addition of cassava leaves concentration is 15% preferred compared to concentrations of 0%, 30% and 50%. The higher the addition of cassava leaves to wet noodles will decrease the panelist's acceptability to the aspect of flavor.

The results showed that the acceptability of wet noodles with the addition of cassava leaves from the most preferred color aspect is a concentration of 15%. The acceptability of wet noodles with the addition of cassava leaves from the most preferred aroma aspect is a concentration of 15%. The acceptability of wet noodles with the addition of cassava leaves from the most preferred aspect of texture is a concentration of 15%. The acceptability of wet noodles with the addition of cassava leaves from the most preferred aspect of taste is a concentration of 15%.

#### Wet Noodle Elasticity Test Result

Table 2 The results of the elasticity test showed that wet noodles with the addition of cassava leaves concentration of 0% obtained an elasticity value of 4.0 cm with a good category while wet noodles with the addition of cassava leaves concentration of 50% obtained an elasticity value of 1.2 cm with less category.

Wet Noodle Elasticity Test with The Addition of Cassava Leaves. The results of the elasticity test showed that wet noodles that have good elasticity are wet noodles concentration of 0% ie without the addition of cassava leaves with an average elasticity value of 4.0 cm, while wet noodles with less elasticity is wet noodles concentration of 50% that is wet noodles with the addition of cassava leaves at most with an average elasticity value of 1.2 cm (Kemenkes, 2017; FAO, 2019).

The results showed that the acceptability of wet noodles with the addition of cassava leaves from the most preferred color aspect is a concentration of 15%. The acceptability of wet noodles with the addition of cassava leaves from the most preferred aroma aspect is a concentration of 15%. The acceptability of wet noodles with the addition of cassava leaves from the most preferred aspect of texture is a concentration of 15%. The acceptability of wet noodles

with the addition of cassava leaves from the most preferred aspect of taste is a concentration of 15%. Wet noodles with the addition of cassava leaves concentration of 15% has an elasticity value closest to wet noodles without the addition of cassava leaves that is 3.3 cm with a medium category.

#### Iron and Protein Content of Wet Noodles

Table 3 shows the results of an analysis of iron levels of wet noodles with the addition of cassava leaves (*Manihot esculenta*) per 100 grams of materials that have been conducted using AAS (Atomic Absorption Spectrophotometer) tests show that the concentration of 50% has the highest iron content of 0.5 mg and meets as much as 3.3% of iron needs based on AKG for young women and 1.8% for pregnant women.

Table 3 also showed the results of analysis of wet noodle protein levels with the addition of cassava leaves that has been conducted using Micro Kjeldahl Test shows that the concentration of 15% has the highest protein content of 8,222 grams and meets as much as 12.6% of protein needs based on AKG for young women and 8.6% for pregnant women.

Then followed by wet noodles with a concentration of 50% as much as 7,945 grams and meets as much as 12.2% protein needs based on AKG for young women and 8.3% for pregnant women. And wet noodles concentration of 30% as much as 7,577 grams and meets as much as 11.6% protein needs based on AKG for young women and 7.9% for pregnant women.

The result of iron analysis of wet noodles with the addition of cassava leaves that produces the highest iron content is wet noodles with the addition of cassava leaves concentration of 50% which is the average iron value of 0.5 mg per 100 grams of cooked wet noodles. The higher the addition of cassava leaves there is an increase in iron levels against wet noodles. This study is in line with research conducted by (Handayani, 2017; Oluwatoyin, Sajid, Adebayo and Joachim, 2018; Sajid, Sonja, Ziba, and Joachim, 2019; Jens, Sebastian, Sajid, and Joachim, 2020). "The addition of Sorghum Flour and Red Spinach Leaves in Wet Noodles for the Prevention of Iron Nutrition Anemia" states that the higher

the addition of red spinach, the higher the iron content in wet noodles increases.

Refers to the 2019 Nutrition Adequacy Figures (AKG) table on iron needs for adolescents of 15 g/day. The results of the study of wet noodles with the addition of cassava leaves with a concentration of 50% have iron content of 0.5 mg / 100 grams of cooked wet noodles, then wet noodles contribute 3.3% of the iron needs of adolescents per day (Kemenkes, 2017; Oluwatoyin, Sajid, Adebayo and Joachim, 2018).

Based on the analysis of wet noodle protein with the addition of cassava leaves that is based on the results of the study conducted, there are differences in wet noodle protein levels at each concentration. Wet noodles with the addition of cassava leaves the highest protein content is a concentration of 15% which is the average protein content value of 8,222 grams, then a concentration of 50% of 7,945 grams and a concentration of 30% of 7,577 grams per 100 gr of cooked wet noodles (Oresegun, Fagbenro. Ilona & Edah, Fatih, 2016; Thidarat et al, 2019; Oluwatoyin, Sajid, Adebayo and Joachim, 2018; Saragih, Febi, Pradita, Krishna, Aswita, 2020; Boundy, Karuna, Garay, Lopez, Yee, Hitomi & Jeoh, 2019).

The protein content of wet noodle concentration is 15% higher compared to the concentration of 30% and 50% this is due to the treatment of the process of making wet noodles with the addition of cassava leaves such as blanching process on cassava leaves, and boiling on wet noodles with the addition of cassava leaves, can affect its protein content because it goes through the heating process. When viewed from the characteristic texture of wet noodles with the addition of cassava leaves concentration of 15% has a dense texture that causes more contribution of wheat flour this can cause more protein levels in wet noodles compared to concentrations of 30% and 50%. This study is in line with research conducted by (Kesuma, 2019; Diarra and Anand, 2020) "The Effect of Cooking on Proximal Content, Minerals, and Vitamin C Water Cress" shows that the processing process in watercress results in decreased protein levels. Fresh watercress protein content of 1.74%

decreased to 1.62% after blansir with presentation loss of 6.89% and decreased drastically by 1.39% after boiling with presentation loss of 20.11%. Boiling in this process is decreasing lower, because the longer the heating, the more watercress will lose protein (Natalie & Mingan, 2016; Diarra and Anand, 2020; Megersa, 2019; Piengtawan, Supajit, Nattaya, Peng, Huaxin, Kanokporn, 2020; Forsythe, Posthumus & Martin, 2016).

#### Fiber Content Test Results

Table 4 The result of fiber content in wet noodles with the addition of cassava leaves is done twice repetition (duplo) using gravimetry method. Showing the result that a concentration of 50% has the highest average fiber content of 9.67 grams. Then followed by a concentration of 30% which is 8.34 grams and a concentration of 15% which is 7.60 grams. The more cassava leaves the higher the fiber content in wet noodles. All wet noodles with the addition of cassava leaves both concentrations of 15%, 30%, and 50% obtained fiber content that falls into the high fiber category. Based on the results of the analysis above, the highest fiber content of wet noodles with the addition of cassava leaves is at a concentration of 50% as much as 9.67 grams per 100 grams of cooked wet noodles. When compared with the nutritional value of wet noodles according to the Indonesian Food Composition Table (TKPI) contains fiber as much as 0.1 gram per 100 grams of cooked wet noodles while in wet noodles with the addition of cassava leaves concentration of 50% contains fiber as much as 9.67 grams per 100 grams of cooked wet noodles. This indicates that the value of fiber content in wet noodles with the addition of cassava leaves increases from wet noodles without addition. So the higher the addition of cassava leaves given, the higher the fiber content to wet noodles that is as much as 9.68 grams per 100 grams of cooked wet noodles (Kemenkes, 2017; Kemenkes, 2019).

In line with the research conducted by (Astuti, 2019) Variations of Mixing Moringa Leaf Flour in The Manufacture of Noodles Reviewed from Physical Properties, panoleptics and Food Fiber

that states that semasi Mixing Leaf flour (Oluwatoyin, Sajid, Adebayo and Joachim, 2018; Jens, Sebastian, Sajid, and Joachim, 2020; Bayata, 2019). The research stated that wet noodles with the addition of cassava skin flour will increase fiber levels (Thidarat et al, 2019; Oluwatoyin, Sajid, Adebayo and Joachim, 2018; Jens, Sebastian, Sajid, and Joachim, 2020).

If referring to the table Nutrition Adequacy Figures (AKG) in 2019 on fiber needs for adolescent boys aged 13-18 years of age of 35.5 g / day and women aged 13-18 years of age of 29 g / day. The results of the study of wet noodles with the addition of cassava leaves concentration of 50% has a fiber content of 9.67 grams per 100 grams of cooked wet noodles then wet noodles with the addition of cassava leaves can meet fiber needs per day for adolescent boys aged 13-18 years by 27.2 % and for adolescent girls aged 13-18 years can meet the needs of fiber per day by 33.3 %.

#### Hydrogen Cyanide (HCN) Test Results

Table 5 The result of hydrogen cyanide (HCN) levels in wet noodles with the addition of cassava leaves Showed that a concentration of 50% had the highest average hydrogen cyanide (HCN) content of 15.7 mg. Then followed by a concentration of 15% which is 13.4 mg and a concentration of 15% which is 9.8 mg. The more cassava leaves the higher the HCN level in wet noodles. All wet noodles with the addition of cassava leaves (*Manihot esculenta*) concentrations of 15%, 30%, and 50% obtained the results of hydrogen cyanide (HCN) levels that fall into the category of safe to consume.

In the analysis of HCN wet noodle levels with the addition of cassava leaves in the Quality Control Laboratory with two repetitions (duplo) using volumetric method that is obtained the results of analysis of HCN levels wet noodles with the addition of cassava leaves with a sample weight of 100 grams of cooked wet noodles at a concentration of 15% as much as 9.8 mg, a concentration of 30% as much as 13.4 mg, and a concentration of 50% as much as 15.7 mg. Based on the results of the analysis, the highest levels of HCN in wet noodles with the addition of cassava leaves are at a

concentration of 50% as much as 15.7 mg per 100 g of cooked wet noodles.

According stated that the safe limit for HCN content is <0.5 mg /kg bb. So that means that every kilogram of weight people should only consume 0.5 mg of HCN. If the assumption of the average body weight of a person is 50 kg, then the amount of HCN that can be consumed is 25 mg. Based on this showed that the results of the analysis of the highest levels of HCN contained in wet noodles with the addition of cassava leaves concentration of 50% as much as 15.7 mg per 100 g of cooked wet noodles still fall into the category of safe food consumed (Thidarat et al, 2019; Oluwatoyin, Sajid, Adebayo and Joachim, 2018; Megersa, 2019; Maria et al, 2021; Oresgun, Fagbenro, Edah, Fatih, 2016).

Different based on The Indonesian National Standard (SNI) year 2006 on food additives that the amount HCN allowed in food is 1 mg / kg bb which means that each kilogram of weight of people should only consume 1 mg HCN, then assuming the average body weight of a person 50 kg the amount of HCN that can be consumed by 50 mg. Based on this showed that the results of the analysis of the highest levels of HCN contained in wet noodles with the addition of cassava leaves concentration of 50% as much as 15.7 mg per 100 grams of cooked wet noodles are still included in the category of safe food consumed (Kemenkes, 2017; Kemenkes 2019: Anjani, Baharuddin & Paulus, 2021; Peprah et al, 2020). HCN is water soluble and volatile in the air at temperatures above 25°C so that simple processing of foodstuffs such as washing with running water, soaking or cooking (boiled) can first reduce or even eliminate the content of HCN (Diarra and Anand, 2020; Megersa, 2019; Piengtawan, Supajit, Nattaya, Peng, Huaxin, Kanokporn, 2020; Maria, 2021; Sajid, Sonja, Ziba, and Joachim, 2019; Junior, Chisté & da Silva, 2019).

#### Conclusion

Based on the results of hedonic tests obtained wet noodles with the addition of cassava leaves 15% are most preferred and contain the highest protein content, in addition to iron content, as

well as fiber and HCN the highest wet noodles with the addition of cassava leaves is at a concentration of 50%.

Future studies require intervention in subjects in order to be known its main health impact based on the parameters of previous research of wet noodle administration with the addition of cassava leaves by 15%.

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Table 1 Distribution of Acceptability to Aspects of Color, Aroma, Texture, and Taste of Wet Noodles with the Addition of Cassava Leaves

Aspects of color				
Cassava Leaf Concentration	n	Mean rank	$\chi^2$ (Friedman test)	p-value
0%	25	2,72	26,849	0,000
15%	25	3,08		
30%	25	2,70		
50%	25	1,50		
Aspects of Aroma				
0%	25	2,04	32,856	0,006
15%	25	3,16		
30%	25	3,10		
50%	25	1,70		
Aspects of texture				
0%	25	2,62	29,804	0,000
15%	25	3,24		
30%	25	2,64		
50%	25	1,50		
Aspects of color				
0%	25	2,48	34,508	0,000
15%	25	3,36		
30%	25	2,68		
50%	25	1,48		

Table 2 Wet Noodle Elasticity Test Result with Addition Cassava Leaves

Concentration	Elasticity	Unit	Category
0%	4,0	Cm	Good
15%	3,3	Cm	Medium
30%	1,7	Cm	Less
50%	1,2	Cm	Less

Table 3 Iron & Protein Content of Wet Noodles with The Addition of Cassava Leaves (*Manihot esculenta*) Per 100 Gram Ingredients

No	Sample Type	Repetition	Iron (mg)	Mean	Contribution of nutritional adequacy figures (%)	
					Women	Pregnant
1	Wet samples 15%	1	0,1	0,1	0,6	0,3
		2	0,1			
2	Wet samples 30%	1	0,3	0,3	2	1,1
		2	0,3			
3	Wet samples 50%	1	0,5	0,5	3,3	1,8
		2	0,5			

No	Sample Type	Repetition	Protein (g)	Mean	Contribution of nutritional adequacy figures (%)	
					Women	Pregnant
1	Mie basah 15%	1	8,270	8,222	12,6	8,6
		2	8,175			
2	Mie Basah 30%	1	7,579	7,577	11,6	7,9
		2	7,575			
3	Mie basah 50%	1	7,494	7,945	12,2	8,3
		2	7,496			

Table 4 Wet Noodle Fiber Content with The Addition of Cassava Leaves (*Manihot esculenta*) per 100 grams

Test	Concentration	Fiber (%)	Category
I	15%	7,63	High
II		7,57	
	Mean	7,60	
I	30%	8,32	High
II		8,36	
	Mean	8,34	
I	50%	9,66	High
II		9,67	
	Mean	9,67	

Table 5 Wet Noodle Hydrogen Cyanide (HCN) content with the addition of Cassava Leaves (*Manihot esculenta*) per 100 grams

Test	Concentration	Cyanida (mg)	Category
I	15%	9,9	Safe
II		9,7	
	Mean	9,8	
I	30%	13,4	Safe
II		13,4	
	Mean	13,4	
I	50%	15,6	Safe
II		15,7	
	Mean	15,7	