

Original Research Article

CHARACTERIZATION OF PEDA PATIN JAMBAL WITH VARIOUS SALT CONCENTRATION AS ENVIRONMENT CONTROL

ABSTRACT

The aim of this research is to get the right salt concentration so as to produce the best peda patin jambal products with the best characteristics. The research's method used in this study is an experimental method with three treatments, consists of salt concentrations of 20%, 30%, and 40% then tests that used are hedonic test by 20 semi-trained panelists who has experience in organoleptic assessment consists of assessing appearance, aroma, texture and taste. This research was conducted at the Fisheries Product Processing Technology Laboratory of the Faculty of Fisheries and Marine Sciences, Universitas Padjadjaran, while the salt and water content testing of the final results of the research was conducted at the Laboratory of food technology at Universitas Pasundan Bandung. This research was conducted on January 27, 2019 until March 31, 2019. Based on the results of the research, the treatment of salt concentration of 30% produces the best pangal catfish products with the best characteristics, which are rather clean appearance, dull white to reddish white flesh, yellowish skin surface, wrinkles on the surface of the flesh and skin, have a distinctive fermentation aroma, have a pearly texture, and has a delicious, savory, slightly salty taste.

Keywords: *Characteristics, Fermentation, Patin Jambal, Peda, Salt concentration*

1. INTRODUCTION

Catfish (*Pangasius* sp.) is one commodity that has great potential in its utilization. This is supported by the rising production level every year. According to the Ministry of Maritime Affairs and Fisheries of Indonesia (2015) the production of catfish in Indonesia in 2013 reached 410,883 tons, then in 2014 it increased to 418,002 tons. Besides having a distinctive taste, catfish meat also has good nutrition. The content of protein, fat, vitamins and minerals in catfish meat is good for meeting the body's needs (Khasanah 2009).

Processing of fishery products generally aims to maintain freshness, preserve, and make products that have physical and chemical properties that are different from the original, but still popular with the community. Processing of fishery products in Indonesia is more than 60% in the form of salted fish, smoked fish, pindang and other traditional products. These products are fishery product processing products favored by most Indonesian people from various circles (Rochima 2005).

Peda is one of the fermented fish products with the help of microorganisms in controlled environmental conditions by the addition of salt with certain concentrations (Fajri et al. 2014). Fermentation carried out on food, including fish can produce food products that have higher nutritional value, as well as distinctive flavors. In addition, fermentation can extend the shelf life, and increase the selling value of the products produced (Heruwati 2002).

There are problems in the lagging processing industry that exist among the people today, namely the quality of products produced by fishermen or fish farmers has different qualities. This is due to differences in the level of knowledge that occurs among fishermen or fish farmers regarding the use of salt in the processing process. The aim of this research is to get the right salt concentration so as to produce the best peda patin jambal products with the best characteristics.

Comment [DALO1]:

Comment [DALO2]: Recast this phrase.

Comment [DALO3]: Expunge. It has been cited in the Materials and Methods; to avoid repetition.

Comment [DALO4]: Cited Ref. should be numbered and in square bracket, e., [1] or [1.2], etc.

Comment [DALO5]: Recast this phrase.

2. MATERIALS AND METHOD

2.1. Time and Place of Research

This research was conducted at the Fisheries Product Processing Technology Laboratory of the Faculty of Fisheries and Marine Sciences, Universitas Padjadjaran, while the salt and water content testing of the final results of the research was conducted at the Laboratory of food technology at Universitas Pasundan Bandung. This research was conducted on January 27, 2019 until March 31, 2019.

2.2. Tools and Materials

The tools used include knives, cutting boards, digital scales, jars, sacks, measuring cups, and spoons. The materials used included 3 kg of jambal patin (*Pangasius djambal*) obtained from the depok fish market, block salt, and water.

2.3. Observation Parameters

The observed parameters used are hedonic test, and chemical test. The hedonic test aims to determine the appearance, aroma, texture and taste. Chemical test aims to determine then salt content and water content. The method used for chemical testing are referring to SNI-01-2354.2-2006 for water content test, SNI 01-2359-1991 for salt content test. The result of testing the water content dan salt content compared with SNI-01-2721-2009.

Comment [DAL06]: Correct this spelling.

Comment [DAL07]: Paraphrase this sentence. What is 'dan' or is it 'and' please correct this.

2.4. Data Analysis

Non-parametric analysis performed for organoleptic testing using a two-way analysis of the Friedman test using the Chi-square test. The statistical formula used in the Friedman test is as follows (Sudrajat 1999):

$$x^2 = \frac{12}{bk(k+1)} \sum_{i=1}^x (R_j)^2 - 3b(k+1)$$

Information :

x = Friedman Test Statistics

b = Repeataation

k = Treatment

Rj = Total ranking of each treatment

Comment [DAL08]: This word should read as repetition

If there is the same number, a correction factor (FK) is calculated using the following formula:

$$FK = 1 - \frac{\sum T}{bk(k^2 - 1)} \quad H_c = \frac{x^2}{FK}$$

Information :

T = N (t3-t)

t = The same number of observations for one rank.

N = The same number of observations for a number with the same value of t.

Multiple Comparisons using the following formula (Sudrajat 1999):

$$|R_i - R_j| \leq Z\{\alpha/k(K-1)\} \sqrt{bk(k+1)/6}$$

Information :

Ri - Rj = Difference in average rank

Ri = Average rating of the i sample

Rj = Average rating of the j sample

α = Experiment wise error

b = Number of data

k = Number of treatments

Z = Value in table Z for multiple comparison

Bayes Equation :

$$Total\ value_i = \sum_{i=1}^m value_{ij} (Krit_j)$$

Information :

Total value = Total final value of alternative to - i

Value = alternative value to - i in the criteria to j

Kritj = Level of importance (value) criteria to - j

i = 1,2,3, n; n = number of alternatives

j = 1,2,3, n; n = number of criteria

2.5. Experimentation Process

The following is a research procedure that has been modified from the wet salting process:

1. Preparation of tools and ingredients, knives, cutting boards, digital scales, jars, sacks, measuring cups, and spoons, jambal patin, block salt, and water.
2. Jambal patin is carried out the process of weeding and cleaning the contents of the stomach then weighed the weight of the meat.
3. Jambal patin soaked in salt solution according to treatment for 24 hours with a ratio of fish and water of 1: 2.
4. Jambal patin then dried in the sun for about 3 hours per day for 3 days.
5. Peda patin jambal cooked and prepared for hedonic testing

Comment [DAL09]: This process is called evisceration. I suggest that this should read as 'Jambal patin was eviscerated, then the meat was weighed'

3. RESULT AND DISCUSSION

3.1. Appearance of Peda Patin Jambal

Based on the results of the research, the salt concentration had an effect on the appearance of peda patin jambal (Table 1).

Table 1. Average Appearance of Peda Patin Jambal

Treatment of Salt Concentration (%)	Median	Average Appearance
20	5	5,8a
30	7	7,3b
40	7	6,4ab

Description: The average number followed by the same letter shows no significant difference according to the multiple comparison test at the test level of 5%.

The treatment of salt concentration in the manufacture of peda patin jambal gives an influence on appearance. Patin meat which has a bright white color turns white to dull reddish white. The formation of the red color is caused by the enzyme activity of the red / orange-forming bacteria during fermentation, the activity of these bacteria also causes an interaction between carbonyl derived from fat oxidation with amino acid groups and proteins (Fajri et. al. 2014). The color of the skin

surface changes from silver white to yellowish to brownish yellow. Color changes that occur are caused by the elemental content of salt crystals (NaCl) found on the surface of the fish body. Catfish including high-fat fish, high fat content can cause the penetration of salt in the fish's body to be imperfect and cause more salt to be left on the outside of the fish body (Tumbelaka 2013).

Another change in appearance that occurs is the surface of the fish meat becomes wrinkled. Meat shrinkage is caused by a reaction between actin and myosin forming actomyosin at the rigor mortis stage (Liviawaty and Afrianto 2014). The difference in salt concentration causes differences in shrinkage of the product. According to Rahmani (2007) salt causes denaturation and coagulation of proteins and enzymes, thus affecting the shrinkage of fish meat. Giving salt will cause the concentration of salt outside the body of the fish more concentrated than the liquid in the body of the fish, resulting in the withdrawal of water from the body of the fish while the salt will enter the body of the fish (Siswanto et. al. 2017). Higher concentration of salt outside the body of the fish, will cause more water withdrawal. Process stops after a balance between the concentration of salt outside and inside the body of the fish, at that time there is thickening of the remaining body fluids and clumping of protein (coagulation) so that the nature and physical appearance of the fish will change (Wijatur 2007).

According to Mardi et. al. (2013) the increased use of salt causes the water binding capacity in meat to decrease. The binding capacity of water by protein meat or water holding capacity (WHC) is the ability of meat to bind free water. Meat with a low binding capacity of water will cause a lot of fluid to be lost. The large amount of lost fluid can affect the shrinkage of meat (Mardi et. al. 2013).

Based on the panelists preference level on peda patin jambal appearance can still be accepted by the panelists because the average value of the appearance of all treatments is still above the product rejection value limit. The limit for rejection of food products is that if the product tested gets a value of ≤ 5 , the product is declared not accepted by the panelist (Soekarto 1985).

3.2. Aroma of Peda Patin Jambal

Based on the results of the research, the salt concentration did not affect the aroma of peda patin jambal (Table 2).

Table 2. Average Aroma of Peda Patin Jambal

Treatment of Salt Concentration (%)	Median	Average Aroma
20	7	6,1a
30	7	6,4a
40	6	6,2a

Description: The average number followed by the same letter shows no significant difference according to the multiple comparison test at the test level of 5%.

The aroma of jambal pangasius in all treatments produces a distinctive aroma of fermentation. The distinctive aroma of fermented products is mainly due to the degradation of proteins and fats in fish meat during fermentation (Thariq et al. 2014). According to Maisyaroh et. al. (2018) Scent compounds are chemical compounds that have aromas because they are volatile compounds. Volatile compounds formed from degradation of proteins and fats are aldehydes, ketones and esters which contribute to the formation of aromas in salt fish fermentation products (Thariq et al. 2014). As for Rochima (2005) the distinctive aroma of fermented fish comes from methylketone, butylaldehyde, amona, amino compounds and other compounds arising from fat degradation. The higher concentration of salt (> 5%) produces a stronger aroma in fermented products (Yuliana 2007).

Comment [DALO10]: This should read as ammonia.

3.3. Taste of Peda Patin Jambal

Based on the results of the research, the salt concentration had an effect on the taste of peda patin jambal (Table 3).

Table 3. Average Taste of Peda Patin Jambal

Treatment of Salt Concentration (%)	Median	Average Taste
20	5	5,4a
30	7	7b
40	7	6,2ab

Description: The average number followed by the same letter shows no significant difference according to the multiple comparison test at the test level of 5%.

Peda patin jambal has a taste that is tasty, savory and does not give after taste like bitter. The taste produced is influenced by the concentration of salt. Adding different salt concentrations to fermented products produces different flavors (Ahillah et al. 2017). The higher salt concentration given in a fish product, will produce a taste that is too salty so it is less preferred (Adawyah 2011). The taste most favored by panelists in this research is the peda patin jambal, which is tasty, and slightly salty (30% treatment). Peda patin jambal taste in this research is close to the common taste of peda mackerel in the market.

According to Thariq et. al. (2014) the difference in salt concentration has an effect on the content of glutamic acid which plays a role in the formation of savory flavors (umami) in low-grade products. Glutamic acid is a simple molecule produced by the breakdown of proteins by proteolytic enzymes during the fermentation process. The higher salt content, the activity of fermenting microorganisms to break down protein into amino acids especially glutamic acid, decreases, this is due to the high salt concentration can slow down the activity of some fermented microorganisms and will affect the savory taste (umami) produced in the peda product (Thariq et. al. 2014).

Comment [DALO11]: This should read as some fermenting microorganisms.

3.4. Texture of Peda Patin Jambal

Based on the results of the research, the salt concentration did not affect the texture of peda patin jambal (Table 4).

Table 4. Average Texture of Peda Patin Jambal

Treatment of Salt Concentration (%)	Median	Average Texture
20	5	5,4a
30	7	5,9a
40	7	6,4a

Description: The average number followed by the same letter shows no significant difference according to the multiple comparison test at the test level of 5%.

Masir texture is a sandy texture that is typical of salted fish due to a reaction between lipoprotein in fish meat and salt that enters fish meat (Fellows 2000). Soaking fish in a salt solution will cause diffusion of NaCl salt into fish meat, this diffusion of Na⁺ and Cl⁻ ions causes damage to lipoprotein bonds. The more NaCl concentration that enters the meat releases the lipoprotein bond. This release of lipoprotein bonds causes fat to separate from protein. This results in the merging of proteins which then form solids and cause texture texture (Chi and Tseng 1998 in Rukmiasih et. al. 2015).

Comment [DALO12]: Delete one of the textures and harmonise and complete this sentence.

3.5. Water Content

Following are the results of water content of peda patin jambal using SNI-01-2354.2-2006 for water content test (Table 5).

Table 5. Test Results of Peda Patin Jambal Water Content

No.	Treatment of Salt Concentration (%)	Result (% b/b)
1.	20	37,8511
2.	30	32,5301
3.	40	27,3237

The value of the moisture content in the jambal pathway tends to decrease with increasing salt concentration. The salt that enters the body of the fish will replace the free water that is in the body of the fish, so the water content will decrease (Juharni 2013). The water content in this research still meets the requirements according to SNI 01-2721-2009, which is a maximum of 40%.

3.6. Salt Content

Following are the results of salt content of peda patin jambal using SNI 01-2359-1991 for salt content test (Table 6).

Table 6. Test Results of Peda Patin Jambal Salt Content

No.	Treatment of Salt Concentration (%)	Result (% b/b)
1.	20	12,2836
2.	30	13,1276
3.	40	14,4902

The levels of peda patin jambal salts produced in this research ranged from 12.28% - 14.49%. The salt content still meets the requirements of SNI 01-2721-2009, which is a maximum of 20%.

3.7. Decision Making with the Bayes Method

The calculation results on the weight of the appearance criteria, aroma, texture, and taste of jambal patin using the Bayes method are presented in Table 7.

Table 7. Weight Value of Peda Patin Jambal Criteria

Criteria	Weight of Criteria
Appearance	0,14
Aroma	0,26
Taste	0,5
Texture	0,1

Based on table 7, it shows that taste is the most important criterion that determines the final decision of the panelist in choosing peda patin jambal with the criteria weight value of 0.5. Furthermore, the panelists also considered that aroma was an important criterion with a criterion weight of 0.26 followed by appearance and texture namely 0.14 and 0.1. This shows that even though other judgments are good, but if the taste of the pangasius jambal is not liked, the panelist will reject the product.

The calculation results in determining the best treatment by considering the appearance criteria, aroma, taste, and texture of peda patin jambal are presented in table 8.

Table 8. Assessment Decision Matrix of Peda Patin Jambal with Bayes Method

Treatment	Criteria				Alternative Value	Rating
	Appearance	Aroma	Texture	Taste		
20%	5,80	6,10	5,40	5,40	5,64	3
30%	7,30	6,40	5,90	7,00	6,78	1
40%	6,40	6,20	6,40	6,20	6,25	2
CRITERIA VALUE	0,14	0,26	0,10	0,50	18,67	1,00

Table 8 shows that the treatment of 30% salt concentration in making peda patin jambal has the highest alternative value of 6.78 followed by 40% treatment with an alternative value of 6.25 while the treatment of 20% has the lowest alternative value of 5.64. Based on the organoleptic test parameters that were observed, the treatment of 30% salt concentration produced peda patin jambal with the best characteristics favored by panelists.

Comment [DALO13]: Recast appropriately.

4. CONCLUSIONS

Based on the results of the research, the treatment of 30% salt concentration produced peda patin jambal with the best characteristics were rather clean appearance, dull white to reddish white flesh, yellowish skin surface, wrinkles on the surface of the flesh and skin, have a distinctive fermentation aroma, have a pearly texture, and has a delicious, savory, slightly salty taste

Comment [DALO14]: Replace with the words 'such as appearance,

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Comment [DALO15]: Correct to read 'and'. Do same for this point onwards.

Comment [DALO16]: Is there no initial?

Several Authors cited were not REFERENCED, e.g., Rukmiasih et al., 2015; Ministry of Maritime Affairs and Fisheries of Indonesia, 2010; Siswanto et al., 2017, etc
Authors not CITED in the text, e.g., No. 7. Kailasapathy and Tamang. 2010.