Utilization of Milkfish in Making of Uli, Local Food of Baduy Tribe

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***Abstract*— The processed food products of the Baduy tribe are known to be high in carbohydrate but lack of protein. One effort to fulfill the needs of protein for the Baduy tribe processed food is to consume fish through diversification of the fishery product processing; one of the efforts is by fortification. Uli, is one of the Baduy processed foods made from glutinous rice, pandanus, coconut, and processed by steaming. In this research, Uli was developed through the addition of milkfish with concentrations of 0%, 10%, 20%, and 30%. The product was characterized by parameters such as proximate analysis, hardness, and Total Plate Count (TPC). Uli, with the addition of 10% milkfish, was the selected treatment. The level of hardness of Uli was limited to 10,000 g as the standard. The desired protein content in the product produced ranged from 4.21 - 9.15%. The most important attention had to be paid to the number of bacteria in the Uli that grew very quickly after the manufacturing process.**

Keywords: Baduy Tribe, local food, milkfish, proximate analysis, Uli

I. INTRODUCTION

The exploration of the local food of Baduy tribe is very important as a cultural heritage. In exploring the local food of Baduy tribe, it is necessary to know the nutritional value contained in the food. The lack of one essential nutritional value in food will have a negative impact on humans [1], therefore it is necessary to provide additional ingredients in order to increase the nutritional value of the processed foods of the Baduy tribe.

One alternative that can be used as the additional material in increasing the nutritional value of the Baduy tribe processed foods is milkfish. Milkfish is a typical fish in Banten Province which is rich in nutritional value and is beneficial for human health, especially as a potential producer of protein. Efforts to make fortification to improve the nutritional value of the typical processed foods of Baduy tribe, and to carry out the process-based standardization and the processed food final products of Baduy tribe, that it is expected to be able to provide benefits in increasing the food security of Baduy tribe.

The processed food products of Baduy tribe are known to be high in carbohydrate content, but lacking in protein. One effort to meet the needs of protein for the processed food of Baduy tribe is to consume fish through diversification of the fishery products processing by fortification. The diversification of milkfish is expected to increase the utilization of fishery products, and also increase the additional nutritional value of the processed food of Baduy tribe.

From this research, it is expected to make an important contribution in the context of diversification of local food so that a robust national food security, especially in tribe communities, is realized.

II. RESEARCH METHOD

A. *Materials*

The materials used in this study are the basic ingredients of Uli. Uli is a Baduy tribe processed food that are made by glutinous rice, coconut and salt. Others materials needed for proximate test, microbiological, physical and sensory analysis are distilled water, 96% alcohol, sterile 0.85% NaCl solution, Plate Count Agar (PCA) media, Acidified Potato Dextrose Agar (APDA), Brilliant media. Green Lactose Bile Broth (BGLBB), Eosin Methylene Blue Agar (EMBA), spirits, tissue, pH 7 buffer, and saturated NaCl.

Tools used in the production of processed Baduy tribe food scales, basins, measuring cups, cups, stoves and knives. The tools for analysis are aluminum cup, desiccator, oven, porcelain cup, furnace, stomacher, sterile petri dish, closed test tube, Durham tube, pipette, micropipette, incubator, bunsen, erlenmeyer, measuring cup, autoclave, hot plate, refrigerator, sealer, aluminum foil, spatula, meter, pH meter, texture analyzer, chromameter, and reflux.

B. *Stage of research*

The experiment was conducted by direct observation of the process of making Baduy tribe processed food in the field and testing in the laboratory. The research begins with conducting samples of Uli. Milkfish was mixed with all ingredients of Uli. Proximate analysis was then carried out to determine the content of protein, fat, ash, water, and carbohydrates. Protein analysis was done by using Kjedal semimicro method, fat analysis by using Soxlet method (SII 2453-90), carbohydrate by using total carbohydrate by difference method and TPC [2], [3].

III. Result And Discussion

Uli is a food product made by glutinous rice, pandanus, and coconut, then processed by steaming. Uli were developed through the addition of milkfish with concentrations of 0%, 10%, 20%, and 30%. The product was characterized by parameters such as proximate analysis, hardness, Total Plate Count (TPC), and organoleptic test. Based on these parameters, it would determine the addition of the most optimal concentration of the fish meat on the Uli.

A. *Proximate Analysis*

Water Content

Based on the variance analysis, the addition of milkfish and the storage time did not haveany interaction, and had no significant influence ($P > 0.05$) on the Uli water content. However, the storage time had significant influence ($P < 0.05$) on the Uli water content. The Uli water content at 0-week storage was not significantly different from the storage for 1, 2, 3, and 4 weeks. Table 1 below presents the Uli water content with the addition of milkfish.

TABLE I. The Uli water content with the addition of milkfish

Parameter	Weeks				
	0	**1**	**2**	**3**	**4**
0%	44,26	43,88	44,27	43,84	44,32
10%	45,81	45,27	45,98	43,56	46,18
20%	47,72	47,86	47,16	47,90	46,89
30%	49,44	50,58	49,11	48,82	49,09

The results of testing on the Uli showed that the water content increased with the increasing milkfish concentration, but relatively stable in amount during 4 weeks storage. This was due to the water content of the added fish, and the presence of fish protein content that had functional character, that was, can bind and hold water. In addition, this condition was also due to the reduced content of starch derived from glutinous rice as the main ingredient. If the starch content of Uli increased, the water content decreased. This was because the starch contained in the flour added to the total weight, and was water binding.

The decrease in the water content was thought to be due to the mechanism of interaction of starch and protein so that the water can no longer be bound properly because the hydrogen bonds, that were supposed to bind water, had been used by the interaction of starch and protein. The most important part in the absorption of water from biomass, was the content of amylase and amylopectin, both of which were components of starch. This was because the amount of hydroxyl amount in the starch molecule was very large, whereas starches that had been gelatinized and dried were still able to absorb large amount of water [4].

Ash Content

The ash content in Uli, with the addition of milkfish, can be seen in the figure below. Based on the variance analysis, the addition of milkfish and storage time did not have any interaction, and had no significant influence ($P > 0.05$) on the Uli ash content. The mineral content of Uli, with the addition of milkfish, was relatively stable during 4 weeks storage. The function and stability of minerals are more influenced by the processing and the pH of the product.

The test results showed that the increasing concentration of the fish meat, the ash content of Uli increased, but had no significant influence. This was because an increase in the fish meat concentration caused an increase in the ash content. Fish meat is an animal food which is quite high in mineral content such as calcium, phosphorus, iron, and others [5]. In addition, the decrease in the water content also increased the percentage of Uli itself.

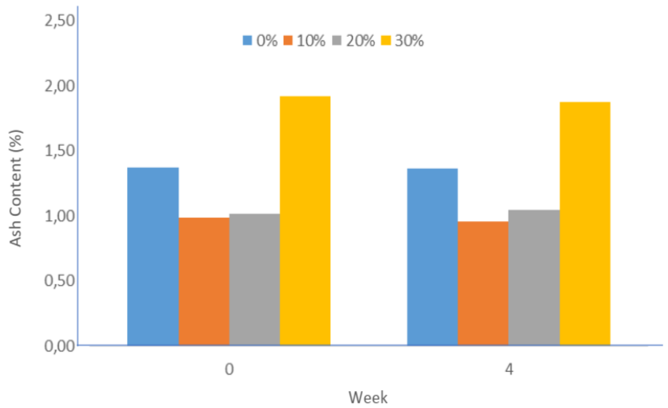

Fig. 1. The ash content in Uli with the addition of milkfish.

Protein Content

Based on the variance analysis, the addition of milkfish and the storage duration did not have any interaction, and had no significant influence ($P > 0.05$) on the Uli protein content. However, storage time had a significant influence ($P < 0.05$) on the Uli protein content. The protein content of Uli at 0-week storage was not significantly different from the storage for 1, 2, 3, and 4 weeks. Table 2 below presents the Uli protein content with the addition of milkfish.

TABLE II. Uli protein content with the addition of milkfish

Parameter	Weeks				
	0	**1**	**2**	**3**	**4**
0%	4,21	5,02	4,60	4,94	4,54
10%	4,82	5,81	4,99	5,14	4,72
20%	9,15	6,27	7,39	6,14	6,54
30%	8,76	7,21	6,93	6,41	6,68

The protein content in Uli increased with the increasing milkfish concentration, but had no significant influence. This was because the treatment given can increase the protein content. Fish can be considered as a food source that has high protein content of 16-20%, in which there are amino acids needed in sufficient quantities, which also means that is high biological value. Regarding the water content in the product, and the ability to bind water, the higher the water content, the lower the protein content.

On the storage for 4 weeks, the Uli protein content of each treatment had decreased protein content. This was because the protein content in Uli underwent denaturation, even if stored at low temperatures. Protein denaturation is the process of complete structural change, and the characteristic of protein form as a result of disruption of the secondary, tertiary, and structural quaternary interactions [6]. Besides this process, this condition is also caused by the activity of enzymes and bacterial growth. Although slow, enzymes have a role in breaking down protein compounds. The increasing amounts of bacteria in Uli also causes proteins to break down due to their activity. Sanitation and hygiene that have not been applied to the process of making Uli causing high bacterial contamination.

Fat Content

Based on the variance analysis, the addition of milkfish and the storage time did not have any interaction, and had no significant influence ($P > 0.05$) on the Uli fat content. The figure below presents the level of the Uli fat content with the addition of milkfish.

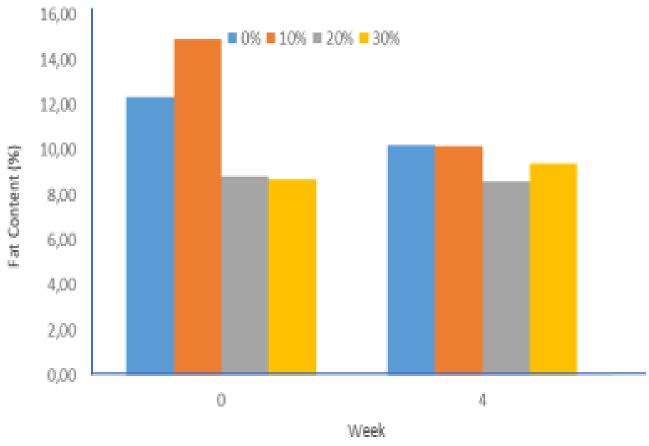

Fig. 2. The Uli fat content with the addition of milkfish.

The results of the analysis showed that Uli had decreased fat content with increasing milkfish concentration. On the storage for 4 weeks, the Uli fat content in each treatment also tended to decrease. This condition was due to the perfect heating process which caused the release of fat in the product. The release of fat due to heating is thought to occur due to broken bonds between fatty radicals that produce free fatty acids. The meat emulsion will separate or become unstable if the fat particles are small, so that the entire surface of the fat that must be covered by protein becomes too large, this emulsion instability can cause the release of oil or fat during heating [7][8].

Hardness

Based on the variance analysis, the addition of milkfish and the storage time did not have interactions, but had significant influence ($P > 0.05$) on the Uli hardness value. The Uli hardness values with a concentration of 0% were not significantly different from the concentrations of 1%, 2%, and 3%. The Uli hardness value at the 0-week storage was significantly different from the storage for 1, 2, 3, and 4 weeks. The Uli hardness value at the 1-week storage was not significantly different from the storage for 2, 3, and 4 weeks. Figure 3 below presents the Uli hardness value with the addition of milkfish.

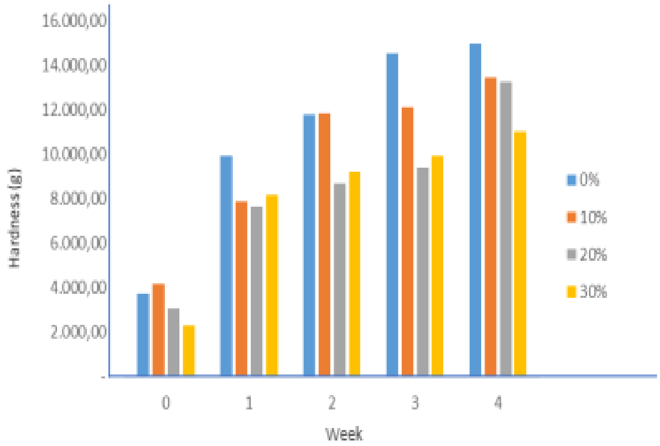

Fig. 3. The Uli hardness value with the addition of milkfish.

The hardness value on Uli products tends to decrease along with the increase in the addition of milkfish. However, this value increases with increasing storage time. This is because the water content is low, so the level of violence is small. In the frying process there is an increase in temperature, the pressure of water vapor formation of CO_2 gas due to the development, starch gelatinization, and protein coagulation. This condition causes the level of crispness of the product increases with the addition of milkfish.

The increase in the hardness value occurs because of the increased protein content in each treatment so that the water holding capacity of the product decreases [9]. If the water holding capacity decreases, the water content of Uli decreases. The condition causes the water content in the product to decrease thereby increasing its hardness value.

Total Plate Count (TPC)

The calculation of Total Plate Count (TPC) aims to calculate all microbes that grow on the product. This test is one of the parameters of the product whether it is feasible or not for consumption. One of the main causes of food damage is due to the growth and microbial activity in the food. The food-destroying microbes are bacteria, mold, and yeast. The results showed that the number of microbes in all treatments at Week 0 reached > 106 colonies/g. This was because the sanitation and hygiene at the time of making Uli were not considered, considering the process of making Uli is still traditional. The condition of the place, equipment, and the processors, had not paid attention to their cleanliness.

Best Product Selection

The Bayes Method is one of the techniques that can be used to analyze the best decision making of a number of alternatives with the aim of producing optimal results. The optimal decision making will be achieved when considering various criteria [10]. The presence of treatment is a criterion that needs to be considered in selecting the best rengginang.

In Uli product, the parameters used consist of objectives (nutrient content, hardness, and total plate count) and subjective (taste, texture, color, and aroma). Parameters that have very important values on Uli product are protein content and hardness. The important parameter values are water content, texture, and taste; while those that have the usual assessment are the ash, fat content, total plate count, color, and aroma). The results of the Bayes Method calculation on Uli product are presented in the Table below.

TABLE III. THE BAYES METHOD CALCULATION RESULTS IN ULI PRODUCT

Treatment	Fish Concentration			
	0%	**10%**	**20%**	**30%**
Protein	1	2	3	4
Hardness	1	2	3	4
Water	4	3	2	1
Texture	4	3	2	1
Taste	4	3	2	1
Ash	2	4	3	1
Fat	1	2	4	3
ALT	1	1	1	1
Color	4	3	2	1
Aroma	4	3	2	1
	2,60	2,60	2,40	1,80
Ranking	2	1	3	4

The calculation results with the Bayes method showed that Uli product with the addition of milkfish of 0% and 10% had the highest average value of 2.60. However, the concentration chosen was the treatment with the addition of milkfish of 10%. This was based on the highest importance value that was the protein content. The protein content of Uli, with the addition of 10% milkfish, had a better value than the treatment with the addition of 0% milkfish.

IV. CONCLUSION

The Uli product with the addition of 10% milkfish was the selected treatment. The hardness content of Uli was limited to 10,000 g as the standard. The desired protein content in the products produced ranged from 4.21 - 9.15%. The most important attention had to be paid to the number of bacteria in Uli that grew very quickly after the manufacturing process. The Uli standard with the addition of fish meat was made with physical, chemical, and microbiological characteristics.

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