

The Effect of Low Salt Concentration

By Herpandi Herpandi

PAPER • OPEN ACCESS

The Effect of Low Salt Concentration on The Quality of Dry Salted Anchovy: A Case Study of Sungsang Village, South Sumatera, Indonesia

To cite this article: I Widiastuti *et al* 2022 *IOP Conf. Ser.: Earth Environ. Sci.* **995** 012026

View [the article online](#) for updates and enhancements.

You may also like

- [Raman and AC Impedance Spectroscopic Studies on Roles of Polyacrylonitrile in Polymer Electrolytes](#)
Zhaoxiang Wang, Weidong Gao, Liqun Chen et al.

5
- [Ultrasonic characterization of pork meat salting](#)
J V Garza-Pérez, M De Prados, N Pérez-Muelas et al.

3
- [Physicochemical properties and total plate count of raw salted eggs with blanching at different concentration of aloe vera solution during the salting process](#)
D Novia and I Julyars



ECS Membership = Connection

ECS membership connects you to the electrochemical community:

- Facilitate your research and discovery through ECS meetings which convene scientists from around the world;
- Access professional support through your lifetime career;
- Open up mentorship opportunities across the stages of your career;
- Build relationships that nurture partnership, teamwork—and success!

Join ECS!

Visit electrochem.org/join



The Effect of Low Salt Concentration on The Quality of Dry Salted Anchovy: A Case Study of Sungsang Village, South Sumatera, Indonesia

I Widiastuti^{1*}, Herpandi¹, Y Oktavia², and D A Putri³

¹ Department of Fisheries Product Technology, Faculty of Agriculture, Sriwijaya University, South Sumatra, Indonesia

² Department of Fisheries Product Technology, Faculty of Fisheries and Marine Science, Universitas Maritim Raja Ali Haji, Riau Islands, Indonesia

³ Bumi Menara Internusa Company, Lampung, Indonesia

*indahwidiastuti@unsri.ac.id

Abstract. Sungsang village is well known as coastal village in South Sumatera, Indonesia. One of the products is salted dry anchovy. Salted dried anchovies are made without standard processes and produced the unequal product. This study objective is to evaluate the low salt concentration's effect on characteristics of dried salted anchovy. The product was made by traditionally way at Bagan. The parameters were physical and chemical analyses include colour test, proximate, salt content; and sensory analysis parameters were appearance, flavor, texture, and colour. The treatments were 0%, 2.5%, 5%, 7.5% and 10% (brine) with 3 replications. The data analyses have been done by randomized block design ANOVA and Tukey's HSD test. The result showed that low salt concentration have been significantly affected the yield, water, ash, protein and salt content. Otherwise, the treatments did not affect the colour and acid insoluble ash content. Based on the sensory analysis, the treatments also showed no significantly change on final product. The best product is 5% salt concentration (brine).

1. Introduction

Anchovy is one of the marine resources that utilized by coastal community as source of nutrition and income. It is a seasonal resource that must be processed to extend its shelf life. The product is dominantly processed into salted dry fish. Generally in Indonesia, especially in South Sumatera, the salted dry anchovy's production has been done traditionally by small-scale fisheries at Sungsang Village. It is located in coastal area of Banyuasin District, South Sumatra Province.

The anchovy's pick season in Sungsang Village is on July until September [1]. This time is different than Asemdayong, Central Java that happen on March until September [2]. The anchovy caught in the peak season is very much, so it must be processed to increase its value. The anchovy is usually processed as dry salted anchovy.

Dry salted anchovy has been made by fisherman household with traditional way at 'bagan'. Bagan is a fishing ground that located in the sea. The fisherman is using it for fishing. The catch is not only the anchovy, but also squid, shrimp and other fish depend on the season. The processing is using wet salting method. Dry salted anchovy is made by boiling anchovy on the brine. The brine is consist of rock salt and seawater. There is no standard of salt concentration. The product produced unequal quality. Beside it, the traditional process also produced dry salted fish with very high salt content. This



study applied low concentration salt treatments on brine that can influence the final product. Some studies have been done on anchovy production such as study on quality changes in India [3], proximate and nutrition analysis of Back Sea Anchovy [4] and study on low salt of Goldstripe Sardinella [5]. These studies conclude that preparation, processing and storage affected the final product.

This general objective of this study is to evaluate the low salt concentration's effect on characteristics of dried salted anchovy. The specific objectives are to evaluate and to analyze the significantly effect of low salt processing on biochemical analyses include proximate and salt content; and sensory analysis were appearance, flavor, texture, and color.

2. Methodology

The dry salted anchovy was made on Bagan, at Sungsang Village, Banyuasin District, South Sumatra Province, Indonesia (Figure. 1). The analysis was conducted in fisheries product technology Laboratory, Sriwijaya University.

2.1. Sample Preparation

The caught anchovy was sorted and weighed. The brine was prepared as 5 treatments: 0%, 2.5%, 5%, 7.5% and 10% of salt concentration. The anchovy was boiled with brine for 7 minutes. The boiled anchovy was drained and then dried with sun drying for 7 hours. The dry salted anchovy was analyzed as soon as arrive at laboratory.

2.2. Sample Analysis

The chemical analysis included proximate (water, ash, acid insoluble ash, and protein) and salt content. The proximate analyses were determined by the Association of Official Analytical Chemists method [6] and the salt contents were estimated by Mohr titration methods [7]. The physical analysis covered yields percentage and color analysis (lightness, chrome and hue) by using Chroma meter. The sensory analysis, covered appearance, texture, taste, color and flavor, were determine by 25 semi-trained panelists using 9 scales questionnaire for dried fish based on Indonesian standard [8].

2.3. Data Analysis

The chemical and physical data were analyzed by randomized block design and Tukey's HSD post hoc test using SPSS 21. The sensory data were evaluated by non-parametric analysis (Kruskal Wallis one-way ANOVA) and post hoc was multiple comparison tests.



3. Results and Discussion

Dry salted anchovy with low salt was made at Bagan that located in the sea. The bagan has the lift net as fishing gear. The fishing method is light fishing, which use light to attract the attention of small pelagic fish, shrimp, squid and others. On the peak season of anchovy, on July until September, the fisherman can catch anchovy until 50 kg per night at one lift net. The catch was processed as treatments.

Table 1. The physical and chemical analysis data of dry salted anchovies.

Treatments	Yield (%)	Color			Water Content (%)	Salt Content (%)	Protein (%)	Ash Content (%)	Acid Insoluble ash (%)
		Lightness	Chroma	Hue					
0%	24.35a	57.87	13.20	66.47	26.71b	1.10a	58.77c	1.08a	0.06
2,5%	29.38abc	54.70	13.07	65.43	28.21ab	1.52a	55.08bc	1.24a	0.01
5%	27.80ab	51.20	12.97	64.40	28.61a	2.19b	53.02b	1.59b	0.05
7,5%	30.55bc	52.83	11.73	65.23	31.70a	2.43b	51.83b	1.69b	0.05
10%	33.62c	58.30	12.37	63.7	34.89a	2.51b	46.16a	1.67b	0.03

Data reported as mean value of 3 replications. The values in the same columns with different letters are statistically different ($p < 0.05$)

The physical and chemical data are shown in Table 1. Based on Table 1, the yield of product ranged from 24.35% until 33.62%. The reducing of weight occurred during sun drying. The difference in brine concentration significantly affected the yield of dry salted anchovy ($p < 0.05$). The highest concentration resulted the highest yield. This condition has been explained in a previous work [9] that the driving force of salt from difference brine concentration affected the yield of final product.

The brine concentration was not significantly affected the color of dry salted anchovy ($p > 0.05$). This result was different in the case of fermented anchovy, that the salt could affect the oxidation process that affects the color of the product [10] and the Maillard reactions during ripening process [11].

The Table 1 also shows that the water and salt content of dry salted anchovy varied from 26.71% until 34.89% and from 1.10% until 2.51% respectively. The water and salt contents were significantly affected by the treatments of salt concentration ($p < 0.05$). The increase on water content was accompanied by increases of salt content. This is caused by the absorption of brine during process. A similar relation has been reported by Hernandez-herrero [10], the absorption process is caused by differences in the displacement of water molecules and salt ions. Beside that, the NaCl movement is influenced by NaCl molarity in fish tissue and NaCl molarity in the brine that go to equilibrium condition.

The protein content of final product decreased significantly ($p < 0.05$) from 58.77% to 46.16%. This result is inversely proportional to the salt concentration treatments. This result is higher than the other studies such as Fahmi [12] 25.5%, Shiriskar [3] 50.45% and Dewi [13] 29.6%. This decrease is caused by the dissolution of salt-soluble proteins in the boiling process. According to Suzuki, [14], protein in fish is dominated by the salt-soluble protein (myosin).

Ash contents and acid insoluble ash contents were showed in Table 1. The ash contents significantly increase with the salt concentration accretion ($p < 0.05$). However, the acid insoluble ash contents were not significantly affected by the treatments. The ash content is from 1.10% until 2.51%. This value is lower than previous study, that the ash content was 25% for boiled and dried anchovy with 10% brine [3]. The ash is correlated with NaCl concentration in the product.

The acid insoluble ash is the indigestible mineral content [15] that correlated with the pollutant in product. Based on Indonesian standard (SNI 01-2721.1-2009); the allowable value of acid insoluble ash is maximum 0.03%. The final products have the value that meet with the standard.

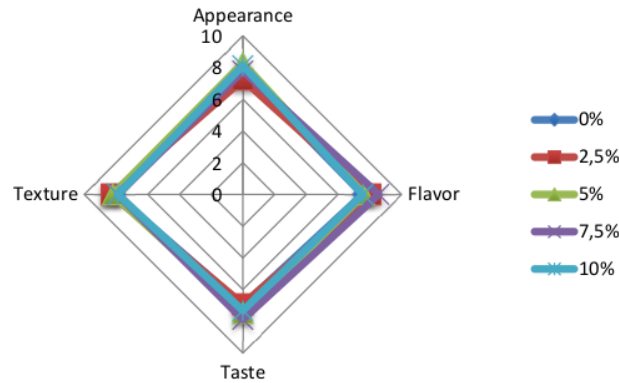


Figure 2. Sensory analysis graph of dry low salted anchovies

Figure 2 shows the sensory analysis graph of dry salted anchovies. There are no significant differences on all sensory attributes, such as appearance, flavor, taste and texture. The valuations have been done by using Indonesian standard of dried fish (SNI 8273:2016). The appearance of all treatments almost same, (7.72-8.28) which is clean, clear specific type, and intact. The flavor is normal specific type (7.56-8.56). The taste is less salty, normal specific type (6.92-7.88). The texture is solid and dry (7.88- 8.28). Overall value of sensory analysis is acceptable.

4. Conclusions

From the discussion, this study concluded that the low salt treatments of processing dry salted anchovy gave the significant effects to yield, water content, salt content, protein and ash. The sensory test showed that the final product is acceptable to panelist. There are no significant differences among treatments in color, acid insoluble ash and sensory attributes.

5. Acknowledgements

The authors deliver the appreciation for the support of this research to Ministry of Research, Technology, and Higher Education and Sriwijaya University research funding.

References

- [1] Gustaman G, Fauziah F and Isnaini I 2014 Efektifitas Perbedaan Warna Cahaya Lampu terhadap Hasil Tangkapan Bagan Tancap di Perairan Sungsang Sumatera Selatan *Maspari J.* **4** 90–102
- [2] Rahmawati M, Fitri A D P and Wijayanto D 2013 Analisis Hasil Tangkapan Per Upaya Penangkapan Dan Pola Musim Penangkapan Ikan Teri (*Stolephorus* spp.) Di Perairan Pemalang *J. Fish. Resour. Util. Manag. Technol.* **2** 213–22
- [3] Shiriskar D A, Khedkar G D and Sudhakara N S 2010 Preparation of boiled and dried products from anchovies (*stolephorus* sp.) and studies on quality changes during storage *J. Food Process. Preserv.* **34** 73–86
- [4] Gencbay G and Turhan S 2016 Proximate Composition and Nutritional Profile of the Black Sea Anchovy (*Engraulis encrasicolus*) Whole Fish, Fillets, and By-Products *J. Aquat. Food Prod. Technol.* **25** 864–74
- [5] Nuwanthi S G L I, Madage S S K, Hewajulige I G N and Wijesekera R G S 2016 Comparative Study on Organoleptic, Microbiological and Chemical Qualities of Dried Fish, Goldstripe Sardinella (*Sardinella Gibbosa*) with Low Salt Levels and Spices *Procedia Food Sci.* **6** 356–61

- [6] AOAC [Association Official Analytical Chemistry] 2005 *Official Methods of Analysis* ed W Horwitz (New York: Arlington)
- [7] Nielsen S S 2017 *Food Science Text Series Food Analysis Laboratory Manual* vol 3
- [8] BSN [Badan Standarisasi Nasional] 2016 *SNI(Standar Nasional Indonesia) 8273:2016 Ikan Asin Kering* (Jakarta: Dewan Stadarisasi Indonesia)
- [9] Andrés A, Rodríguez-Barona S, Barat J M and Fito P 2005 Salted cod manufacturing: Influence of salting procedure on process yield and product characteristics *J. Food Eng.* **69** 467–71
- [10] Hernandez-Herrero M M, Roig-Sagués A X, López-Sabater E I, Rodríguez-Jerez J J and Mora-Ventura M T 1999 Total Volatile Basic Nitrogen and other Physico- chemical and Microbiological Characteristics as *J. Food Sci.* **64** 344–7
- [11] Moretti V M, Vasconi M, Caprino F and Bellagamba F 2017 Fatty Acid Profiles and Volatile Compounds Formation During Processing and Ripening of a Traditional Salted Dry Fish Product *J. Food Process. Preserv.* **41**
- [12] Fahmi A S 2015 Kemunduran Mutu Dan Umur Simpan Ikan Teri Nasi Setengah Kering (Stolephorus Spp) Selama Penyimpanan Dingin/ Deterioration Rate and Shelf life of Semi-dried Anchovy (Stolephorus spp) during Chilled Storage *Saintek Perikan. Indones. J. Fish. Sci. Technol.* **11** 41–6
- [13] Dewi E N 2002 Chemical analysis during the processing of dried salted anchovy *J. Coast. Dev.* **5** 55–65
- [14] Suzuki T 1981 *Fish and krill protein* (London: Applied science publishers)
- [15] Sales J and Janssens G P J 2003 Acid-insoluble ash as a marker in digestibility studies: a review *J. Anim. Feed Sci.* **12** 383–401

The Effect of Low Salt Concentration

ORIGINALITY REPORT

13%

SIMILARITY INDEX

PRIMARY SOURCES

- 1** repository.lppm.unila.ac.id 81 words — 4%
Internet
- 2** www.researchgate.net 66 words — 3%
Internet
- 3** S N Fatwa, I Suhaidi, S Ginting. "The quality characteristics of frozen salted egg yolk salting using various media", IOP Conference Series: Earth and Environmental Science, 2020 38 words — 2%
Crossref
- 4** F Pattipeilohy, T Moniharapon, R B D Sormin, D L Moniharapon. "The effect of soaking in salt and atung (*Parinarium glaberrimum*, Hassk) on the quality of dried salted tongkol (*Auxis thazard*).", IOP Conference Series: Earth and Environmental Science, 2021 18 words — 1%
Crossref
- 5** I S Dmitrienko, V N Makhonina, V P Agafonychev. "Influence of salting on technological properties of lump and chopped chicken meat", IOP Conference Series: Earth and Environmental Science, 2022 16 words — 1%
Crossref
- 6** www.coursehero.com 15 words — 1%
Internet

7

SADETTIN TURHAN. "OXIDATIVE STABILITY OF
BRINED ANCHOVIES WITH EXTRACTS FROM
BLUEBERRY *(VACCINUM SP.)* FRUITS AND LEAVES",
Journal of Food Quality, 08/2009

Crossref

13 words — 1%

8

doi.org

Internet

11 words — 1%

EXCLUDE QUOTES ON

EXCLUDE SOURCES < 1%

EXCLUDE BIBLIOGRAPHY ON

EXCLUDE MATCHES < 9 WORDS