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Fortification Seaweed Noodles [*Eucheuma cottonii* (Weber-van
Bosse, 1913)] with Nano-Calcium from Bone Catfish
[*Clarias batrachus* (Linnaeus, 1758)]

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Abstract

This research studies the effect of addition nanocalcium obtained from the bone of catfish for noodle seaweed. In this study, seaweed used types *Eucheuma cottonii* obtained from Jepara, Indonesia. Nanocalcium obtained from the bones of catfish processed chemically by precipitation method and then characterization using X-Ray Diffraction. In manufacture of noodles used seaweed as much as 30 % with addition of various concentration nanocalcium as much as 1 %, 1.5 % and 2 %. Result Fourier Transform Infra Red and X-Ray Diffraction of nanocalcium indicated that calcium obtained minerals hydroxyapatite with the wave number group OH and PO₄³⁻ at 3 441.01 cm⁻¹ and 1 049.29 cm⁻¹, and the crystal have size 15.29 nm. The best results from seaweed noodles fortified with nanocalcium, in the addition of nanocalcium with level 1 % are calcium, water, ash, fat, protein, and carbohydrates of 1.49 %, 34.31 %, 4.28 %, 8.45 %, 5.74 % and 47.22 %.

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1. Introduction

Noodles has long been used as an alternative substitute of rice. Characteristic noodles is practical and tastes good have an attraction, also a relatively cheap price, make a noodle product could be reachable by a lot layers of society. In the manufacture of noodles, wheat flour as main ingredient needed to form elasticity, hardness, excellent source of protein and carbohydrates. Good quality of noodles is characterized by a strong texture and elastic because function of flour as a binder during the formation of the dough. Noodles during cooking should be free from surface sticky, chewy and elastic (Miskelly, 1996; Chang and Wu, 2008). Increasing noodle consumption influence need for raw material for noodles. Nowadays there a tendency are decrease flour supply and expensive prices, cause manufacture noodles was looking for a new formula for the next generation of noodles are have higher protein, higher quality but cheaper. Therefore, it is necessary replacement of raw materials noodles that have quality and nutritious.

Different types of flour for noodle will produce a variety noodles textures. Substitution seaweed on noodles can provide elasticity and strength similar properties to noodles texture. Because seaweed gel has same properties as gel forming and contribute in establishment of structures for dough formation. Weakening effect on texture attributes occur with substitution seaweed powder (Dhargalkar and Kavlekar, 2004), so it can be minimized or neglected using pure seaweed that can produce a strong dough during gelatinisation.

On other side, less complete of nutrients such as minerals in noodle make noodles is less good to eat every day. Therefore, need for additional minerals in the noodles to fit the numbers daily nutritional. One of minerals that still lacking in the daily consumption is calcium. According to data from the Ministry of Health in 2008, Indonesian daily consumption average of $254 \text{ mg} \cdot \text{d}^{-1}$. This amount is far below daily calcium intake of $1500 \text{ mg} \cdot \text{d}^{-1}$. In fact, calcium is important in life of the cell and tissue fluids, activities several enzyme systems, helps in the process muscle contraction and maintain normality heart work. Calcium deficiency can cause bone and tooth growth retardation, rickets in children and can lead to osteoporosis (brittle bones) (Poedjadi et al., 2009). Because importance role of calcium in a food product needs to be added, as a supporter nutrient intake.

Bone catfish is one ingredient that can be used as a source of calcium. Nutrient content in catfish bone is 0.735 % calcium, 24.3 % protein, 3.84 % fat, 58.43 % ash, and carbohydrates 6.02 % (Sa'adah, 2013). The calcium content on fish bones indicate that fish bone has potential as a calcium food source. To maximize process calcium influx in the body, calcium needs to be modified to be nanokalsium.

The purpose of this study is to make seaweed noodles with fortified nano-calcium from catfish bones to create a noodle quality and nutritional value better. In this study, noodles are made by mixing flour and seaweed after noodles are added to a variety of nano-calcium concentrations to determine the concentration of the most good for consumption.

2. Material and methods

2.1. Material

Materials used in this study is the seaweed *Eucheuma cottonii* (Weber-van Bosse, 1913) from Jepara, Central Java, Indonesia high protein wheat flour, starch, eggs, salt, sodium bicarbonate, aquades, demineralized water, coconut oil, NaOH, HCl, H_3PO_4 , NH_4OH .

2.2. Extraction calcium from bones Catfish

Catfish [*Clarias batrachus* (Linnaeus, 1758)] bones cleaned of residual meat attached. Bone dried at $100 \text{ }^\circ\text{C}$ for 2 h. Bone obtained soaked in a solution of HCl 4 % in the ratio of 1:15 (w/v) (Garnjanagoonchorn et al., 2007). Bone results soaking separated between filtrate with lees, and add filtrate with 2 M NaOH solution with a ratio of 1:2 (v/v) were accompanied by stirring. Separate the filtrate and wash the precipitate until pH 7. Then, dry the precipitate at a temperature of $110 \text{ }^\circ\text{C}$ for 4 h.

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