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Characteristics of Flavor Powder of Liquid Waste Mackarel Tuna with Wheat Flour Filler

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KeyWords
Flavouring powder, liquid waste mackarel tuna, wheat flour, level of food preference.

ABSTRACT

This research aim to decide correct consentration of flour materials for the characteristic of the most liked liquid waste mackarel tuna flavor powder by the people. The reaserch was held in February-Maret 2018 in TPHP Laboratory Faculty of Fisheries and Marine Science, Unpad Central Laboratory, the center of mackarel tuna factory in Cirebon, and BPPMHP Cirebon. The method which used is experimental research, which consist three treatments adding wheat flour 10%, 15% and 20% (b/v). The parameter is monitored is the degree of the flavouritness filt wheat for sensory characteristic (physically, smell, texture and taste). The data obtained were analyzed using non-parametric statistic. Physical parameter (rendement, bulk density, and solubility), proximate parameter (ash, water, protein, fat and carbohydrate). The result of the research shows that liquid mackerel tuna flavor powder which focused on wheat flour in 15% which is the favorite of panelist has the average 7,3; 7,0; 7,4; and 5,8, then it has high alternative value, it is 6,53. Wheat flour consentrate 15% which result to rendement value 19,34%, bulk density 0,42 g/ml and solubility 44%. Proximate analysis of ash content 26,71%, water 4,90%, protein 30,90%, fat 6,59% and carbohydrate 30,90%.

INTRODUCTION

Fish brine is a product that is quite popular in Indonesia. The Ministry of Marine Affairs and Fisheries (KKP) reported that fish brine production in Indonesia reached 242,159 tons in 2013, and continues to increase year after year (Abdillah et al 2015). The industry of marinating mackarel tuna in its process produces liquid waste, which can cause environmental pollution, especially odor resulting from protein decay. One unit of tuna processing industry, produces liquid waste per day as much as 150 m3 (Nilawati et al 2014). Cultivation area of mackarel tuna fish brine found in West Java precisely in Purwawinangun Village, Suranenggala District, Cirebon Regency. The waste generated in the form of industrial water contains 12.22% protein, 2.10% fat, 2.60% ash, meat flakes and other components lost during cooking process (Isnaeni et al 2014).

So far, liquid waste from the fish brining process has not been optimally utilized. Whereas, if its exploited with various technological developments, liquid waste of fish brine potentially produce new products such as petis, soy sauce, and crackers (Oktavia dkk 2012). Another alternative for utilize liquid waste mackarel tuna fish brine into a product that has a higher economic value is to process it into a "flavor powder" liquid waste mackarel tuna fish brine. Flavored powder or called flavoring is a additional food that can provide and add its flavor and aroma. Making this product is expected to compete with other flavor powder and favored by society. The creation of a liquid flavor powder requires the addition of a filler to speed up the drying process, increase the yield, coat the flavor component and prevent damage by the heat (Lailiyah 2014).

Fillers used in the manufacture of mackarel tuna fish brine flavor powder in the form of wheat flour because wheat flour has economic value, easy to obtain and beside, wheat flour has a similar degree of solubility with maltodektrin. Wheat flour as a filler for carbohydrates and gluten contained in wheat flour can be a protein encapsulation agent. The protein encapsulation agent is a material that can bind the flavor with protein components in the form of particles so that it is not damaged during the drying or heating process due to the denaturation of protein (Khasanah 2015). The concentration of the filler is very influential on the characteristics of powder liquid waste fish brine flavor powder to produce high nutrient flavor powder, which has the appearance of fine and dry powder, beige color, special aroma of broth and the special taste of broth preferred by panelist (Ramadhani 2015). The objective of this study was to determine the exact concentration of flour fillers to produce the most favorable flavor of powder liquid waste fish brine liquid flavor.

METHOD OF RESEARCH

Place and Time of Research

This research was conducted in February - March 2018 in three places, namely Fishery Products Processing Laboratory of Fishery and Marine Science Faculty of Padjadjaran University, Central Laboratory of Padjadjaran University and at Cirebon Quality Research and Testing Center (BPPMHP).

Tools and Materials

Tools and materials used are Blender, Pan, stove, stirrer, strainer, spoon, Spray dryer and plastic sealer, tuna waste water powder, wheat flour, garlic, onion, pepper and turmeric, and polyethylene plastic.

The method which used is experimental research, which consist three treatments adding wheat flour 10%, 15% and 20% (b/v). The parameter is monitored is the degree of the flavouritness filt wheat for sensory characteristic (physically, smell, texture and taste). The data obtained were analyzed using non-parametric statistic (Friedmen test). Physical parameter (rendement, bulk density, and solubility), proximate parameter (ash, water, protein, fat and carbohydrate).

RESULT AND DISCUSSION

Mackarel Tuna Fish Brine Flavor Powder Physical Test

1. Rendement (Rendement)

Rendement was obtained by computing (weighing) the final weight of the material resulting from the process compared with the initial weight before undergoing the process (Husna et al 2017). Based on the results of observation of flavor powders rendement test with 10% treatment has a rendement value of 18.52% is the lowest rendement and 20% treatment has a rendement value of 21.04% and is the highest rendement value (Table 1).

Table 1. Flavor Powder Rendement Observation Results

No.	Additional treatment of wheat flour (%)	Rendement (%)
1.	10	18,52
2.	15	19,34
3.	20	21,04

The results of this rendement test proves that the higher the addition of wheat flour can affect the rendement, the rendement will be higher to be exact. This result is in accordance with the opinion of Kanpairo et al (2012) that the increase in total solids from flavor powder is due to the addition of filler material.

2. Bulk density

Calculation of bulk density is done to determine the bulky nature of the flavor powder. Based on the result of observation of

density test of fish brine flavor powder. Flavored powder of all treatments have different values of density and it can be seen in (Table 2).

Table 2. Flavor Powder Bulk Density Observation Result

No.	Additional treatment of wheat flour (%)	Bulk density g/ml
1.	10	0,36
2.	15	0,42
3.	20	0,46

The bulk density results of mackarel tuna fish brine flavour powder show that the addition of wheat flour will increase the bulk density. Food has high bulk density show high density. The high bulkdensity will require a smaller place. Bulk density from various powder products generally ranges from 0.30-0.80 g / mL (Miftakhurohmah 2012).

3. Solubilty

Solubility test is needed because the application of flavor powder is mixed into the cooking as a flavoring, especially solubility test against water solvent. Based on the observation result of mackarel tuna fish brine flavour powder, soluble flavor powder of all treatments have different solubility value and can be seen in (Table 3).

Table 3. Flavor Powder Solubility Observation Results

No.	Additional treatment of wheat flour (%)	Solubility (%)
1.	10	54
2.	15	44
3.	20	42

The solubility of mackarel tuna fish brine with flour filler is still low compared to the solubility value of tuna flavor powder with maltodextrin filler in Kanpairo et al (2012) which has a solubility value of 60.87-70.12%.

Hedonic Test of Mackarel Tuna Fish Brine Powder Flavor

1. Appearance

The appearance is the first characteristic of a panelist in consuming a product. Based on Friedman test results toward the appearance of flavor powder obtained the same median value of 7 which means the appearance of flavor powder products favored by the panelist. The average value of mackarel tuna fish brine powder flavor appearance can be seen in (Table 4).

Table 4. Average Value of Flavor Powder Appearance

Additional treatment of wheat flour (%)	Median	Average of Appearance
10	7	6,8 a
15	7	7,3 a
20	7	6,6 a

Description: The numbers followed by the same letters show no significant difference according to the comparative test level of 5%.

The appearance of mackarel tuna fish brine flavored powder with 10% flour additive treatment has slightly darker cream color, 15% treatment has cream color like color of commercial chicken flavoring powder. The color of the flavoring powder with 20% treatment has a slightly pale creamy color due to the increasing amount of wheat flour. The color of the brown flavored powder is caused by the heating process during drying that triggers Maillard reaction. Maillard reaction is a reaction between carbonyl compounds that react with reducing sugars and amines derived from amino acids (proteins from tuna broth) and can cause brownish color in foods (Oliveira et al 2014).

2. Flavour

Some food industries conclude that the scent is very important because it can provide favorable or unfavorable research results on food products. The average value of mackarel tuna fish brine flavored powder can be seen in (Table 5).

Table 5. Average Value of Flavour Powder Aroma

Additional treatment of wheat flour (%)	Median	Average of Flavour
10	**7**	**6,5 a**
15	7	7 ab
20	5	5,3 b

Description: The numbers followed by the same letters show no significant difference according to the comparative test

level of 5%.

The smell of tuna fish brine on the 10% treatment has a distinctly stronger aroma of cob fish brine, the 15% treatment has a strong tomato fish brine aroma and 20% treatment has a less strong artifact of cob fish brine. Aroma is a volatile component that can determine the quality of the flavor. The aroma of the parsed flavor powder flavor comes from the protein content found in the fish. The aroma comes from the aromatic amino acid-free and volatile compounds found in fish. Boiling process causes volatile compounds to evaporate so it can cause aroma (Suharso 2006).

3. Texture

Texture is one of the parameters of consumer preferences in a food product. Good flavor powder texture has fine, dry and homogeneous powder particles. The mean value of the fish brine flavored powder flavor texture can be seen in (Table 6).

Table 6. Average Value Flavor Powder Texture

Additional treatment of wheat flour (%)	Median	Average of Textur
10	5	5,7 a
15	7	7,4 ab
20	7	6,8 b

Description: The numbers followed by the same letters show no significant difference according to the comparative test level of 5%.

The texture of a 10% cob flavor powder mixture has a fine powder particle texture and is slightly drier. The 15% treatment has a fine, dry powder particle texture. The 20% treatment has a fine powder particle texture and is very dry. The texture difference of the cob fish brine flavor powder flavor is due to the addition / concentration of the filler. The higher the total number of dried solids to a certain extent then the higher the rate of water evaporation. High evaporation of water then the properties of the resulting flavor powder will be more dry (Lailiyah 2014).

4. Taste

Taste is the response of the tongue to the stimuli given by a food. Pain is an important factor in determining whether or not a food product is favored. The mean value of cob fish brine flavor powder can be seen in (Table 7).

Table 7. Average Value Flavor Powder Taste

Additional treatment of wheat flour (%)	Median	Average of Taste
10	7	6,3 a
15	5	5,8 a
20	5	5,7 a

Description: The numbers followed by the same letters show no significant difference according to the comparative test level of 5%.

Taste of mackerel tuna fish brine flavor powder on 10% treatment has slightly saltier taste, 15% treatment has saltiness, and 20% treatment has slightly salty taste. Typical flavors of the cob fish brine flavor powder are the free amino acids in the mackerel tuna fish brine broth which serve to provide a product flavor. One of the amino acids in tungsten liquid waste is glycine and threonine compounds that give sweet and glutamic acids that give a good taste to the fish (Brogstrom 1989).

Decision-Making with Bayes Method

Based on the calculation result on the weight of the appearance criteria, flavor, color and the taste of the flavor powder, it is found that the taste has the highest value criterion weight compared to other criteria with the value of 0.47 (Table 8).

Table 8. Criteria Weight Value of Mackerel Tuna Fish Brine Powder Flavor

Criteria	Priority Values
Appearance	0,09
Flavour	0,25
Textur	0,17
Taste	0,47

Based on calculation result by Bayes method obtained that powder flavor fish brine powder with treatment of wheat flour addition amounting to 15% has highest alternatif value that is equal to 6,53 and priority value equal to 0,35. The 15% treatment turn into the most preferred mackerel tuna fish brine flavoring powder (Table 9).

Table 9. Assessment Decision Matrix with Bayes Method

Treatment	Criteria					
Additional treatment of wheat flour (%)	**Appearance**	**Flavour**	**Textur**	**Taste**	**Alternative Values**	**Priority Values**
10	6,80	6,50	5,70	6,30	6,29	0,34
15	7,30	7,00	7,40	5,80	**6,53**	**0,35**
20	6,60	5,30	6,80	5,70	5,87	0,31
Weighting Criteria	0,09	0,26	0,17	0,47	18,69	**1,00**

Proximate Analysis Results

Proximate analysis was performed on one sample of flavor powder with 15% flour added which is the most preferred treatment by panelists. Based on the proximate result of cob fish brine flavor powder, with the addition of wheat flour 15% has ash content of 26,71%, water content 4,90%, protein content 30,90%, fat content equal to 6,59% and carbohydrate by 30,90% (Table 10).

Table 10. Proximate Analysis Results of Mackarel Tuna Fish Brine Flavor Powder

Parameter	Unit	Produk Bubuk Flavor: Additional treatment of wheat flour 15%	SNI 01- 4281- 1996
Ash Content	%	26,71	-
Water Content	%	4,90	Maks.4,0
Protein Content	%	30,90	Min. 6
Fat Content	%	6,59	Min. 2
Carbohydrate Content	%	30,90	-

The the proximate test result of ash content has a value of 26.71%. Ash content affects the shelf life of food because ash content has a mineral component that affects the physical damage of materials, because minerals can serve as a barrier to the growth of microorganisms. The high ash content causes the shelf life of the product to be longer (Perkasa 2013).

The result of proximate test of moisture content has a value of 4.90%. Water content that exceeds the maximum limit due to several factors one of which is the duration of drying. The drying temperature plays a role in the evaporation of water contained in the material. So if the drying temperature gets bigger then the evaporated water will be more and more, and the water content of the product will be smaller (Kumala dkk 2013).

Protein content in foodstuffs determines the quality of food. Protein is one of the macronutrients that have an important role in the formation of biomolecules. Proteins are water-soluble but some are insoluble. Proteins have an effect on binding materials so that the texture becomes smooth, homogeneous and dry (Mustika 2012). The result of proximate test on the protein content of cob fish brine on the addition of wheat flour 15% has a value of 30.90%.

Fat is an important food substance to maintain the health of the human body and as a more effective source of energy. The result of proximate analysis of fat content of parsley flavor powder has a value of 6.59%. Flavor fat content of flavor powder will decrease as the addition of the amount of filler be it flour, corn and tapioca. That is, the more fillers are added then the fat content will decrease (Aniar 2008).

Carbohydrates have an important role in determining the characteristics of foodstuffs and can affect the taste, color and texture of products and the process of increasing the food can increase the availability of carbohydrates (Sulistiyono 2014). The proximate test result of carbohydrate content of cob fish brine flavor powder at 15% treatment has a value of 30.90%. This is due to the content of the flour filler material derived from the material consisting of polysaccharides resulting in high carbohydrate levels.

Conclusion

Based on the result of the research, it can be concluded that the right flour filler concentration to produce the most favorable panelist of cob fish brine liquid waste flavor powder characteristic is 15% (w / v) with the mean value of organoleptic test of hedonic scale for the appearance, texture and taste respectively 7.3; 7.0; 7.4; and 5.8 and has the highest alternative value of 6.53. The concentration of wheat flour 15% (w / v) rendement value of 19.34%, kamba density of 0.42 g / ml and a solubility of 44%. Proximate analysis was ash content 26,71%, water content 4,90%, protein content 30,90%, fat content equal to 6,59% and carbohydrate content 30,90%.

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