Bukti Korespodensi artikel " The Functional Properties Ofof Rabbit Skin Gelatin Compared Toto Commercial Gelatin Andand Its Application Inin Jelly Candy"

An. Dr. Sri Mulyani

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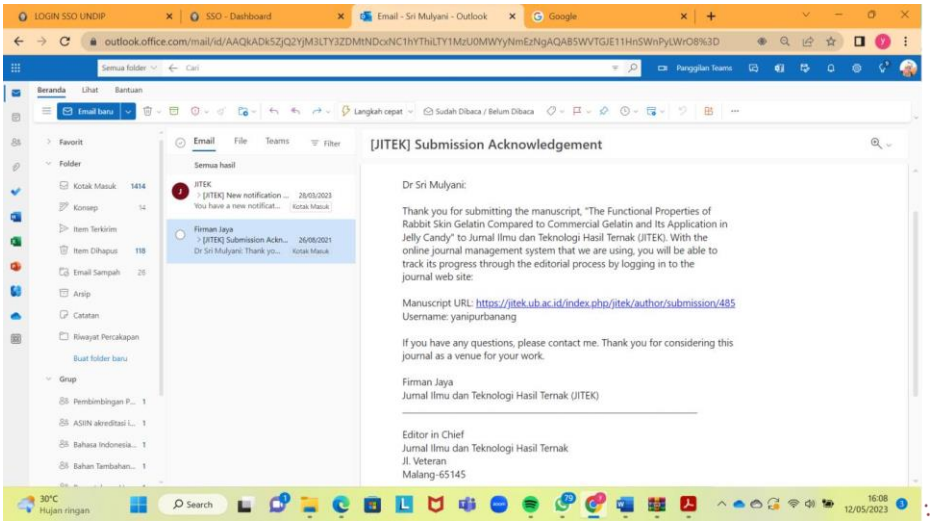

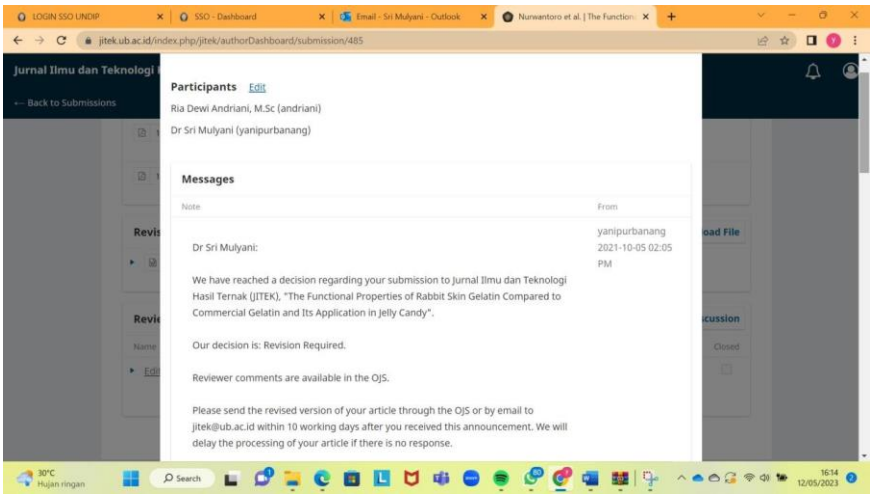

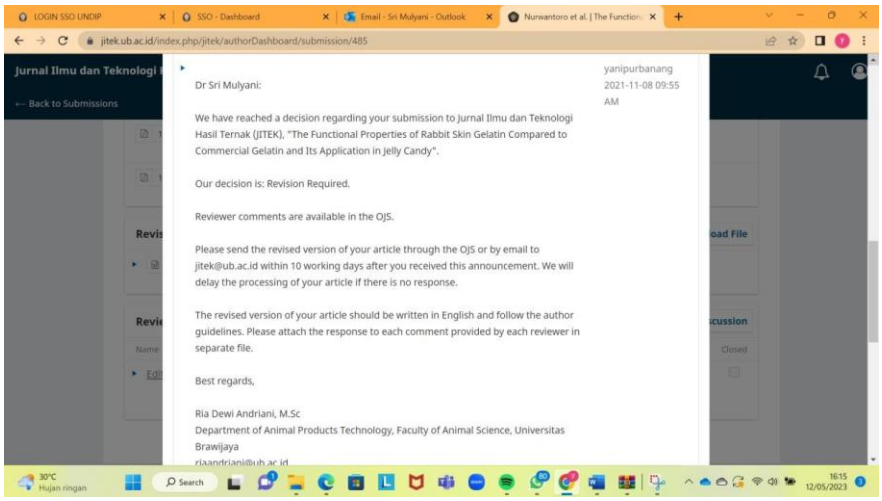
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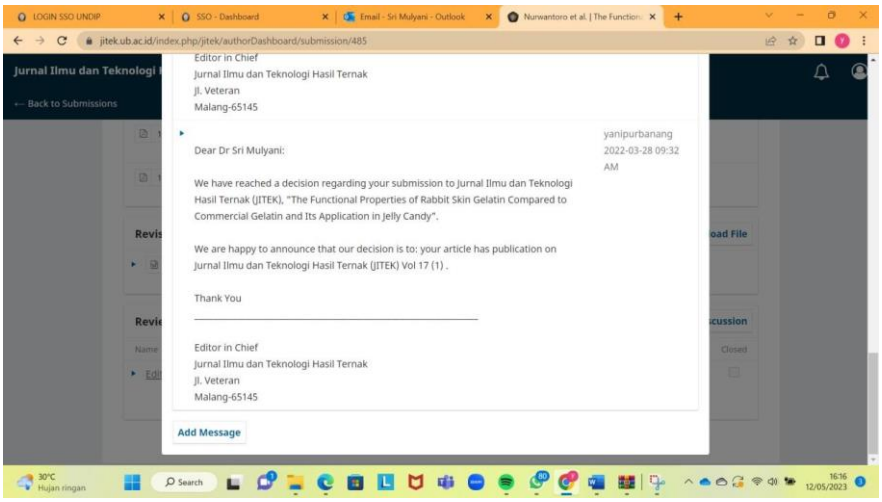
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The Functional Properties ~~Of~~of Rabbit Skin Gelatin Compared ~~To~~to Commercial Gelatin ~~And~~and Its Application ~~In~~in Jelly Candy

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ABSTRACT

Rabbit skin can be ~~used~~ utilized as an ingredient in ~~making~~ gelatin making. Gelatin can be used in ~~making~~ jelly candy. The ~~purpose of this~~ study aims~~was~~ to compare the functional properties of rabbit skin gelatin and commercial gelatin ~~to~~ in gel strength, viscosity, and ash content and to determine the different test and hedonic test of jelly candy. This study used the t-test with 2 treatments and 6 replications. The results between P1 (rabbit skin gelatin) and P2 (commercial gelatin) were not different (P> 0.05) on gel strength, ~~and~~ however, there was a difference (P <0.05) on viscosity and ash content. In the differentiation test for jelly candy, 21 panelists said it was different and 4 panelists said the same. ~~.~~The hedonic test on jelly candy gave no difference (P> 0.05) on texture, flavor, taste, and overall, except ~~and~~ there was a difference (P <0.05) on color. ~~Conclusion~~The gel strength of rabbit skin gelatin and commercial gelatin only differ in viscosity and ash content. Jelly candy with rabbit skin gelatin and commercial gelatin only differ in color acceptance by the panelist. Both jelly candies can be distinguished and accepted by the panelist.

Keywords: gelatin; rabbit skin; jelly candy

INTRODUCTION

Jelly candy is one product that is very popular with consumers from children to adults. ~~Currently~~Nowadays~~,~~ there are many jelly candy products with various shapes and flavors ~~so that~~to ~~they are~~ increas~~inglye~~ ~~attractive~~ appealing for~~to~~ consumers. Jelly candy includes soft candy made from fruit juice and gelling material which has a clear, transparent appearance, and has a certain elasticity. (Susanti and Asyik, 2019). The ingredients in making jelly candy are sucrose, glucose syrup, citric acid, and gelling agents (Putri *et al*., 2015). Gelling material commonly used in the manufacture of jelly candy is gelatin. Gelatin is a water-soluble protein obtained from collagen tissue derived from skin, bone, and connective tissue which is ~~is~~ hydrolyzed by acid or base (Abustam *et al*., 2020). The gelatin in jelly candy ~~serves~~ roles to improve the shape and texture of jelly candy and inhibit~~s~~ sugar crystallization (Eletra and Astuti, 2013).

Indonesia has been import~~eds~~ 2000-3000 tons of gelatin products or worth 25,036.10 from various countries such as China, Japan, France, New Zealand, and Australia (Atma, 2016). Gelatin from pork skin is a problem for Muslims, while gelatin from cow skin and bones is not accepted by Hindu society. This encourages the search for alternative sources in gelatin production (Ratnasari *et al*., 2013). Rabbit skin has not been fully utilized to its full potential. The chemical composition of rabbit skin is a protein content of 22.98%; fat 5.6%; ash 3.49%; and other ingredients 2.03% (Mas'ud *et al*., 2015). Rabbit skin has a high protein content such as collagen protein so it has the potential to be extracted into gelatin (Wuysang *et al*., 2016). Rabbit skin gelatin can be ~~used~~ utilized as ~~a~~ gelling agent in jelly candy. The purpose of this study was to determine the differences in the functional properties of rabbit skin gelatin and commercial gelatin in terms of gel strength, viscosity, and ash

content and to determine the differences in the characteristics of jelly candy in terms of organoleptic tests.

MATERIALS AND METHODS

Materials

The research material was the skin of male New Zealand rabbits aged 6 months, distilled water, 0.5 M NaOH, 0.3 M HCl, sucrose, glucose syrup, citric acid, commercial gelatin. Research equipment includes measuring cups, stirrer, filter cloth, pans, stoves, thermometers, analytical balances, jelly candy, plastic cups, trays, porcelain dishes, desiccators, water baths, furnaces, refrigerator, freezer, viscometer brookfield, texture analyzer, erlenmeyer, cabinet dryer.

Methods

Extraction of Rabbit Skin Gelatin

The rabbit skin wasis washed and the remaining fat wais cleaned, then the rabbit skinit wais soaked in 2% lime water for 24 hours. The soaking water wasis removed and the rabbit skin wasis re-washed and the fur wais cleaned. The rabbit skin was cut into pieces 1 x 1 cm and weighed per 100 g. Rabbit skin that had been cut and weighed then soaked in 300 mL of 0.25 M NaOH solution for 2 h and , then rinsed with water repeatedly. The skin was re-soaked in 300 mL of 0.3 M HCl solution for 4 h, then washed to neutralize the pH between 5-6. Extraction was carried out in 3 stages, namely at temperature 65°C for 5 h, 68°C for 5 h, and 70°C for 5 h in the water bath. The extract was filtered and the filtrate was dried in a cabinet dryer at temperature 50-55°C for 48 h (Mulyani *et al*, 2017).

Making of Jelly Candy

Sucrose 40 g g sucrose was heated at 40°C plus 40 g glucose syrup and 0.3 g citric acid (for one experimental unit). Gelatin dissolved in hot water (50°C) as much as 50 ml in a different container. The gelatin isswas added to a mixture of sucrose, glucose syrup, and citric acid. Heating was was continued at 100°C for 10 minutes until thickened, t. Then removed and poured into the mold and cooled at room temperature 28°C for 1 hour. Candy is putstored in the refrigerator at 5°C for 24 hours, then . candy is left at room temperature 28°C for 1 hour and and then removed from the mold (Sachlan *et al*., 2020)

Design Research

The study followed experimental design used a t-test with 2 treatments and 8 replications so tha, thust 16 experimental units were obtained. The treatments were determined, namely, P1: the use of rabbit skin gelatin in jelly candies and P2: the use of commercial gelatin in jelly candies.

Measurement

Measurement~~Tests~~s for the functional properties of gelatin ~~include~~ are tests of gel strength (Mulyani *et al*., 2017), viscosity (Santoso *et al*., 2019), and ash content (Male *et al*., 2014). Organoleptic tests for jelly candy include discriminatory test~~s~~ (Syukroni *et al*., 2013) and hedonic test~~s~~ (Megantara *et al*., 2017).

RESULTS AND DISCUSSIONS

Gel Strength

Gel strength is a functional property of gelatin that is important to determine the quality of gelatin because it ~~can~~ can convert liquids into solids or change the sol into a reversible gel. The results of testing the gel strength of rabbit skin gelatin and commercial gelatin can be seen in Table 1.

Table 1. Gel strength, viscosity, and ash content of rabbit skin gelatin compared to commercial gelatin

Treatment	Gel strength (Bloom)	Viscosity (cP)	Ash Content (%)
Rabbit skin gelatin	238.1 ± 16.07	10.4 ± 1.45[a]	1.2 ± 0.059[a]
Commercial gelatin	243.0 ± 33.55	13.7 ± 1.53[b]	0.4 ± 0.061[b]

~~note~~Remarks:

Data is displayed in the form of mean±standard deviation.

[a,b] Different lowercase superscripts showed a significant difference (P<0.05)

Based on Table 1, ~~T~~there was no significant difference (P>0.05) between the gel strength of rabbit skin gelatin and commercial gelatin. According to SNI 06-3735-1995 states that the gel strength value ranges from 75-300 g Bloom. Gel strength is divided into 3 classifications, namely low (50-100 Bloom), moderate (100-200 Bloom), and high (200-300 Bloom) Oktaviani *et al*. (2017).

The gel strength of commercial gelatin and rabbit skin gelatin is high. This is caused by ~~s because~~ the extraction that has been optimally carried out ~~optimally~~. Extraction using HCl can help collagen break down the triple helix into single chain~~s~~. Kusumawati and Wawasto (2008) stated that acid solution can convert triple helix collagen into single chain~~s~~ in a short time, ~~therefore so that~~ more collagen can~~is~~ be hydrolyzed. Extraction wa~~i~~s carried out at optimal temperatures therefore ~~so that~~ the resulting gel strength is high. Rabbit skin gelatin extraction was carried out at temperature 65-70°C, while t~~T~~emperature 70°C ~~it~~ would convert unbreakable collagen ~~at~~ to temperature 65°C, ~~so that~~hence the collagen in rabbit skin could be converted into gelatin optimally.

~~-~~Extraction optimization is influenced by the optimal extraction time (Wulandari *et al*. 2013).

The extraction process for 5 hours was~~is~~ the optimal time to ~~to be able to~~ convert the collagen into gelatin~~,~~, ~~because~~ should ~~if~~ it ~~i~~was more than 5 hours, ~~then~~ the skin would ~~ill~~ be destroyed and more dissolved with distilled water (Pratiwi *et al*, 2018). The optimal extraction process on rabbit skin gelatin produces gel strength that has ~~is~~ not differen~~t~~t from commercial gelatin. Gel strength is an important property of gelatin to determine the quality ~~which affects the quality~~ of jelly candy.

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Viscosity

Viscosity is the degree of ~~viscosity~~ consistency of a solution (Pelu *et al*., 2017). The results of testing the viscosity of rabbit skin gelatin and commercial gelatin can be seen in Table 1. There was a significant difference (P<0.05) between viscosity rabbit skin gelatin and commercial gelatin. The protein content of rabbit skin is 28.51% while the protein content of cow skin is 62.01% (Sasmitaloka *et al*. 2017). Different viscosity happened due to different protein content. The protein content will affect the level of collagen, the higher the amount of protein, the ~~higher the~~ amount of collagen will increase. Collagen content depends on the type of animal. Commercial gelatin is made from cowhide, which ~~the~~ collagen content ~~of cowhide~~ is higher than rabbit skin. This can be seen from the protein content of cowhide ~~which is~~that ~~,~~ is higher than ~~the~~ protein content of rabbit skin. High collagen content is directly proportional to the levels of amino acids proline and hydroxyproline in gelatin which will ultimately contribute to gelatin viscosity (Suseno, 2013, Sugihartono, 2014).

Another factor that affects the viscosity of gelatin is the age of the livestock. The age of rabbits in this study was only 5 months hence ~~so that~~ the viscosity value of rabbit skin gelatin was lower than commercial gelatin. The age of livestock is one of the factors that affect the amount of collagen protein in animal skin. The older the animal, the more ~~higher the~~ protein will increase (Putro *et al.*, 2019).

The high and low viscosity of gelatin can be caused by the ash content of gelatin. low ash content will produce high viscosity (Sasmitaloka *et al*., 2017). The high ash content of rabbit skin gelatin is ~~is thought to be due~~caused by ~~to~~ its water-insoluble ~~the~~ mineral content ~~that is not soluble in water~~ in the demineralization process. Suboptimal demineralization caused ~~an cause~~ low gelatin viscosity (Wulandari *et al*., 2013).

Ash Content

Ash content is one of the requirements that must be met by gelatin. Tests for the ash content of rabbit skin gelatin and commercial gelatin can be seen in Table 1. The results showed that there was a significant difference (P<0.05) between the ash content of rabbit skin gelatin and commercial gelatin. The ash content of rabbit skin gelatin is higher than commercial gelatin, this may occur ~~because~~ since the filtering process for rabbit skin gelatin is not correct. Hasdar and Rahmawati (2016) stated that filtration that leaves a precipitate can produce higher gelatin ash content. The ash content is ~~still~~ matched with~~at~~ the SNI 06-3735-1995 quality standard with a maximum ash content of 3.25% and the GMIA standard with ~~an~~ ash content ranged 0.3-2%. Ash content is an indicator of gelatin purity. The higher the ash content, the larger the gelatin impurities, while the lower the ash content, the higher the collagen purity (Amin, 2017). The purity of gelatin is affected by impurities from the raw material or in the gelatin manufacturing process. The presence of deposits produced on rabbit skin gelatin is

suspected as an impurity resulting in higher ash content. Kusnadi and Putri (2020) stated that raw materials that are not clean will ~~result in the increasing of~~increase ash content.

The high ash content is due to the presence of minerals bound to collagen in the washing process thus mineral impurities ~~so that in the extraction process minerals~~ will also be extracted (Islam, 2018). In addition, the high and low ash content of gelatin is determined by washing or demineralization, the more minerals that dissolve in the washing process, the lower the ash content (Juliasti *et al*, 2014). Sompie *et al*. (2012) stated that the ash content in gelatin indicates its mineral content.

Organoleptic Test

Organoleptic tests carried out include differentiation tests and hedonic test. Difference test on jelly candy is used to find out the differences or similarities between two jelly candies with different gelatins. The results of the difference test carried out on 25 panelists can be seen in Table 2. The hedonic test on jelly candy is used to determine the level of preference between two jelly candies with different gelatin. The results of hedonic test carried out on 25 panelists using a scale 1-4 can be seen in Table 3.

Table 2. The r~~R~~esult of difference test on Jelly Candy made from rabbit skin gelatin and commercial gelatin

Type of gelatin	Similar	Different
Rabbit skin gelatin	4	21
Commercial gelatin		

Table 3. Hedonic t~~T~~est of j~~J~~elly c~~C~~andy made from rabbit skin gelatin and commercial gelatin

Type of gelatin	Texture	Color	Taste	Aroma	Overall
Rabbit skin gelatin	2,92 ± 0,86	3,36 ± 0,57[a]	3,12 ± 0,88	2,56 ± 0,77	3,12 ± 0,67
Commercial gelatin	3,04 ± 0,79	2,72 ± 0,79[b]	2,96 ± 0,73	2,48 ± 0,87	3,04 ± 0,61

~~Note~~Remarks:-
Data is displayed in the form on mean ±standard deviation
[a,b], Different lowercase superscripts in the same column showed a significant difference (P<0.05)
Hedonic scale = 1 (dislike very much), 2 (dislike), 3 (like), 4 (like very much)

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Based on Table 2 ~~D~~difference test showed that 21 panelists stated different and 4 panelists stated the ~~same~~ similar from 25 panelists. The color of jelly candy with rabbit skin gelatin is a cloudy white, while jelly candy with commercial gelatin is a clear white. The shape of the jelly candy with rabbit skin gelatin and commercial gelatin is bear-shaped ~~because~~ since it is ~~printed~~ formed with a bear-shaped mold. The aroma of jelly candy with rabbit skin gelatin and commercial gelatin are~~is~~ distinctive ~~because~~ with~~there is~~ no addition of essence. The taste of jelly candy with rabbit skin gelatin and commercial gelatin are sweet and sour ~~because~~ due to~~there are~~ sucrose, glucose syrup, and citric acid in the manufacture of jelly candy.

The results of hedonic test conducted by 25 panelists (Table 3) showed that there was a significant difference (P<0.05) on color, but there was no significant difference (P>0.05) on texture, taste, aroma, and overall. In Table 2, the results of the difference test on jelly candy state that there was~~is~~ a significant difference between rabbit skin gelatin jelly candy and commercial gelatin jelly candy. The product differentiation is ~~thought~~ clarified~~of due to~~ with the difference in color between both jelly candies (Table 5). The high ash content in rabbit skin gelatin affects ~~T~~the color difference ~~was caused by the high ash content of gelatin in rabbit skin gelatin.~~. Rabbit skin gelatin ~~is~~has dark brownish-yellow and affects the color of jelly candy as its final product. The high mineral content in gelatin ~~can~~ cause~~s~~ the color of the gelatin ~~to become~~to become cloudy. Gelatin which is brownish-yellow in color affects the color of jelly candy (Arima and Fithriyah, 2015; Rahmawati and P~~p~~ranoto, 2015).

The results showed that there was no significant difference (P>0.05) in texture between candy jelly with rabbit skin gelatin and commercial gelatin~~. There was no difference because~~since the gel strength of gelatin from rabbit skin and commercial gelatin was similar~~ and high~~. The texture of the jelly candy is influenced by the gel strength of the gelling agent (Estherella *et al*., 2018). Jelly candy has a chewy and elastic texture. The texture of the jelly candy with rabbit skin gelatin and commercial gelatin w~~as~~as acceptable to the panelists. ~~Gelatin~~ The gelatin in jelly candy ~~is able to~~ bind~~s~~ water, consequently, ~~so that~~ the texture will ~~becomes~~become chewy. ~~Using g~~Gelatin added in jelly candy can improve the texture, which is chewy and not too soft, and increase the preference of the panelists (Mufida *et al*., 2020; Nelwan *et al*.-, 2014).

The results showed that there was no significant difference (P>0.05) ~~on~~ in the taste of jelly candy. The taste of jelly candy is more influenced by the ingredients for making jelly candy such as sucrose, glucose syrup, and citric acid. Sucrose and glucose syrup are added ~~cause a sweet taste~~ to balance the sour taste in jelly candy (Simorangkir *et al*., 2017; Fajarini *et al*., 2018; Johan and Herawati, 2017).

The results showed that there was no significant difference (P>0.05) in the aroma between jelly candy with rabbit skin gelatin and commercial gelatin. Jelly candy has a caramelized aroma, fragrant

aroma, and a slight aroma from the main ingredient in making jelly candy (Mansur, 2017). The addition of essence can affect organoleptic assessment and consumer acceptance therefore ~~so that~~ it can provide the aroma that consumers like (Mahardika *et al*., 2014).

The results showed that there was no significant difference (P>0.05) ~~in~~ overall between jelly candy with rabbit skin gelatin and commercial gelatin. Overall acceptance is the key to determine whether a product is ~~liked~~ accepted or not~~, so that~~ thus it can help to understand the consumer's insight or preference~~consume it or not~~ (Parnanto *et al*., 2016). In general, both are acceptable and liked by the panelists.

CONCLUSION

~~Gel~~ The gel strength of rabbit skin gelatin is the same as commercial gelatin~~,~~ but differs in viscosity and ash content. Jelly candy with rabbit skin gelatin and commercial gelatin can be distinguished by panelists, but both jelly ~~candy~~ candies are still in the medium preferred level by panelists, only differ in color acceptance.

ACKNOWLEDGMENTS

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