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Converting Banana-based Traditional Dessert to a Ready-to-eat Food via Sausage Technology

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ABSTRACT

Banana, as one of the most popular fruits worldwide, has been long used as the main ingredient in many of local traditional dessert such as *pengat*, *cekodok*, *lempeng*, *apam*, *lepat* and *bingka*. These delicious banana-based local desserts have potentials to be introduced to the global market by improving their commercial values. One of the ways to achieve this is by transforming the desserts to become a ready-to-eat food for consumers' convenience and preference. Thus, this study focusses on converting the banana-based traditional dessert to become a ready-to-eat food by adopting the sausage technology. The product development involved formulating the dessert based on the bingka pisang recipe using overripe bananas for the suitability of the process. According to the findings, the produced product has potential to be commercialized for local and international markets based on the overall acceptability in terms of the texture, appearance and sensory.

KEYWORDS

Banana, Traditional dessert, Sausage technology, Product development

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INTRODUCTION

Bananas (*Musa paradisiaca*) are among the main tropical fruit that grows largely in Asia, Latin America and Africa. Based on the volume of production worldwide, bananas come fourth after rice, wheat and maize (Idris & Soon, 2016). This popular fruit can be used in many applications including for the production of food products such as desserts, beverages, snacks, and wines. In Malaysia, bananas have been long used as the main ingredient in many of local traditional dessert such as *pengat*, *cekodok*, *lempeng*, *apam*, *lepat* and *bingka*. All of these delicacies are really popular among Malaysian, but their market niche is considerably small. By considering the current consumers' preference for the convenience in food preparation, there is an opportunity to improve the market value of the banana-based traditional desserts to be a ready-to-eat food. Ready-to-eat food by definition is food that is in a form that is edible without additional preparation to achieve food safety (Gamut, 2006). Currently, ready-to-eat food is the largest segment in the overall food industry and is growing at a fast pace as a result of the high consumer acceptance for such food globally.

One potential way of converting our traditional desserts to become a ready-to-eat food is by adopting the sausage technology. In the sausage production, a few processes are involved, including mixing, stuffing mixture into casing, cooking, cooling and peeling of the casings. By modifying the formulations and adjusting some of the related processes, our banana-based traditional dessert such as *bingka pisang* can be prepared as a ready-to-eat food. In such form, a few advantages can be achieved, including a more uniform size for packaging and aesthetic value, a longer shelf-life since the product can be stored in the freezer, and an ease of the end users to consume the product at any preferable time. Subsequently, the commercial value of this product can be increased, and our local traditional food can be introduced and marketed globally. Thus, the aim of this study is to establish the preparation of a ready-to-eat food based on our banana-based traditional dessert, *bingka pisang* by adopting the sausage technology.

MATERIALS AND METHODS

Raw material preparation

The banana (Musa acuminata (AA Group)) was acquired from local convenient stores in Sri Serdang, Selangor. Since we were using overripe bananas (stage 7) for this project, the purchased bananas were left at the room temperature for 3 days to let them to fully ripe. Next, the bananas were peeled, and the flesh was used as the main ingredient in preparing for the dessert. Other ingredients such as wheat flour, coconut milk, salt, and sugar were also obtained from local convenient stores.

Formulation Development

The formulation of the new ready-to-eat food product in this study was based on the recipe of traditional *bingka pisang* with some modifications. The formulation consisted of banana flesh, wheat flour, coconut milk, salt, and sugar. For this study, two sets of samples were prepared based on the banana content in the banana-flour mixture of 50% and 80%, respectively to make a total of 1 kg of banana-flour mixture. Other ingredients such as salt, sugar and coconut milk were prepared at 0.2%, 10%, and 15%, respectively, of the total weight of the banana-flour mixture (1kg). All formulations are described in Table 1.

Table 1: Formulations of the banana-based traditional dessert

<table>
<tr><th colspan="3">Sample Formulation</th></tr>
<tr><td colspan="3">Banana content of 50% and 80% in the banana-wheat flour mixture</td></tr>
<tr><td>Salt</td><td>0.2%</td><td rowspan="3">Based on the total weight of banana and flour</td></tr>
<tr><td>Sugar</td><td>10%</td></tr>
<tr><td>Coconut milk</td><td>15%</td></tr>
</table>

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Sample Preparation

The banana flashes were cut into smaller shapes by knife prior to soaking in hot water of 60°C for 10 min. This blanching process was performed to maintain the freshness of banana and slow down the browning process (Jeet et al., 2015). The blanched banana flashes were then ground using an electric meat grinder (MK-MG 1500, Panasonic, Japan) to produce banana puree. The banana puree was mixed with other ingredients i.e. sugar, flour, salt and distilled water in a mixer (KENWOOD, Britain) for 30 minutes at the room temperature until the mixture was homogenized. A sausage stuffer (IYouNice, China) was used to stuff the mixture into circular cellulose casings (2.5 cm diameter and 18 cm length). Both ends of the stuffed casings were tied with cotton strings, and the stuffed rods were steamed for 30 minutes at 100 °C in an electric steamer (Panasonic, Japan). After cooking, the steamed gels were immediately immersed in ice water to prevent shrinkage and to facilitate separation from the casings. The gels were then stored at -4 °C before use in the subsequent analyses. The overall production of the banana-based dessert is exhibited in Figure 1.

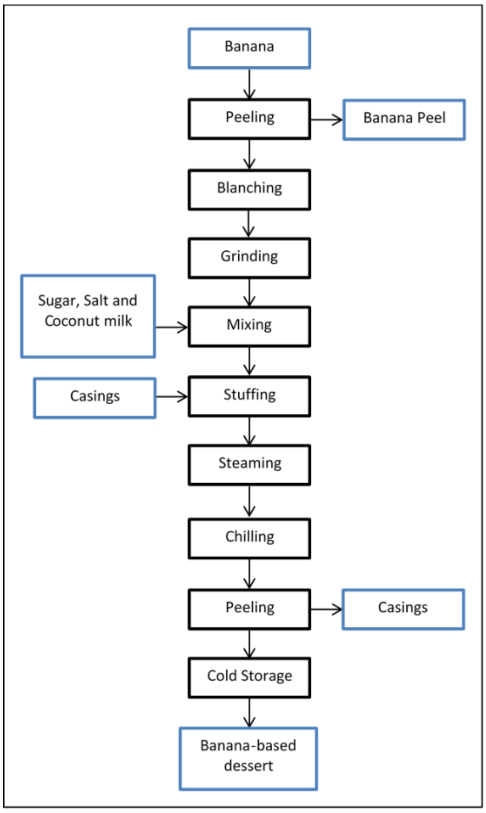

Figure 1: Overall production of the banana-based dessert

Compression Analysis

The chilled gels were maintained at room temperature for 2 hours prior to analysis and cut into cylinders (25 mm diameter and 20 mm length). The compression test was performed using Instron Universal Testing Machine (Instron, USA). Samples were placed on a heavy-duty platform, and force was applied onto the sample using a compression probe to determine the maximum load (N) that the samples can bare until breakpoint.

Moisture Content and Colour Analysis

The moisture content of the samples (before and after steaming process) was measured by using a moisture analyzer (MX-50 Moisture analyzer, Japan). A spectrophotometer (CR-10, Konica Minolta, Japan) was used to determine the color properties expressed as lightness (L*), redness (a*) and yellowness (b*) values of the samples.

Pre-Sensory Evaluation

Ten random and untrained panellists were selected to evaluate the sensory properties of the samples. The samples were re-heating by a steamer at 100 °C for 30 minutes and were cut into a cylindrical shape of 25 mm diameter and 20 mm length. Both samples (50% banana and 80% banana) were labelled randomly and displayed to every tester on a plastic plate. The sensory assessment was performed in a clean room with good lighting. Each of the panellists was given an assessment sheet to evaluate 5 attributes of the samples, i.e. appearance, aroma, texture, flavour and overall acceptability based on the 9-point hedonic scale (1 = disliked extremely and 9 = liked extremely).

RESULTS AND DISCUSSIONS

Compression Load Analysis

The compressive load test evaluates the behaviour of the samples under crushing loads and determines the breakpoint of each sample. Based on Fig. 2, sample with 50% banana content has a maximum compression load of 33.35 N which is almost triple the value obtained from with the other sample (80% banana content) with only 11.85 N. This finding can be explained by the amount of flour used in both samples. Lesser banana content in the sample means higher starch content that can undergo the gelatinization and retrogradation process during sample preparation. Retrogradation process will result the sample to have a more compact structure and requires more load to break it.

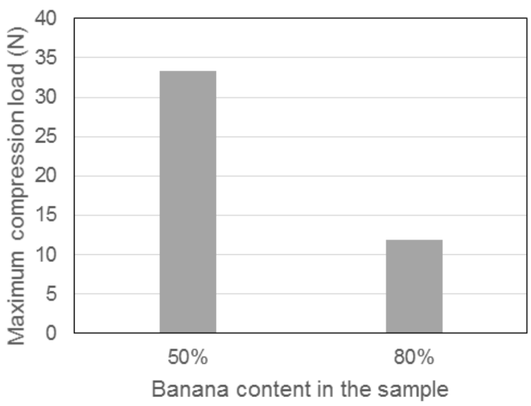

Figure 2: Maximum compression load of both samples

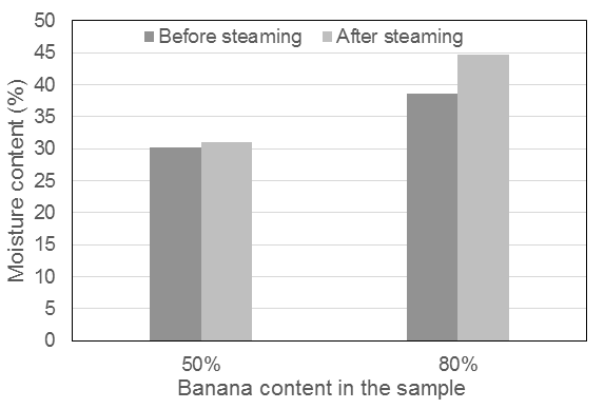

Figure 3: Moisture content of the samples before and after steaming process

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Moisture Content Analysis

The moisture content of both samples was measured at two different conditions; 1) before steaming process, 2) after steaming process as shown in Fig. 3. Both samples exhibited some increment of moisture content after undergone the steaming process. Sample (50% banana) has 30.2 % and 31.1% percent of moisture content in the uncooked and cooked condition. The values were lower than the moisture content of the sample with 80% banana that contained 38.6% and 44.81% in the uncooked and cooked conditions, respectively. This agrees with some other reports stating that the higher banana content in the banana dessert, the higher the moisture content in them (Zghal et al., 2001).

Colour Parameter

Table 3 exhibits the effect of banana percentage on lightness (L*), redness (a*) and yellowness (b*) of the samples. Based on the table, the L*, a* and b* values (lightness, redness, and yellowness, respectively) for the sample with 80% banana content were higher than the other sample. This might be due to the high presence of carotenoid and sugar in the sample which have affected its colour properties (Monteiro et al., 2017).

***Table 2**: Effect of banana percentage on lightness (L*), redness (a*) and yellowness (b*) of the samples*

Values	Banana content (%)	
	50%	80 %
L*	38.4	39.2
a*	5.5	6.9
b*	20.8	23.8

Pre-sensory Evaluation

The scores of each attribute during the sensory evaluation are shown in Fig. 4. Based on the results, panellists have scored sample with 80% banana with a higher score in all the attributes excluding the appearance. This might be due to the color properties of sample of 50% banana which was a little bit lighter as discussed in the previous section. Other than that, sample with higher banana content seemed to be more favorable by the panelist since it has more banana aroma and flavor. The softer texture of the sample also suit the panelist preference. As overall, the sample with 80% banana was more accepted by the panellists with 6.8 scores compared to the other sample with 5.9 scores only.

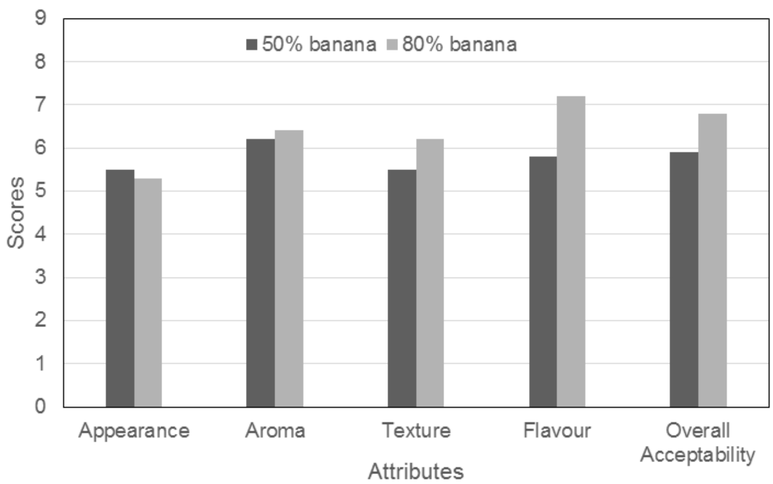

Figure 4: Average scores for all the sensory attributes of the samples

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CONCLUSIONS

In this study, an effort has been made to convert the banana-based traditional dessert to become a ready-to-eat food by adopting the sausage technology. Based on the findings, a higher amount of banana in the formulation would result in a sample with a softer texture, higher moisture content and darker colour. The pre-sensory performed showed that the sample with a higher amount of banana in the formulation was more acceptable as to compare with the other sample. Based on the findings in this study, converting the banana-based local traditional dessert to become a ready-to-eat food seems promising, however, further explorations are required to improve the product for customers' acceptance and commercialization purpose.

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