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The Effect of Preservation On NaCl and KCl On the Quality of Pufferfish (*Arothron Reticularis*) Skin Preserved

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Abstract

This study aims to explain the effect of preservation with NaCl and KCl on the quality of the Pufferfish skin. The material used in this study was 100 pufferfish skin tail. The research was conducted in June to August 2015 in the Waste Laboratory of Polytechnic ATK. Pufferfish skin preservation is done by soaking the skin of Pufferfish in each saturated NaCl and KCl at a concentration 20⁰Be and preserve skin blushes Pufferfish with salt NaCl and KCl, for four weeks. Results of the research were analyzed by independent T-Test. The results pointed that there was no difference in the levels of NaCl and KCl in solution and sow salt. The longer the curing time, the levels of NaCl and KCl in the skin of Pufferfish is increasing, conversely levels of NaCl and KCl in a saturated solution decreases. Conclusion of this research is NaCl and KCl can be used for preservation of Pufferfish.

Keywords: Pufferfish; NaCl; KCl; preservation.

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INTRODUCTION

Pufferfish (*Arothron reticularis*) are popular pets. Many people look for these fish to be used as ornamental fish. This is because Pufferfish body pattern may be interesting and impressed people's eyes. Since this fish belongs to carnivorous fish, it should be separated with other type of fish. Due to its poisonous tetrodotoxin, to be edible it must be carefully prepared to remove toxic parts and to avoid contaminating the meat. In addition, Pufferfish may not only be used as ornamental fish, but also consumed or tanned to be the material of leather goods. Tanning requires a long series of processes, one of which begins with the preservation process leather. According to Purnomo states that the preservation of the skin can be done in several ways, among others, 1) preservation of poison / antiseptic, then dried in the sun to dry, 2) preservation with wet salt, then dried in the sun to dry, 3) preservation with dry salt, then dried in the sun to dry, 4) preservation with acid (usually skin to be stored more than 1 year) [1]. Leather industry currently expect on the challenges of globalization and demanded more and more creative, efficient and environmentally friendly. Environment becomes very important because to produce good quality product tanning industry may generate waste that can potentially harm the environment. Moreover, to protect the environment as well as to maintain the quality of the skin, preserving the skin is generally defined as a method of process to prevent lysis or degradation of components in the skin tissue. The principle of preservation of the skin is to create conditions that are not suitable for the growth and proliferation of microorganisms of husk. This is conducted by lowering the water content to a level as low as possible to a certain extent so that the microorganisms are not possible to grow (\pm 5-10%). Preserving the skin in large amounts is specially required in order to prevent the microbes growth. Preserving leather of Pufferfish is also necessary to keep skin of Puffer fish to be used for a better purpose.

1 Preserving conducted in this study is pickling with saturated salt. NaCl and KCl are used in the preservation of Pufferfish skin. Therefore, this study aims to determine differences in the quality of the skin preserved with saturated salt NaCl and KCl with soaking time is difference.

Pufferfish comes from the family of Diodontidae and derives from the order of Tetraodontiformes. Tetraodontiformes is originated from tooth morphology of this fish, which has two large teeth in the upper jaw and underneath are quite sharp. Tropical water is the habitat of this fish, not in a temperate or cold water. In Asia Pufferfish spread in Japan, India, Burma, Thailand, Singapore and Philippines [2].

Rawhide preservation principle is treatment of the fresh complexion by reducing the water content to a minimum for the life of microorganisms or by adding certain medications so that tissue damage can be minimized. Preserving the skin can be rated to be good when the skin can show all the skin tissues that are beneficial to the tanning process can be maintained and there is no main change to collagen protein, either in chemical or physical change. [3]. How to make a saturated salt solution is to enter the water as needed in accordance with the amount of skin to be preserved, put salt little by little, stirring, stirring until it cannot dissolve anymore (\pm 300 g salt / liter of water). Salt solution, is a saturated salt solution. It is to add skin poison accordingly into the saturated salt solution [1]. NaCl may inhibit spoilage microorganisms or proteolytic activity. NaCl has a high hygroscopic and capable of causing cell plasmolysis, hydrating microbial cells, reducing the solubility of oxygen in water so that the resulting Cl ions are toxic to microbes [4]. Salts inhibit proteolytic enzymes. Dehydrated skin occurs due to the hydration of the salt so that the water levels go down and cannot be used by bacteria or fungi to sustain growth. Potassium Chloride (KCl) is one of several potassium salts are usually called potash (potassium). KCl has properties that are relatively similar to NaCl. Because the cations K⁺ and Na⁺ is still in one class IA [5].

Most of Pufferfish are wasted without further processing, a part from its function as ornamental fish and edible delicacy, utilizing Pufferfish may increase its economic value. In pickling process, NaCl is mostly used, therefore there should be a solution to create material substitution used as Pufferfish preservatives. This study aims to describe the influence of pickling with saturated salt NaCl and KCl on the quality of Pufferfish skin.

RESEARCH METHODS

The research material

The materials used in this research were 100 of Pufferfish skins obtained from fish auction in Rembang, salt (NaCl), potassium salts (KCl), and water. The tools included here are blades, buckets, Baume meter, watch glass, glass beaker, mixer, electric stove, incubator, scissors, paper filter, oven, ose, bunsen, and the petri dish.

The course of study

The research was conducted in June to August 2015 in the Waste Laboratory of Politeknik ATK Yogyakarta. This research was conducted by comparing leather Pufferfish preservation with NaCl and KCl with soaking time 0 weeks, 1 week, 2 weeks and 3 weeks on levels of NaCl and KCl absorbed.

After cleaning from grease, blood, meat and dirt remained, fresh skin then soaked in saturated salt (NaCl) at the high level of salt concentrations (salinity) 20-24^oBe. Concentrations of salt should not be under 20^oBe. The salinity levels were measured with an instrument called Baume meter.

Variable Observations

Determination of NaCl, in determining salinity kohman way, the measures undertaken are as follows:

- a. \pm weighing 5 grams of material
- b. attenuating materials
- c. insert material that has been refined into a test tube
- d. inserting hot distilled water into a test tube 10 ml

- e. inserting test tube into centrifuge for 5 minutes at a speed of 800 rpm and do it again with 1x repetition
- f. co-opted a clear liquid is collected in Erlenmeyer
- g. add 3 ml of 5% potassium chromate and titrate with 0.1 N AgNO₃
- h. perform titrations until sorrel

$$\% \text{ NaCl} = \frac{\text{ml AgNO}_3 \times \text{N AgNO}_3 \times 58.46}{\text{g material} \times 1000} \times 100\%$$

Determination of KCl, K were applied by pipette each 25 ml of the standard solution of K (0, 5, 10, 15, 20, and 25 ppm), which was prepared and put into a glass beaker 24. Then measured with a flame photometer with a wavelength of 766.5 nm. Do the same procedure for the standard solution (from the smallest concentration) to another, as well as samples. Each made with 3 repetitions.

Analysis of the data used in this study is Test Independent T-test, because this variable has only two categories, namely NaCl and KCl so as to determine the difference between a test of NaCl and KCl in this study using independent t-test test.

RESULTS AND DISCUSSION

According to Aten (1966), preservation by way of salting is divided into dry salting (dry salting) and wet salting (wet salting) [6]. Stanley (1993), adding that salting is a method of preservation of the most convenient and effective [7]. Reaction urgent osmosis of salt water out of the skin to the level of conditions that do not allow the growth of bacteria. Fresh raw skins are easy to rot because it is a good medium for growing and breeding of organisms. Rawhide is composed of chemical elements such as: proteins, carbohydrates, fats, and minerals. Therefore, it is necessary to preservation process skin before the skin is processed further. The results of the study can be seen in the table below.

Table 1: NaCl Levels (%) in Pufferfish Skin

Week	NaCl					
	Solution			Salt		
	1	2	Average	1	2	Average
0	63,45993	63,87555	63,66774	93,75068	95,03492	94,3928
1	67,26799	66,00173	66,63486	102,2067	104,9436	103,5751
2	70,46698	71,05658	70,76178	101,499	100,298	100,8985
3	84,72744	84,43724	84,58234	103,1152	113,1536	108,1344

Table 2: KCl Levels (%) in Pufferfish Skin

Week	KCl					
	Solution			Salt		
	1	2	Average	1	2	Average
0	64,13793	70,474	67,30597	90,48642	91,75048	91,11845
1	91,72915	95,28079	93,50497	122,1773	119,0175	120,5974
2	153,831	158,1669	155,999	127,2029	124,8436	126,0233
3	180,382	139,438	159,91	189,8975	173,3202	181,6089

Table 3: NaCl Levels (%) in The Form of a Saturated Solution of Salt And Dry

Week	NaCl					
	Solution			Salt		
	1	2	Average	1	2	Average
0	194,2912	197,1354	195,7133	93,81276	94,42825	94,12051
1	153,6671	151,9391	152,8031	93,14036	94,63543	93,88789
2	110,0692	112,2988	111,184	89,97946	91,56548	90,77247
3	121,3491	63,38995	92,36952	56,16097	57,49219	56,82658

Table 4: KCl Levels (%) in The Form of a Saturated Solution of Salt and Dry

Week	KCl					
	Solution			Salt		
	1	2	Average	1	2	Average
0	208,3921	212,6139	210,503	94,01946	95,34935	94,6844
1	190,3525	217,733	204,0427	95,19784	93,33408	94,26596
2	171,2051	171,3156	171,2604	92,50739	90,93801	91,7227
3	91,48705	93,41259	92,44982	60,24148	61,24851	60,745

Table 1 describes the content of NaCl in Pufferfish skin is immersed in a solution of NaCl the longer the higher levels. This means that more salt is absorbed into the skin. In Table 2 describes the content of KCl in the skin of Pufferfish soaked in a solution of KCl the longer is also increasing its salinity. According Widyani and Suciati (2008), that the effects of salt as a preservative is a high osmotic property so as to solve the microbial cell membranes. When microorganisms are placed in a concentrated salt solution (30-40%), the water in the cells would be out by osmosis and the cells undergo plasmolysis and will be hampered in breeding.

Table 3 illustrates the concentration of NaCl in the solution was gradually decrease, as well as in Table 4 that the KCl solution seemed the longer is also declining. Pickling salt is a major contributor to pollution of salt by tannery plant, so it must be sought preservatives skin substitute more environmentally friendly. Miwada (2001) have examined the replacement of NaCl with KCl with the result that the skin be preserved with KCl, having tanned skin has the same quality as that be preserved with NaCl. Miwada concluded that KCl can be used as an alternative preservative salt (NaCl). This salt is safe to use as a preservative and effluent does not harm plants, even beneficial to plants as a nutrient for plants.

Table 5: Result Analysis of Levels of NaCl and KCl Solution in Pufferfish Skin

Group Statistics				
Solution Levels	N	Mean	Std. Deviation	Std. Error Mean
Score NaCl solution	8	71.4116800	8.57283535	3.03095500
KCl solution	8	94.1799688	41.93763799	14.82719410

From Table 5, it pointed out that NaCl solution amounted to eight samples with a mean of 71.412 and a standard deviation of 8.573. KCl solution amounted to eight samples with mean standard deviation of 94.180 and 41.938. Table 6 shows that there are no differences in the levels of NaCl and KCl in the skin of pufferfish. It shows that both NaCl and KCl can be used as a preservative Pufferfish skin to avoid skin damage. This is in accordance with the opinion of

Miwada (2001) that the replacement of NaCl with KCl with the result that the skin preserved with KCl, having tanned skin has the same quality as that preserved with NaCl (table salt). Reinforced by Sarkar (1995) that the skin after the escape of livestock body only hold a few hours (less than 6 hours), when more skin will undergo lysis and did well again to be tanned.

Table 6: Interpretation of Levels of NaCl and KCl Solution in Pufferfish

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Skor	7.212	.018	-1.504	14	.155	-22.76828875	15.13381555	-55.22709489	9.69051739
Equal variances assumed									
Skor			-1.504	7.584	.173	-22.76828875	15.13381555	-58.00296127	12.46638377
Equal variances not assumed									

In table 6, from the results it can be seen two interpretations, namely: Test of Equality of Variances:

Ho = variance between the levels of NaCl and KCL solution in Pufferfish skin is the same.
 H1 = variance between the levels of NaCl and KCL solution in Pufferfish skin is different
 Seen from SPSS output that F count equal to 7.212 with a probability of 0.018. Because the probability of less than 0.05 (0.018 < 0.05), then Ho is rejected. It can be concluded that that the variance between the levels of NaCl and KCL solution in Pufferfish skin is different.

T-test

Ho = there is no difference in the levels of NaCl solution with levels of KCL solution in Pufferfish.

H1 = no differences in levels of NaCl solution with levels of KCL solution in Pufferfish.

Seen from SPSS output that t of -1.504 with probability 0.115. Because the probability is greater than 0.05 (0.115 > 0.05), then Ho is accepted. Thus we can conclude there is no difference in the levels of NaCl solution with levels of KCl solution in Pufferfish.

CONCLUSIONS

Preserving Pufferfish can be done either with NaCl or KCl salt. Pickling can be done either with salt or salt saturated sow. Absorption levels of salt KCl into the skin of Pufferfish higher than a level of NaCl absorption in the skin of Pufferfish, so the quality of the skin preserved using salt KCl higher compared to NaCl. For future study KCl may be used as material substitution especially for Pufferfish skin pickling process.

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