Effect of Frying on The Nutritional Composition of Catfish Nuggets (Clarias gariepinus) Substituted by Modified Cassava Flour (Mocaf)

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1. Introduction
Children under five years of age are included in group of nutrition’s susceptible. They are growth and development cycle which need a huge nutrient [1]. The UNICEF report states that in 2018, one in three children in the world under the age of 5 was categorized as "not growing well" or growth was not good and in Indonesia around 50-59% of children under five experienced poor growth.

Health Research results (2018) show that the prevalence of underfive and poor nutritional status in 2018 is 17.7%, this figure is still relatively high compared to the 2015-2019 National Medium Term Development Plan target of 17%. Meanwhile, the prevalence of short and very short nutritional status (stunting) under five in 2018 was 30, 8%, this stunting prevalence rate also has not met the World Health Organization (WHO) target of 20%. Prevalence data for children with protein deficiency (KEP) in Yogyakarta in 2015 amounted to 8.04% and in 2017 increased to 8.26%. The Research reported that there was a significant relationship between parenting and stunting [2]. Therefore, an important effort in overcoming the problem of under-five malnutrition and saving future generations is the provision of supplementary food (PMT) [3].

Indonesia Ministry of Health Regulation No. 66/2014 states that additional food in the form of snacks using local food ingredients that are available or produced in the local area, especially food sources of energy and protein such as grains, tubers, nuts, green vegetables, and fish. Fish is an animal food that contains a good source of protein because it contains various essential amino acids and is easily
digested by the body. African catfish (*Clarias gariepinus*) is a type of freshwater fish that is rich in protein and essential amino acids such as lysine and leucine which are needed by children to support growth, tissue repair, produce antibodies, and help calcium absorption [4].

The form of food product innovation that is quite popular with many people, has been recognized by the public as practical food and does not take long to serve, is nugget. According to SNI 01-6683-2014 nugget is a form of processed meat product made from ground beef which is printed in the form of two square pieces coated with battered and breaded flour. Nugget products can be made from beef, chicken, fish, and others [5]. In the past, people knew nugget as a side dish, now nugget has shifted its function into a snack [6].

Local food that has the potential to fill nugget is modified cassava flour (mocaf). Mocaf is cassava flour that has been modified by fermentation using LAB (*Lactic Acid Bacteria*). Mocaf has a fairly high starch content, namely 70,6% [7]. Some of the advantages of Mocaf include the ability to bind water, increase emulsion stability, reduce fishy odors, and increase water binding capacity [8]. Nugget is usually consumed through the frying process. Frying can improve the sensory qualities of food by forming aroma, attractive color, and forming texture. Through frying, the quality of food becomes hygienic by inactivating microorganisms. The undesirable changes in frying are the loss of dissolved water content and the oxidation of vitamins. So, this study aimed to determine the nutritional content of catfish nuggets substituted by Mocaf before and after frying.

2. Method
This study used a pure experimental research design. This research was started from December 2019 to May 2020. The research site was Central Laboratory for Food and Nutrition Studies, Universitas Gadjah Mada, Yogyakarta, Indonesia.

Water content was analyzed using the oven method, ash was analyzed using the dry ashing method, the protein was analyzed using the Mikrokjehdahl method, the fat was analyzed using the Soxhlet method, and carbohydrates were analyzed using the by difference method.

3. Results and Discussion
The results of the proximate analysis of raw nugget on water, ash, fat, protein, carbohydrate and crude fiber content were 67,05% (% ww); 1,63% (% ww), 3,02% (% ww); 9,62% (% ww), 18,69% (% ww) and 1,26% (% ww). The results of the proximate analysis of fried nugget showed that the water content of the nugget was 55,11% (% ww). According to the requirements of SNI 01-6683-2014, namely a maximum of 60% (% ww). The protein content of fried nugget is 11,02% (% ww) by following SNI 01-6683-2014 which is at least 9% (% ww). This nugget allows a decrease in protein caused by the cooking process so that it is denatured at a temperature of 50°- 60°C [9]. This denatured protein will have an impact on increasing protein digestibility [10].

The fat content of this nugget is 11,02% (% ww). The source of fat comes from the absorption of oil during the frying process. The frying process affects the fat content of the nugget [11]. During the frying process, some of the oil enters the nugget and fills the space that was originally filled with water. The thicker the middle layer, the more oil will be absorbed. This fat content comes from catfish and cooking oil. The carbohydrate content of this nugget is 20,41% (% ww) and according to SNI 01-6683-2014. The carbohydrate content in this nugget comes from the main ingredients of catfish and Mocaf. The ash content was 2,04% (% ww) and the crude fiber content was 2,64% (% ww).
4. Conclusion
The catfish nuggets before being fried contained water 67.05%; ash 1.63%; fat 3.02%; protein 9.62%, carbohydrate 18.69%; fiber 1.26%. The catfish nugget after frying contained water 55.11%; ash 2.04%; fat 11.43%; protein 11.02%; carbohydrate 20.41% and fiber 2.64%.

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