

The Effect of Banana Peel Flour (Saba and Berangan Banana) on Chicken Sausage Physicochemical Composition and Sensory Acceptance

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Introduction: Meat is a typical protein source, vitamins, mineral, and essential fatty acids required by the human body. In recent years, there are increasing consumer demands for healthier meat products with reduced fat level, sodium and nitrate, and improved fatty acid profile composition and other health components. The enrichment of meat product with health-enhancing ingredients are widely studied. In tropical and subtropical regions, one of the most cultivated and consumed fruit is banana. Only 12% (w/w) of the plant are considered edible, while banana cultivation and commercialization produced a considerable amount of waste (Tibolla et al., 2018). In the meantime, 38% of the total banana weight constituted by the banana peel (BP) (González-Montelongo et al., 2010). Often, BP will be discarded without further utilization and this cause environmental issue and industrial concern. Considering the nutritional benefit from a banana peel, it could be an excellent vehicle to improve the nutritional value of food, especially meat product. From the technological point of view, DF incorporation in meat product offering improved functional properties such as water, oil binding and gelling capacity in meat products. In turn, this will boost the emulsion stability, viscosity, rheological properties and sensory aspects of meat products (Ağar et al., 2016; Bis-Souza et al., 2019; Hu et al., 2016). Therefore, a study on the application of BP as a fibre source in meat product was conducted.

Aim and methods: Hence this study was carried out to determine how banana peel flour of Saba (*Musa balbisiana*) and Berangan (*Musa Acuminata*) affect the physicochemical properties and sensory acceptance of chicken sausage. Sensory analysis was performed by using the 7-point hedonic scale and tested by 40 untrained panelists. The physicochemical properties such as proximate (moisture, protein, ash, and fat content), average total dietary fibre (TDF), mineral content, water holding capacity (WHC), cooking yield, texture profile, rheology, and colour were carried out during this study.

Results and discussion: The addition of banana peel from both varieties increases the nutritional value of sausages such as TDF by up to 45 percent, mineral content, and lowers fat content. Conversely, sausages containing high banana peel, especially Saba banana, had a more rigid texture, high storage modulus (G') and darker colour. At the same time, sausages containing Berangan peel had a more significant increase in WHC. Chicken sausage with the addition of 2% Berangan banana received the highest sensory score, with Saba banana peel-containing sausage closely behind. However, the addition of >2% banana peel of both varieties negatively affected the sausage texture and colour, resulting in reduced sensory acceptance.

Conclusion: Banana peel from both Saba and Berangan bananas has shown promise as a potential value-adding ingredient in the formulation of functional meat products. It has a conclusive positive impact on the nutritional value and specific technological properties of the food. This study found that adding banana peel flour to chicken sausage improved its water holding capability and cooking yield. Furthermore, banana peel enhanced not only functional aspects such as WHC, but also has potential health benefits such as increased dietary fibre; however, sensory and textural aspects of the final product were negatively affected. The organoleptically acceptable and textural comparable chicken sausage enriched with dietary fibre prepared with 2% banana peel of both varieties was found to be organoleptically acceptable and textural comparable to the other samples.

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Literature:

The interest in the study of waste management is being increased worldwide, including the banana peel. The bioactive compound and fibre rich content found in the banana peel may potentially be used as a functional additive in the food industry. Meat products are widely consumed worldwide, and as a result, they can be an exciting carrier of health benefits due to the need for better formulations, such as reduced-fat and increased fibre in processed meats.

As an agro-biomass, BP contains various vitamins, minerals, phytonutrients, dietary fibre and antioxidant (Singh et al., 2016). Several bioactive compounds such as tannins, phlobatannins, alkaloids, glycosides, and terpenoids can be found in the banana peel, beneficial for specific pharmacological and biological aspects (Pereira & Maraschin, 2015).

Dietary fibre (DF) is naturally can be found in cereal, vegetables, nuts and fruits. DF has been demonstrated to deliver a health benefit to the human digestive system, such as preventing constipation, absorb harmful substance in the gut, provide satiety, controlling body weight, and reduce the level of glucose and triglycerides concentration in blood (Tse et al., 2000; Boryca, 2010; Ma & Mu, 2016). DF's recommended daily intake should be at least 30 g a day, regardless of gender (NCCFN, 2017). However, rapid urbanization has changed the current food intake habit as people are more likely to consume more fast foods, unbalanced diet and excessive calorie intake (Nemnunhoi & Soniika, 2016). This factor causes most people worldwide unable to achieve the daily recommended DF intake.

Hence, DF supplementation in food product such as cookies, snack foods, canned meat, beverages, frozen foods, canned meat and other foods has been widely studied in providing a solution to increase the DF intake without drastically change the current eating habit. Considering the nutritional benefit from a banana peel, it could be an excellent vehicle to improve the nutritional value of food, especially meat product.

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