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Analysis of Fortified Biscuits' Nutritional Value Using "Patin" Fish Bone Meal Waste and Coconut Dregs

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Abstract. Health, nutrition, mental health, and other processes like the immune system, reproduction, and cognitive capacities can all be affected by malnutrition. Food fortification, or the addition of certain nutrients to food items, can be used to solve this issue. Food items like "Patin" bones and coconut dregs can be fortified. These substances can be turned into flour to create a source of wholesome nourishment. The body need calcium for growth, which "Patin" bones and coconut pulp both contain in significant amounts. By exploiting the local potential of "Patin" bones and coconut dregs, this study intends to provide nutritious food fortification. Then, the moisture, ash, protein, fat, carbohydrate, and fiber contents are analyzed. The analysis's findings revealed that "Patin" bone meal and coconut dregs flour had respective water, ash, protein, fat, carbohydrate, and fiber contents of 3.02%, 6.29%, 6.21%, 20.89%, 64.08%, and 6.58%. Based on the findings of this investigation, it can be said that cookies containing "Patin" bone flour and coconut dregs have a high nutritional value. This research is anticipated to be used as one of the food innovations to support initiatives to provide the body with the micronutrient nutrition it requires.

Keywords : Cookies, "Patin" bones, coconut dregs, fortification, and nutrition.

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Introduction

ROS When the body does not receive enough vitamins, minerals, proteins, carbs, and other nutrients, it is said to be malnourished [1]. Nutrient deficiencies may be remedied by raising food's nutritional value. Fortification is a method for increasing the amount of nutrients in food. The purposeful addition of one or more nutrients to food is known as fortification. Food fortification is done to improve a food's nutritional value [2]. Fortifying cookies using "Patin" bone flour and coconut dregs flour is one of the food fortifications that is frequently carried out.

Cookies have a small, round shape, a sweet flavor, and a less dense, crunchier texture. Typically, wheat flour, sugar, and eggs are used to make cookies [3]. Cookies made with these ingredients typically have a low nutritional content, necessitating the inclusion of additional nutrients to make the finished product have a high nutritional value. "Patin" bone flour is one of the ingredients that can be made. "Patin" bones and other fish parts are used to make "Patin" bone meal. The protein content of "Patin" bones is fairly high, at 32–34% [4]. "Patin" bones still have the potential to be developed due to their high protein content, such as through the production of "Patin" bone meal.

Cookies must be adjusted by adding flour made from coconut dregs to boost their nutritional content. Coconut dregs are a locally available resource that are rarely used effectively. Typically, only processed goods like "serundeng" and animal feed are made with coconut dregs. In reality, when prepared correctly, coconut pulp has a very high fiber content. Protein content in coconut dregs flour is 4.11%, crude fiber content is 30.58%, fat content is 15.89%, moisture content is 4.65%, ash content is 0.66%, and carbs are 74.69%. Dietary fiber has been shown to help and maintain the health of the digestive system and can maintain a healthy body, particularly in efforts to prevent numerous degenerative diseases like obesity, diabetes mellitus, and cardiovascular disease [5]. Based on this, it is anticipated that fortifying cookies with "Patin" bone meal and coconut dregs flour will boost their nutritious value.

Experimental

Extraction Research Methods

Tools and Materials

The tools used are basins, pots, pressure cookers, mixing spoons, sieves, blenders, mixers, ovens, baking sheets and digital scales. The main ingredients used in this study consisted of wheat flour, coconut dregs obtained from coconut milk production houses Mendalo Darat, Jambi Luar Kota and "Patin" bones obtained from the production house for making "Patin" souvenirs in the village Lubuk Ketapang, Kabupaten Batanghari, Provinsi Jambi. Other supporting materials used in the manufacture cookies namely sugar, eggs, salt, butter, vanilla powder, and baking powder.

The Method Used to Create "Patin" Bone Meal

The "Patin" bones are first thoroughly cleaned before being cooked for 30 minutes at 80°C and then dried in the sun for five hours. then for two hours was pressed. It is then dried in the oven for 1.5 hours at 125°C after pressing. To obtain "Patin" bone meal, blend the dry bones and sift through an 80 grit sieve [6].

Producing Coconut Dregs Flour

The Process Coconut dregs are steeped in plain water for 10 minutes after being cleansed with water for 2 to 3 minutes. Coconut pulp is produced by first pressing coconuts through a filter. The coconut dregs are then dried in the sun for 2–3 days, or until they are completely dry. Next, 2000 rpm was used to mix the dried coconut dregs. Coconut dregs flour was produced by filtering the blended ingredients through a 40 mesh sieve [7].

Cookie-making procedure

The seven steps involved in the process of making cookies are: preparing the ingredients, combining the ingredients, kneading the dough, shaping the cookies, baking the cookies, cooling the cookies, and packaging.

Results and Discussion

Characteristics of Raw Materials

with Table 1 shows the findings of the examination of the properties of the raw materials, specifically "Patin" bone meal and coconut dregs flour.

Table 1. Lists the characteristics of the raw materials used to make coconut dregs flour and "Patin" bone flour.

No	Analysis (%)	Test	
		A	I
1.	Water Content	4,22	1,21
2.	Ash Content	0,56	59,53
3.	Protein Content	3,07	17,99
4.	Fat Level	37,08	3,17
5.	Carbohydrate Content	55,07	18,10
6.	Crude Fiber Content	7,83	0,71

Description: A (Coconut Dregs Flour) and I (Patin Fish Bone Flour).

Fortification Characteristics Cookies

This research produces fortified products cookies with the addition of "Patin" bone meal and coconut dregs which are rich in nutrients to meet the needs of micronutrients in the body. The following are the results of the fortification analysis cookies with the addition of raw materials in the form of "Patin" bone meal and coconut dregs flour which are presented in Table 2.

Table 2. Cookies Made from "Patin" Bone Flour and Coconut Dregs Flour

No	Analysis (%)	Ulangan		Rata-Rata	SNI (%)*
		C ₁	C ₂		
1.	Water Content	3,03	3,01	3,02	Maksimum 4
2.	Ash Content	6,36	6,22	6,29	Maksimum 2
3.	Protein Content	6,15	6,27	6,21	Minimum 6
4.	Fat Level	20,48	21,31	20,89	Minimum 18
5.	Carbohydrate Content	63,97	64,19	64,08	Minimum 70
6.	Crude Fiber Content	6,58	6,58	6,58	Maksimum 0,5

Note: *Source SNI 01-2973-1992, C₁ and C₂ (37.5gr "Patin" bone flour : 37.5gr coconut dregs flour : 175gr wheat flour) [8].

Water Content

We can see in table 1. Water content at cookies C₁ with cookies C₂ produced relatively the same water content, in which the addition of 37.5 g of "Patin" bone meal and 37.5 g of coconut dregs flour and 175 g of wheat flour resulted in an average moisture content of 3.02%. Water content at cookies should not exceed 4% [8]. It can be said that the water level is cookies "Patin" bone meal and coconut dregs meet the standards set by SNI 01-2973-1992. This is in accordance with research that has been done that the composition of water in cookies with an average of 3.2 – 5.4% [9]. Water is one of the main components in food ingredients which greatly affects the texture, appearance and taste of food. The durability of processed materials is also closely related to the water content because it greatly affects the growth of microorganisms. According to research that has been done previously, the water content in food ingredients affects the resistance of food ingredients to microbial attacks. The water content is expressed by water activity, which is the amount of free water that can be used by microorganisms for growth. Humidity and water content usually affect the growth of microorganisms in processed products [10]. Low water content on cookies will extend shelf life and can reduce the possibility of microbiological contamination so that it is safer as a nutritious product in fulfilling micronutrients in the body.

Ash Content

In table 1 it can be seen that the average ash content produced is very high, namely 6.29%. According to SNI, the ash content that must be present in cookies maximum 2% [8]. The high level of ash on cookies caused by the treatment of the addition of "Patin" bone meal that was carried out. According to research that has been done, the ash content has something to do with the minerals of a material. Minerals contained in a material can be of two kinds of salts, namely organic salts and inorganic salts. Thus the higher the ash content, the worse the quality of a product and conversely the lower the ash content, the better the quality of a product [11]. The high content of dry cake ash can be caused by the treatment of adding fish bone meal because fish bones contain several main constituent components such as minerals [12]. Bones also contain living cells in the form of mineral salts. Mineral salts are components consisting of 80% calcium phosphate and the remainder consisting of calcium carbonate and magnesium phosphate. So that this element makes the ash content in pastries products increase. The difference in the value of ash content is also thought to be caused by differences in habitat and environment so that inorganic minerals such as calcium, potassium, magnesium, zinc are higher. The ash content of a food product shows the residue of organic matter remaining after the organic matter in food has been reduced [13].

Protein Content

Protein is the most abundant macromolecule in cells and makes up more than half the dry weight of almost all organisms. Amino acids, the structural units of proteins, and simple peptides, which consist of several amino acids joined together by peptide bonds. Protein structure consisting of polypeptides which have very long chains, composed of many amino acid units. Protein is a food substance that is very important for the body, because this substance besides functioning as fuel in the body also functions as a builder and regulatory substance. Protein is a source of amino acids containing the elements C, H, O, and N which are not owned by fat or carbohydrates [14]. Based on table 2 it can be seen that the protein content values obtained in C1 and C2 namely 6.21% which is still

categorized as meeting the standard protein content set by SNI, namely a minimum of 6% [8]. Coconut dregs flour is one of the low protein. There is a possibility of increased protein levels in cookies directly proportional to the addition of coconut dregs flour. According to research that has been done, the protein content of pastries increases with the addition of added coconut flour. The higher the amount of coconut flour used, the higher the protein content in the pastries [15].

Fat Level

In table 2 we can see that the average fat content produced in cookies C1 and C2 namely 20.89%. Fat content produced in cookies This is quite sufficient and meets quality standards cookies determined based on SNI, namely a minimum of 18% [8]. The high fat content can be affected by the ingredients used in the manufacture cookies. According to previous research, the high fat content is due to the ingredients used in the manufacture cookies contain high levels of fat, such as margarine [12]. The fat content test was carried out to determine the fat content in the fat cookies, considering that the base material used is a high-fat base material such as "Patin" bones. Fat levels on cookies influenced by the temperature used and the length of processing time. The higher the temperature used, the higher the damage to the fat [16].

Carbohydrate Content

In the body, carbohydrates function as fat and protein metabolism, preventing the onset of ketosis and excessive breakdown of body protein. While in food, carbohydrates function in determining the properties of food ingredients such as taste, texture and color. In table 2, the average carbohydrate content produced is 64.08%. Carb content for cookies from the treatment of adding "Patin" bone meal with coconut dregs flour from all treatments did not meet the standard cookies according to SNI that is at least 70% [8]. Formulation cookies which has the least proportion of wheat flour will have a low carbohydrate content. This is in line with research that has been done previously that biscuits that have a greater proportion of wheat flour than other flours have the highest carbohydrate

content [17]. Low carbohydrate levels are greatly influenced by other levels of other ingredients cookies produced. such as water content, ash content, fat content, and protein content. The higher the element contained in other elements, the lower the carbohydrate content and vice versa, the lower the element contained by other elements, the higher the carbohydrate content [18].

Crude Fiber Content

Crude fiber is part of food that cannot be hydrolyzed by human digestive enzymes. Crude fiber is also part of insoluble fiber [19]. The data from the analysis in table 2 shows that the average crude fiber content produced is the same, namely 6.58%. Crude fiber content for cookies from the treatment of adding "Patin" bone meal with coconut dregs flour from all treatments exceeded the standard cookies according to SNI, which is a maximum of 0.5% [8]. High fiber content in cookies This can be caused by the addition of coconut dregs flour. This is in accordance with the results of previous studies which stated that there was a relationship between the addition of coconut dregs flour and the crude fiber content cookies, that the higher the percentage of coconut dregs flour added, the crude fiber of cookies more increasing. The main advantage of flour from coconut dregs is its very high dietary fiber content [18]. High fiber content in cookies can make cookies as an alternative food source of fiber. Thus, the higher the fiber content in cookies formulated with coconut dregs flour, the better for digestion, so cookies These can be used as food (snacks) for the diet [11].

Conclusion

Substitution of "Patin" bone meal and coconut dregs flour had an effect on the moisture content, ash content, protein content, fat content, carbohydrate content and crude fiber content in cookies. Treatment cookies with a serving size of 37.5g "Patin" bone meal: 37.5g coconut pulp flour and 175g wheat flour is the formulation of choice among other formulations with a high protein content so that it has the potential as a source of fulfilling the micronutrients needed by the body.

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Author Contributions

The first author as the originator of the idea, product analysis, and discussion of research results, the second author as the data analyst and manufacturing process cookies, The third author as a provider of materials and manufacturing processes cookies, the fourth author as director and designer of the course of research and discussing research results.

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