Determination of nutrition contents based on raw seaweed: economic improvement efforts in Dolly ex-prostitution area

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Abstract. The effort to change Dolly and Jarak’s image as an ex prostitution area that was once famous and largest in Southeast Asia in the villages of Putat Jaya, Sawahan District, Surabaya City, has never been done. Making the Dolly and Jarak areas as a tourist village that is capable of supporting and sustaining the economy, is the dream of all citizens and the Surabaya City Government. However, the effort must be thoroughly pursued and patented so that it can be realized and fulfilled. At the Research-based Community Service this time, the service strives to diversify practical, healthy and hygienic seaweed products. There is information on nutrient levels and the great benefits of consuming various processed seaweed.

1. Introduction
This activity is a series of Sepuluh Nopember Institute of Technology (ITS) research-based community service programs conducted in the Dolly and Jarak ex-prostitution areas in Surabaya [1]. In this activity the composition of seaweed has been managed by the Dolly and Jarak communities, therefore it can be used as a parameter for certification. This research process series includes testing the nutritional content found in processed food products of seaweed. Seaweed is part of aquatic plants (algae) which are classified into the macroalgae class, which produces hydrocolloid materials. Seaweed used by the Dolly community is the species of *Eucheuma cottoni* and *Eucheuma spinosum*. Besides functioning as food, seaweed products also have various uses. Along with advances in science and technology, the use of seaweed has been widespread in various fields, some various processed seaweed with various diversifications [2].

The purpose of this study is to produce information to the public about the nutritional value of various processed uses seaweed (*Eucheuma cottoni*) as an additional ingredient in several types of food, in this case nuggets and meatballs. With known nutritional value can help seaweed processors in increasing marketing of their products. The expected benefits to be achieved from this research is that the public knows the high nutritional content and value of dried seaweed therefore consumers are expected to choose the type of seaweed that they need.

2. Materials and Methods

2.1 Materials
Chicken, seaweed and spices and herbs, NaOH, HCl, CuSO₄·5H₂O, H₂SO₄, anhydrous Na₂SO₄, n-hexane, phenolphthalein indicator (PP), methyl red and methyl blue, ash-free filter paper.

2.2 Preparation Seaweed Nuggets and Meatballs
The seaweed nuggets and meatballs were made by soaking 250 grams of red seaweed (*Euchema cottonii*) into fresh water overnight and then rinsed with clean water. The cleaning seaweed, boiling for 2-3 minutes, then mashed. 100 grams Chicken meat washed and chopped. Seaweed, minced chicken and herbs (shallots, garlic, salt and pepper) are ground with a meat grinder until smooth. The mixture is then poured into a mold and steamed for about ± 30 minutes. The steamed was stopped and the mixture was allowed to cool to room temperature, during which nuggets was formed. As for the seaweed meatballs, printing is done roundly and put in boiling water until it floats [3].

### 2.3 Determination of Water Content

Determination of water content is measured in accordance on SNI. 01-2891-1992 Item 5.1 [4-8] uses the method of drying to obtain a fixed mass. Two grams of dried sample were weighed and roasted at 105°C for 3 hours. After roasting, the samples was allowed to cool in a desiccator for 15 minutes, then the mass of the cup and dry sample were weighed. Analysis is carried out until a constant mass is obtained.

### 2.4 Determination of Ash Content

Determination of ash content was measured by the SNI method. 01-4494-1998 Item 6.1 [4-8] using a furnace. Five grams of dried sample were weighed and made up using a Bunsen heater to reduce longer emits smoke. After fabrication, the samples placed in a furnace at 600°C until the graying process is completed and cooled in a desiccator for 15 minutes [9,10]. The cup and ash formed was measured by analytical balance until a constant mass is obtained.

### 2.5 Determination of Protein Content

Determination of protein content was measured through the Kyeldahl [4-8] method. 0.1 gram of sample is put into a test tube, then added with 1 gram of anhydrous Na$_2$SO$_4$ catalyst and 2 mL of concentrated H$_2$SO$_4$. The mixture was degraded for 2 hours at 85°C and cooled. And then 50 mL H$_2$O and 10 mL 50% NaOH is added into mixture. To the erlenmeyer 10 mL of HCl 0.02 N was added, each 5 drops of the methyl red and methyl blue indicator as a distillate holding solution were placed under the condenser. Distillation is carried out until the volume of the solution in the erlenmeyer reaches 2 times the initial volume. The tip of the condenser is rinsed with distilled water and collected in an erlenmeyer. The distillation solution was titrated with 0.02 N NaOH until a color change from purple to green was obtained. A blank solution is made as a comparison.

### 2.6 Determination of Crude Fiber Content

Determination of crude fiber content is measured through the SNI method. 01-2891-1992 Item 11 by hydrolysis. A total of 1 gram of a free sample of water was put into a 250 mL erlenmeyer and 50 mL of 0.25 N. H$_2$SO$_4$ was added. The mixture was hydrolyzed in an autoclave for 15 minutes at 105 °C and cooled and added 25 mL of 0.5 N NaOH, then hydrolysis was carried out. back in the autoclave for 15 minutes. The sample is filtered with filter paper that has been dried and weighed. Furthermore the filter paper containing the sample was washed consecutively with hot water, 15 mL H$_2$SO$_4$ 0.25 N, hot water and 96% alcohol. The filter paper is dried in an oven at 105°C for 1 hour until a constant mass is obtained.

### 2.7 Determination of Fat Content

Determination of fat content is measured through the SNI method. 01-2891-1992 Item 8.2 [4-8] using Weibull modified Soxhlet. A total of 5 grams of sample was weighed and put into a 400 mL beaker glass and hydrolyzed with hydrochloric acid to release the bound fat. Then fat which made is extracted by diethylether on Soxhlet and evaporated at 105°C. After chilling, fat residue is weighed and finally fat content was measured.
3. Results and Discussion

3.1 Determination of Seaweed Nutrition Component

The results of the seaweed composition analysis used in the process of making nuggets and meatballs are presented in Table 1.

Table 1. Seaweed composition used as supporting material in the making of nuggets and meatballs

| Nutrition Type | Unit   | Content |
|----------------|--------|---------|
| Protein        | %      | 9.32    |
| Fat            | %      | 1.15    |
| Crude Fiber    | %      | 46.19   |
| Carbohydrate   | %      | 5.91    |
| Vitamin C      | mg/100g| 25.45   |
| Na             | mg/100g| 5.85    |
| K              | mg/100g| 13.19   |
| Ca             | mg/100g| 329.69  |
| Mg             | mg/100g| 271.53  |
| Fe             | mg/100g| 2.61    |

Seaweed has a high fiber content (46.19%), carbohydrates, proteins and fats, most of which are salt compounds. The composition of seaweed can improve the body's defense function, improve blood circulation and the working system of the heart, and the digestive system. The high fiber content can also prevent colitis, colon cancer, constipation, help treat ulcers, and other digestive disorders. There is no negative effect caused by consuming the seaweed [12].

Seaweed also has a very low fat content, therefore safely for consumption even in large quantities. Low fat content causes seaweed to be used as one of the main constituents in low-fat diet foods. However, a certain amount of fat is needed for the human body. Fat is an organic compound that is not soluble in water, but dissolves in organic solvents. Fat functions as the biggest source of energy between protein and carbohydrates. One gram of fat can produce 9 kcal, while carbohydrates and protein produce only 4 kcal. Fat is also a source of fatty acids, pospolipid, cholerterol, and as a solvent in the process of absorption of vitamins A, D, E, and K. In addition, fat also serves to help the process of metabolism, osmoregulation, and maintain the shape and function of membranes or tissues (phospholipids). The results of the product analysis made, in the form of nuggets and shredded, are stated in Table 2.

Table 2. Standard of nugget and meatball quality requirements SNI. 01–6638–2012 [10]

| Parameter       | Unit | Requirements | Results | Nuggets | Meatsballs |
|-----------------|------|--------------|---------|---------|------------|
| Water Content   | %    | Max 60       |         | 35      | 37         |
| Carbo Content   | %    | Max 25       |         | 20      | 19         |
| Protein Content | %    | Min 12       |         | 22      | 21         |
| Fat Content     | %    | Max 20       |         | 17      | 18         |
Overall the results of making Nugget and Meatballs obtained, are in accordance with SNI requirements. The results of the analysis of fat content in Table 2, show high results when compared with fat in previous studies. The results of a study mention the fat content with the addition of soy flour and tapioca flour to snapper nuggets stated the results of fat analysis ranged from 1.46 to 6.24%. Low fat content because of the delicious content of snapper at 0.7 g, the addition of tapioca flour and soy flour [13].

The fat needed by the body from the food consumed is around 10%, which means the fish nugget sample with the addition of Euchema cottonii meets the needs of fat in the body. Fat is grouped into two namely saturated fatty acids and unsaturated fatty acids. Saturated weak acids are fatty acids that are nonessential and can be synthesized by the body. While unsaturated fatty acids, which are essential fatty acids, are said to be essential because they are needed by the body and cannot synthesize. The fat contained in the nugget is good for the body because it is included in unsaturated fatty acids [14].

4. Conclusions
Based on the results of the current study, the following conclusions may be drawn:

1. In this work, we demonstrated the guest effect of seaweed in the Nugget and Meatballs to improve the nutritional value produced. Seaweed was firstly introduced in nugget and meatballs as additive material, and seaweed effectively increase the nutrition value with the high content of nutrition dominated by crude fiber of 46.19%.

2. The nutrition improvement of nugget and meatballs related with many important nutrients which contain in seaweed such as Protein, Carbohydrates, Energy and Crude Fiber.

3. Low fat content and high crude fiber, which makes seaweed good for daily consumption.

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