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## Sensory characteristics and moisture content of salted sardinella (*Sardinella fimbriata*) in different salt concentration

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**Abstract.** Salted fish is one of the processed fish products favored by Indonesian people. Salted fish is a fish that is preserved by adding salt to produce a distinctive taste and flavor. Salted fish had unattractive appearance and bad taste (too salty). It was caused by uncertain salt was added into fish salted processing. Sardinella fish (*Sardinella fimbriata*) was one of fish species which is abundant in Tangerang Regency. It was the main raw material for salted fish in Tangerang Regency. The purpose of this study were to determine the sensory characteristics and moisture content of salted sardinella. The treatments given were 10%, 15%, 20% and 30% salt contents. Sensory analysis of salted sardinella which was added by 10%, 15%, 20% and 30% salts contents for the appearance were 6.6; 7.5; 8.1; 8.5, odor were 7.8; 7.6; 8.3; 8.1, taste were 8.7; 8.1; 8.0; 7.1 and texture were 7.3; 7.8; 8.2; and 8.6 respectively. Kruskal Wallis analysis showed that salt concentration had significant effect for appearance and texture, but no significant effect for odor. Moisture contents of salted sardinella which was added by 10%, 15%, 20% and 30% salts contents were 43.5%; 33%; 29.5% and 24% respectively. Anova analysis showed that the addition of salt had significant effect on moisture content of salted sardinella. Salted fish with 10% salt treatment had significant effect with 15%, 20% and 30% salt treatment. Salted fish with 15% salt treatment had no significant effect with 20% salt treatment, but had significant effect with 30% salt treatments. Salted fish with 20% salt treatment had significant effect with 30% salt treatment. The result showed that increasing salt concentration could increase sensory score and decrease moisture content of salted fish.

### 1. Introduction

Tembang fish (*Sardinella fimbriata*) with the local name tanjam fish is one of the fish resources that has economic value and an important role in Indonesian fisheries. One area that has excellent tembang fishery potential in Indonesia is the waters of the Sunda Strait, Banten Province. The importance of fish resources for human needs, both for fulfilling nutrition and economic activities, encourages humans to exploit as many resources as possible, including tembang fish [1]. Tembang fish is a type of small pelagic fish that has a fairly high nutritional content. The chemical composition of tembang fish consists of a water content of 68.60%-68.89%, a protein content of 14.40% -17.59%, a fat content of 9.70%-10.89%, a carbohydrate content of 0.4%-0.38%, an ash content of 6.95%-6.61, and a calorific value of 1.75 kcal/gm [2]. This type of fish is a seasonal fish where at a certain time the production is abundant.



Fish is a fishery product that quickly decomposes or is perishable food, this is because the water content is high enough in the fish's body which is a suitable medium for the growth of putrefactive bacteria or other microorganisms [2]. This condition will be very detrimental when fish production is abundant because so many fish cannot be used and have to be thrown away because they are not suitable for consumption. Therefore, to inhibit the decay process, it is necessary to carry out various methods of preservation and processing which are fast and careful to produce quality products.

One method of preserving fish that is often used is salting followed by drying, the result is commonly known as salted fish. Salted Fish is a protein source food product processed from preserved fish or fish meat by adding a certain amount of salt to produce fish with a distinctive taste, aroma and texture [3].

Salted fish is liked by many people because of the easy processing method, long durability and cheap price. The disadvantage of salted fish products is that the product looks unattractive and the taste is too salty. This is because there is no definite measure for the amount of ingredients used, especially salt. salted fish processors still do not know the basics of knowledge in the salting process of fish. Additionally the processing is individual, so the use of different salt concentrations is based on the individual.

The quality and safety of salted fish need attention given that the production and distribution processes are still simple and conventional. The quality of salted fish is affected by the quality of fish raw materials, the amount and purity of salt used, and the drying process [4]. This study aims to see the sensory reactions and water content of tembang fish with the addition of salt.

## **2. Materials and methods**

The experiment was carried out with a randomized block design (RBD) using 4 different salt concentrations, namely 10%, 15%, 20%, 30% with four replications. The process of making salted tembang fish according to SNI for Dried Salted Fish 8273-2016.

The hedonic test parameters used the Kruskal-Wallis test analysis. The significant data results were then followed by a comparison multiple test [5]. The hedonic test is a test method used to measure the level of liking of a product using an assessment sheet. The assessment attributes of salted fish include appearance, smell, taste, texture. The range of assessment scores provided is 1-9. Dried salted fish was assessed by 30 untrained panelists. Water content is tested according to SNI 2354.2: 2015 [6]. The data obtained were analyzed using ANOVA then followed by the BNJ or Tukey test to obtain significant results.

## **3. Results and discussion**

The treatment of salted fish in this study were four different concentrations of adding salt to tembang fish. The purpose of this study was to determine the effect of adding salt by performing sensory tests and water content.

### *3.1 Sensory test (appearance, odor, taste, texture)*

The sensory test is a testing method based on the sensing process, namely the physio-psychological process or recognition of the human senses as the main tool for measuring the acceptability of a product [7]. The organoleptic attributes observed were appearance, aroma, texture and taste [8]. Organoleptic testing has an important role in the application of the quality of a product [9]. The results of the sensory test of salted tembang fish can be seen in Table 1.

**Table 1.** Sensory test results of tembang salt.

Concentration (%)	Parameters			
	Appearance	Odor	Taste	Texture
10	6.6 ±1.07 <sup>a</sup>	7.8±1.19 <sup>a</sup>	8.7±0.65 <sup>a</sup>	7.3±1.14 <sup>a</sup>
15	7.5±1.13 <sup>ab</sup>	7.6±1.22 <sup>a</sup>	8.1±1.06 <sup>ab</sup>	7.8±1.04 <sup>b</sup>
20	8.1±1.00 <sup>b</sup>	8.1±0.94 <sup>a</sup>	8.0±1.12 <sup>b</sup>	8.2±0.98 <sup>b</sup>
30	8.5±0.78 <sup>c</sup>	8.3 ±0.93 <sup>a</sup>	7.1±1.09 <sup>c</sup>	8.6±0.76 <sup>c</sup>

Note: The same letters indicates no significant different.

The highest appearance score of salted tembang fish (score 8.5) was obtained from fish with the addition of 30% salt, while the lowest added salt was 10% (score 6.6). The nature of salt attracts water, so the appearance of the fish will look dry and hard. The Kruskal-Wallis test results for the appearance attribute showed that the effect of concentration gave a significant difference to the appearance of dried salted tembang fish ( $P < 0.05$ ). Evaluation of the appearance of salted tembang fish in general includes all the criteria tested organoleptically which includes appearance, smell, taste and texture [10]. This means that the appearance of salted tembang fish is included in the 8th scale parameter, namely intact, clean, bright, and shiny according to type [11]. The more salt used the lower the mean appearance score. This is because the amount of salt absorbed by the fish will increase the effect of salt crystal fouling on the appearance, the salty taste is quite high and the texture becomes hard so that this salted fish product is less preferred by panelists. Sipahutar (2018) reported that the longer the fish meat was soaked in the salt solution [12], the more water it drained [13] which states that the presence of Mg, Ca, Al, and Fe compounds in salt causes salted fish to become hard, brittle, and tastes bitter. Tumbelaka *et al.* (2013) reported that the higher salt concentration and salting time were thought to cause dried salted milkfish to look whiter because of the salt crystals on the surface of the fish so that the panelists' preference was reduced [14].

The highest tembang salted fish aroma score (8.33) was obtained by adding 20% salt concentration while the lowest score (7.8) was obtained by adding 10% salt. The results of the Kruskal-Wallis test for aroma showed that the effect of concentration did not make a difference to the odor of dried salted tembang fish ( $P < 0.05$ ). The reason is thought to be due to the oxidation process that has not yet continued so that rancidity is hampered by the process. In addition, this salted tembang fish has not undergone storage so that the process of overhauling the fat by enzymes has not yet occurred. As reported by Rahmani *et al.* (2007) [15], that the treatment of salt concentration and immersion time did not give a significant difference to the preference level of the panelists for the aroma of salted snakehead fish, because it is possible that the salt does not have a significant effect on the aroma of salted fish. Also added by Sipahutar *et al.* (2016) that freshly produced / processed salted fish tends to be preferred by consumers, because there is no physical deviation such as odor [16]. Winarno (2014) states that, change or decomposition of fat can affect the smell and taste of a food ingredient, especially during the storage period, so that the damage to fat can reduce nutritional value and cause odor and taste deviations [17].

The highest tembang salted fish taste score (8.7) was obtained by adding 10% salt concentration, while the lowest score (7.1) was obtained by adding 30% salt. The results of Kruskal-Wallis calculations for taste showed that the effect of concentration gave a significant difference to the taste of dried salted tembang fish ( $P < 0.05$ ). Riansyah *et al.* (2013) states that processing by means of salt will improve the taste of the resulting product [11]. During the processing process, the protein hydrolysis process will occur into amino acids which will break down further into components that play a role in the formation of flavor. Thariq *et al.* (2014) reported that the higher the salt used, the panelists' acceptance of the peda fish taste decreased [18]. Reo (2011) also states that the effect of impurity on organoleptic parameters, especially appearance, taste, and texture can be caused by the Mg, Cl, Al, and Fe compounds contained in salt causing salted fish to become hard, brittle and taste bitter [19].

The highest score of salted tembang fish texture (8.6) was obtained by adding 30% salt concentration, while the lowest score (7.3) was obtained by adding 10% salt. The results of the Kruskal-Wallis test for texture showed that the effect of concentration gave a significant difference to the texture of dried salted tembang fish ( $P < 0.05$ ). Increasing the salt concentration will increase the hedonic score of the texture, because the addition of too much salt can bind too many water molecules so that the texture becomes hard [20]. Agus and Malik (2018) reported the texture of dried anchovy can be assessed from the density, hardness, cohesiveness, tenderness, and whether or not the meat is mushy [21]. The process of breaking down the tissue by enzymes and the activity of bacteria can reduce the organoleptic score of dried anchovy, which can cause the meat to become damaged, lose its texture and disintegrate in powder form. [18] explained that the use of high salt concentrations causes the water contained in the fish meat to come out of the fish meat, resulting in a hard texture.

### 3.2 Moisture content

The results of the water content test of salted tembang fish with the addition of salt concentration can be seen in Table 2.

**Table 2.** Moisture Content of tembang.

Concentration (%)	Moisture Content
10	45.54±0.65 <sup>a</sup>
15	33.40±1.18 <sup>b</sup>
20	29.90±2.21 <sup>b</sup>
30	24.63±3.01 <sup>c</sup>

Note: The same notation indicates no significant different

The results of the water content test of salted tembang fish ranged from 24.63% -45.54%. These results meet the standard criteria set by SNI 8273-2016 concerning dried salted fish, which states that the water content in dried salted fish is a maximum of 40.0%. ANOVA analysis results show  $F_{count} > F_{table}$  which states that there is a significant effect on the treatment of adding salt. Based on the follow-up test (Tukey), the addition of 10% salt was very significantly different with the addition of 15%, 20% and 30% salt.

Based on these results it is known that the more salt content is added to the tembang fish, the lower the water content. This happens because the salt is hygroscopic and there is a difference in osmotic pressure between the salt and the liquid in the fish's body, so that the water is drawn out of the food [22]. According to Moeljanto (2009), salt will increase the osmotic pressure of the substrate, resulting in withdrawal of water from the food out [13]. Thus, the water content in fish meat decreases because the cells will lose water and experience shrinkage so that microbes that cannot tolerate salt cannot grow. Salt at a high enough concentration is a preservative by drawing water from the fish meat [17]. According to [23] the free water in the food is easily evaporated by drying.

Sipahutar and Siahaan (2020) explained that the water content in salted anchovies has decreased by increasing the concentration of salt content [20]. The water content of salted anchovy products is lower than the raw material for fresh anchovy due to the drying process so that the water content has decreased. Paparang (2013) reported that the effect of salt concentration on water content in peda fish meat decreased with increasing salt concentration [24]. The best water content results close to SNI are obtained at a salt concentration of 15%.

#### 4. Conclusion

Sensory score indicates that salt concentration has a significant effect on appearance, taste and texture, but does not significantly affect odor. Increasing the salt concentration can increase the sensory score and decrease the water content of salted fish.

#### References

- [1] Simarmata R, Boer M and Fahrudin A 2014 Analisis Sumberdaya Ikan Tembang (*Sardinella fimbriata*) di Perairan Selat Sunda yang Didaratkan DI PPP Labuan, Banten *Mar. Fish.* **5** 149–54
- [2] Astawan M 2019 *Penanganan dan Pengolahan Hasil Perikanan* (Tangerang Selatan: Universitas Terbuka)
- [3] Ningrum R, Lahming and Mustarin A 2019 Pengaruh Konsentrasi dan Lama Waktu Penggaraman Terhadap mutu Ikan Terbang (*Hirunditichthys Oxchepalus*) Flying Fish *J. Pendidik. dan Teknol. Pertan.* **5** 25–35
- [4] Nawansih O, Rizal S, Rangga A and Ayu E 2017 Uji Mutu dan Keamanan Ikan Asin Kering (Teri dan Sepat) di Pasar Kota Bandar Lampung *J. Chem. Inf. Model.* **1** 74–83
- [5] Sugiyono 2007 *Statistik non parametrik untuk penelitian* (Bandung: Alfabeta)
- [6] National Standardization Agency of Indonesia 2015 *SNI-01-2354.2-2006 Cara uji kimia - Bagian 2 : Pengujian kadar air pada produk perikanan* (Indonesia: BSN)
- [7] De Man J M 2010 *Kimia Makanan* (Bandung: Institut Teknologi Bandung)
- [8] Buckle K A, Edwards R A, Fleet G H, Wootton M, Purnomo H and Adiono 2009 *Ilmu Pangan* (Jakarta: UI Press)
- [9] National Standardization Agency of Indonesia 2015 *SNI 2346:2015 Pedoman pengujian sensori pada produk perikanan* (Indonesia: BSN)
- [10] National Standardization Agency of Indonesia 2016 *SNI 8273:2016 Ikan Asin Kering* (Indonesia: BSN)
- [11] Riansyah A, Supriadi A and Nopianti R 2013 Pengaruh Perbedaan Suhu dan Waktu Pengeringan Terhadap Karakteristik Ikan Sepat Siam (*Trichogaster pectoralis*) dengan menggunakan metoda oven *J. Fishteach* **2** 53–68
- [12] Sipahutar Y H, Napitupulu R J, Tambunan E, Aup J, Minggu P and Telepon J S 2018 Kajian Penerapan Sertifikat Kelayakan Pengolahan pada Produk Ikan Selar (*Selar crumenophthalmus*) dalam Upaya Peningkatan Keamanan Pangan di Hajoran, Tapanuli Tengah *Prosiding Seminar Nasional Ikan ke-10* (Jakarta: Masyarakat Iktiologi Indonesia) pp 1–15
- [13] Moeljanto 2009 *Pengawetan dan Pengolahan Hasil Perikanan* (Jakarta: Penebar Swadaya)
- [14] Tumbelaka A R, Naiu A S and Dali F A 2013 Pengaruh Konsentrasi Garam dan Lama Penggaraman terhadap Nilai Hedonik Ikan Bandeng (*Chanos chanos*) Asin Kering *J. Ilm. Perikan. dan Kelaut.* **1** 48–54
- [15] Rahmani, Yuniarta and Martati E 2007 Effect of Wet Salting Method on the Characteristic of Salted Snakedhead Fish (*Ophiocephalus striatus*) *J. Teknol. Pertan.* **8** 142–52
- [16] Sipahutar Y H, Nurbani S Z and Sari R P 2016 Kajian Penerapan GMP dan SSOP pada Produk Ikan Teri (*Stolephorus* sp.) Rebus Asin Kering dalam upaya Peningkatan Keamanan Pangan di Hajoran, Tapanuli Tengah - Sumatera Utara *Prosiding Seminar Nasional Perikanan dan Kelautan* (Bandung: Universitas Pajajaran Press) pp 50–65
- [17] Winarno F 2014 *Kimia Pangan dan Gizi* (Jakarta: Gramedia)
- [18] Thariq A, Swastawati F and Surti T 2014 Pengaruh Perbedaan Konsentrasi Garam Pada Peda Ikan Kembung (*Rastrelliger Neglectus*) Terhadap Kandungan Asam Glutamat Pemberi Rasa Gurih (Umami) *J. Pengolah. dan Bioteknol. Has. Perikan.* **3** 104–11
- [19] Reo A R 2011 Pengaruh Perbedaan Konsentrasi Larutan Garam dan Lama Pengeringan terhadap Mutu

- Ikan Layang Asin dengan Kadar Garam Rendah *Pacific J.* **2** 1118–22
- [20] Sipahutar Y H and Siahaan C M 2020 Penerapan Kelayakan Pengolahan Ikan teri (*Stolephorus* sp.) Asin dalam Peningkatan keamanan Pangan di Pulau Pasaran-Lampun. *Seminar Nasional Tahunan XVII Hasil Penelitian Perikanan dan Kelautan* (Yogyakarta: Universitas Gajah Mada) pp 348–55
- [21] Agus A and Malik F R 2018 Pengujian Mutu Ikan Teri Kering (*Stolephorus* spp) Dengan Menggunakan Konsentrasi Garam yang Berbeda *J. Ilmu Kelaut. Kepul.* **2** 30–46
- [22] Estiasih T and Ahmadi K 2016 *Teknologi Pengolahan Pangan* (Jakarta: Bumi Aksara)
- [23] Effendi M S 2015 *Teknologi Pengolahan dan Pengawetan Pangan* (Bandung: Alfabeta)
- [24] Paparang R W 2013 Studi pengaruh konsentrasin garam terhadap citarasa peda iakan layang (*decapterus russelli*) *J. Media Teknol. Has. Perikan.* **1** 17–20