Potential and characteristics of dadiah processed into products-like nuggets with addition of cinnamon bark flour
(*Cinnamomum burmanni*)

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Abstract. Dadiah is a natural fermentation of buffalo milk from West Sumatra, which has a distinctive smell and flavor. This causes the dadiah to be less liked, so it is necessary to diversify the processed of dadiah. This study aimed to determine the effect of adding cinnamon flour (*Cinnamomum burmanni*) in the processing of nugget-like products on antioxidants, cholesterol, the total colony of lactic acid bacteria and organoleptic values. This research used 2000 grams of dadiah and cinnamon bark flour (15 g). The variables observed were antioxidants, cholesterol, the total colony of lactic acid bacteria and organoleptic values. The method used in this study was an experimental method using a Completely Randomized Design (CRD) with 4 treatments and 5 replications. The treatments in this study were the addition of cinnamon flour namely A (0%), B (0.5%), C (1%), D (1.5%). The results of this study indicated that the addition of cinnamon flour to nugget-like products had a significant effect (P<0.05) increasing antioxidant levels and decreasing cholesterol levels, not significantly different (P>0.05) on the total colony test of lactic acid bacteria and the organoleptic test of taste, texture and flavor. The addition of cinnamon flour to nugget-like products in treatment D (1.5%) gave the best results with antioxidant levels of 73.24%, cholesterol levels of 20.32 mg/dl, the total colony of lactic acid bacteria 1.48x10^7 CFU / ml and taste organoleptic value 3.44, texture 3.68 and flavor 3.80.

Keywords: Dadiah, cinnamon bark flour, nugget-like product

1. Introduction
Lifestyle in the millennial era has led to the development of various types of diseases in the community. With this phenomenon, lately, public awareness to pay attention to health began to increase. This can be seen with the growing number of various types of food and health drinks that contain probiotics, such as Yakult, yogurt, kefir, curd, and others.

Dadiah is a typical food of West Sumatra made from buffalo milk which is fermented naturally in a bamboo tube through storage at room temperature for 2-3 days [1]. Dadiah contains 84.35% water, 5.93% protein, 5.42% fat, 3.34% carbohydrate, and 3.4% acidity [2]. Besides that dadiah also contains Lactic Acid Bacteria which can function as probiotics. This lactic acid bacteria has the potential to reduce blood cholesterol levels, balance microbes in the intestinal tract, anti-carcinogenic, increase endurance, prevent the growth of pathogenic bacteria, stimulate immune responses, reduce constipation, prevent diabetes, increase lactose digestibility in patients with lactose intolerance and play a role in determining the texture and taste of curd [3]; [4].

But unfortunately, the dadiah is less popular compared to other fermented milk, especially for teenagers and children. This is because dadiah has a distinctive sour aroma and taste and denser texture,
even more like milk tofu. For that, we need an effort to introduce and develop dadiah into a product that is more acceptable to all people but does not reduce the benefits of the dadiah. One of the foods that are most loved by people is nugget, especially children.

Nugget is processed meat made from ground beef that is seasoned, steamed and cut rectangular and coated with panir flour. Most nuggets are made from meat, both chicken, beef and fish. Dadiah also has the potential to be processed into products that are similar to nuggets (like nuggets) because they have a smooth, compact and compact texture. To reduce the flavor and sour taste of the dadiah product "like nuggets", an ingredient such as cinnamon flour can be added.

Cinnamon is a kind of tree that produces spices. This plant in Indonesia is found in the regions of West Sumatra, North Sumatra, Jambi, and Bengkulu. Usually used as a spice in food and also as a traditional medicine that can improve health and appetite. Cinnamon bark has a spicy and sweet taste, smells nice, and is warm. [5] stated that cinnamon is a plant source of antioxidants. Essential oils, cinnamaldehyde, eugenol, cinnamic acid, catechins, epicatechin are phytochemical compounds that make cinnamon potential as an antioxidant. The main component is cinnamaldehyde which ranges from 60-70%.

Antioxidants are compounds or substances that can slow down or prevent oxidation despite a small concentration. In food processing technology, antioxidant compounds have an important role in maintaining the quality of food products and inhibit various types of damage such as rancidity, aroma color changes, changes in texture and changes in nutritional value.

This study aims to see the potential and develop dadiah into products-like nuggets and determine the effect of adding cinnamon bark flour to dadiah product-like nugget on antioxidants, cholesterol, total lactic acid bacteria, and organoleptic values.

2. Materials and methods
The material used in this study is Dadiah from Jorong Lareh Nan Panjang Nagari Bt. Payung sub-district Lareh Sago Halaban District Lima Puluh Kota as much as 2000 g and cinnamon bark flour as much as 15 g.

This study uses a completely randomized design (CRD) experimental method which consists of 4 treatments including cinnamon: A 0% (control); B (0.5%); C (1%); D (1.5%) and repeated 5 times. Data were analyzed statistically using ANOVA and if the treatment showed significantly different results (P<0.05), further tests were performed using Duncan's Multiple Range Test (DMRT). Furthermore, data processing is carried out using SPSS.

3. Results and discussion
The treatment of adding cinnamon bark to the processing of dadiah into product-like nuggets (hereinafter referred to as dadiah nugget) can be seen in Table 1 below.

| Treatment | Antioxidant (%) | Cholesterol Levels (mg/dl) | Total Colony of LAB (x 10^7 CFU/ml) | Organoleptic Value |
|-----------|----------------|---------------------------|-------------------------------------|-------------------|
|           |                |                           |                                     | Taste | Texture | Flavor |
| A         | 25.87^d        | 38.98^a                   | 1.10                                 | 3.88  | 3.88    | 3.96   |
| B         | 58.73^c        | 33.20^ab                  | 1.22                                 | 3.60  | 3.80    | 3.96   |
| C         | 64.99^b        | 26.92^b                   | 1.27                                 | 3.64  | 4.00    | 3.72   |
| D         | 73.24^a        | 20.32^c                   | 1.48                                 | 3.44  | 3.68    | 3.80   |

Note: Different superscripts show significantly different effects (P <0.05).

3.1. Antioxidant levels
Variance analysis results showed that the addition of cinnamon bark flour significantly affected the antioxidant levels of dadiah nugget (P <0.05). Duncan's Multiple Range Test (DMRT) test results
showed that treatment A was significantly different from treatments B, C and D. This showed that the higher the administration of cinnamon bark flour, the antioxidant levels in dadiah nugget were also higher.

Cinnamon bark flour contained high levels of antioxidants that was 71.23% (laboratory test results). The most antioxidant component in cinnamon flour is cinnamaldehyde, this is by the opinion of [5] that cinnamaldehyde is the largest component of antioxidants in cinnamon bark which ranges from 60-70%. This causes the higher administration of cinnamon flour, the higher the antioxidants produced.

In treatment D, the addition of cinnamon flour was the highest concentration and produces an antioxidant content of 73.24%, which was higher when compared to research by [6] that states the administration of cinnamon at 1.5% resulted the antioxidant levels of 38.43% in functional drinks of steaks and stevia leaves.

The high content of antioxidants in dadiah nugget, it is expected that dadiah nugget will have a longer shelf life. As [7] state that antioxidants are defined as compounds that can delay, slow down and prevent lipid oxidation, in a special sense antioxidants are substances that can prevent the formation of free radical reactions (peroxide) in lipid oxidation.

3.2. Cholesterol levels
In Table 1 it can be seen that the addition of cinnamon bark flour treatment can reduce cholesterol of nugget dadiah, where the highest number is in treatment A (38.98 mg/dl) and the lowest number is in treatment D (20.32 mg/dl). Duncan’s Multiple Range Test (DMRT) test results showed the treatment had a significantly different effect, where the higher the addition of cinnamon bark flour, the lower cholesterol level of dadiah nugget.

The decline in cholesterol levels of dadiah nugget, due to the presence of antioxidants in cinnamon bark flour, especially cinnamaldehyde and also vitamin A and vitamin C. as stated by [8] that vitamin C in cinnamon as an antioxidant function to bind oxygen so it does not support oxidation reaction.

3.3. Total Lactic Acid Bacteria (LAB)
The average total colony of lactic acid bacteria of dadiah nugget addition with cinnamon bark flour ranged from 1.1x10^7 CFU/ml to 1.48 x 10^7 CFU/ml (Table 1). The results of the analysis of variance showed that the addition of cinnamon bark flour was not significantly different (P>0.05) to the total value of lactic acid bacterial colonies (LAB) produced. This shows that the addition of cinnamon flour did not affect the total number of LAB colonies on the dadiah nuggets.

The treatment of the addition of cinnamon bark flour gives no significant effect because cinnamon bark flour does not contain components that can stimulate the growth of LAB. Besides, the nugget processing does not occur further fermentation process, so it does not allow LAB to develop. This result is different from [9] research, regarding the addition of cinnamon bark flour to yogurt, where the addition of cinnamon bark flour to 0.2% produces a total LAB of 3x 10^8 CFU / ml.

The total colony of lactic acid bacteria in this study was not significantly different, but the dadiah nugget was still included as a functional food because in addition to the high nutritional value it also contained LAB which was good for health. This is by the opinion of [10] which states that lactic acid bacteria contribute positively to health through its metabolic activity which can produce lactic acid so that it can inhibit the proliferation of pathogenic bacteria and increase the number of lactic acid bacteria.

3.4. Organoleptic value
The average organoleptic value of dadiah nuggets with the addition of cinnamon powder flour can be seen in Table 1. From the table, it appears that the treatment gives a significantly different effect for all organoleptic variables namely taste, texture and aroma. This shows that the treatment given has no real effect on the taste, texture, and flavor of dadiah nuggets.

Cinnamon flour had a distinctive taste that is spicy and sweet, but the addition to the level of 1.5% has not caused a striking difference in taste for panelists and is still acceptable with a minimum score of 3.44. this showed that the addition of cinnamon flour can be fused with dadiah nuggets. Under the
opinion of [11], the taste of food is influenced by several factors, namely chemical compounds, temperature, consistency, and interactions with other taste components.

Dadiah nuggets had a crispy and soft texture on the inside, as do nuggets in general. The treatment of adding cinnamon bark flour gives a different effect which is not real because it is added in the form of flour so that it does not affect the consistency of the nugget itself. [12] stated that texture is a characteristic of a material as a result of a combination of several physical properties which include size, shape, amount and elements of material form that can be felt by the sense of touch and taste, including the senses of the mouth and vision. The treatment given was also still acceptable to panelists with the lowest score of 3.68.

The flavor of dadiah nuggets with the treatment of adding cinnamon bark flour to a level of 1.5% is still acceptable to panelists, with the lowest score of 3.72. The distinctive flavor of cinnamon bark can mix well so that it does not affect the panelist's acceptance of the product. As [13] opinion, in general the odor received by the nose and brain is more a variety of ingredients or a mixture of four main ingredients, namely fragrant, sour, rancid and scorched.

### 4. Conclusion

From the results of the study it can be concluded that the dadiah can be processed and developed into product-like nuggets and the addition of cinnamon bark flour (Cinnamomum burmanii) in the making of dadiah nuggets can increase the added value of the product that can be seen by increasing antioxidant levels and decreasing levels of product cholesterol and levels of addition up to 1.5% can still be accepted by panelists in terms of taste, texture, and flavor.

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