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# Karakteristik Daging Burger yang Diproduksi Menggunakan Tepung Sorgum, Tepung Talas dan Tepung Sukun

# Characteristics of Burger Patties Prepared with Sorgum, Taro and Breadfruit Flours

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***Abstrak:*** *Aplikasi penggunaan lima persen bahan pengikat bebas gluten pada pembuatan daging burger telah dilakukan. Tepung sorgum, tepung talas, dan tepung sukun telah digunakan pada formulasi daging burger sebagai representasi tepung bebas gluten dan dibandingkan dengan burger dengan bahan pengikat tepung terigu sebagai kontrol (tepung yang mengandung gluten). Kadar air, susut masak, penyusutan diameter, kekerasan, dan profil sensori (warna, aroma, rasa, tekstur, dan penerinaan keseluruhan) telah dievaluasi. Hasil dari penelitian ini menunjukkan bahwa tidak ada perbedaan yang nyata pada kadar air, susut masak, penyusutan diameter, dan kekerasan sampel. Daging burger menggunakan tepung sukun memiliki daya terima yang lebih rendah dibanding perlakuan lainnya ($P<0.05$), dimana daya terima burger menggunakan tepung sorgum dan tepung talas setara dengan burger menggunakan tepung terigu ($P\geq0.05$). Dari penelitian ini disimpulkan bahwa tepung sorgung dan tepung talas dapat menjadi sumber bahan pengikat alternatif pada pembuatan burger yang umumnya menggunakan tepung yang mengandung gluten.*

***Kata Kunci:*** *bahan pengikat alternatif, daging burger, bebas gluten, daya terima keseluruhan*

***Abstract:*** *The application of five percent gluten-free binder in production of burger patties was conducted. Sorghum, taro, and breadfruit flours were used in burger patties formulation as representative of gluten-free flours and compared with wheat flour as control (gluten-containing flour). Moisture, cooking loss, diameter reduction, hardness, and sensory profiles (color, aroma, taste, texture, and overall acceptance) were evaluated. The result of this present study showed that moisture, cooking loss, diameter reduction, and hardness among samples were comparable ($P\geq0.05$). Patties with breadfruit flour had lower acceptance score in aroma and overall acceptance compared to others ($P<0.05$), in which those with sorghum and taro flour were equivalent with that of wheat flour ($P\geq0.05$). To sum up, sorghum and taro flours could be an alternative source of binder in patties production that commonly used gluten containing flour.*

***Keywords:*** *alternative binder, burger patties, gluten-free, overall acceptance*

## 1. Introduction

Meat is important commodity contributes to fulfill the protein requirement of the civilization. Indonesia as a biggest country in Southeast Asian, start to improve consumption of animal-based protein from meat, milk, and egg. Since consumption style of most Indonesian are could not be separated from plant and fishery-related products, meat products might not develop as rich as plants products. However, some typical Indonesia meat products might still well-known over the world. In fact, market expansion of fast food from abroad that competes with local food indirectly contributes to enhance the protein consumption and food style of the public.

Burger is a western food that commonly found as an option among various meat products. This product is a combination of sliced bread, meat patties, vegetables, sauce, and mayonnaise, and sometimes also with addition of cheese slice. Burger usually found as preference menu in fast food courts, even though the popularity in Indonesia might still not as popular as fried chicken. Different with the latter product, burger patties classified as

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restructured product in which ground meat were reshaped with addition of binder and other ingredients after past trough mixing and heat treatment processes.

Flour as binder plays important role to determine of quality characteristics of burger patties. Wheat flour might classify as the most flour used worldwide for various food products, including burger patties. In contrast, this flour is not suitable for people with symptom of celiac disease. Sorghum, taro, and breadfruit flours are some of gluten-free flours that could be alternative to replace gluten-containing flour. Taro and breadfruit are well known plants in Indonesia, while in recent years sorghum might be also popularized in research and planting in some areas. Those flours had increasing intention by food industry and also frequently used in formulation, particularly in various bakery products.

In fact, not many information could be found out related to their application in meat products. Thus, utilization of some gluten-free flour in burger patties formulation is interesting to be explored. This is important to understand the potency of those flour as alternative of wheat flour but with gluten-free benefit. Moisture, cooking loss, diameter reduction, and sensory preference are some important interrelated parameters that significant to determine the quality of burger prepared.

## 2. Material and Method

### 2.1. Material

Chicken meat bought from wet market in Padang. Sorghum, taro, breadfruit, and wheat flours were signifying binder for research treatment. Other ingredients consist of salt, konjac powder, butter, soy protein isolate, ice flake, and seasoning (onion, garlic, black pepper, cinnamon). Margarine was used as frying medium.

### 2.2. Method

#### 2.2.1. *Burger production*

Meat was frozen for 15 hours after deboned. After thawed for 15 min, chicken meat was resized and ground for 15 min using meat mixer (FM - R22 Fomac, China). Subsequently, salt, konjac powder, butter, soy protein isolate, ice flake, sugar, and seasoning were combined with ground meat and grinding process was applied again for the next 15 min [1]. After that, meat batter divided into 4 portions and each portion combined by hand with binder treatment i.e. (a) wheat flour (control) (b) taro flour (c) breadfruit flour (d) sorghum flour. Two min mixing process by meat mixer was applied to completing homogenization process of the batter. The batter was resized and divided into 65 g in weight and subsequently molded using a burger maker (HF – 100, Getra, China). Raw patties were then continued into frozen storage for 20 hours. After thawed, both sides of patties were cooked using margarine as heating medium for 5 min.

#### 2.2.2. *Laboratory analyses*

Moisture [2], cooking lost, diameter reduction, [3], hardness, sensory preference [4] were determined.

#### 2.2.3. *Statistical analysis*

Statistical analysis was conducted using SPSS program. ANOVA was used to determine compare means. Significance of result was determined at 0.05 using Duncan.

## 3. Result and Discussion

Moisture content of burger patties treated with various binders is provided in Figure 1. No significant different was found in moisture content of burger patties (P≥0.05). Starch in flour plays important role on hold water. Starch consist of amylase and amylopectin in which amylase was more significant on maintain water. From previous researches, amylose content of wheat flour was 24% [5], taro flour was 27.6-35.9% [6], breadfruit flour was 20.0% [7] dan 22.52% [8], and sorghum flour 28.9% [9]. Breadfruit seem to have lower amylose, however, no significant different statistically obtained. This might due to percentage ratio of amylose and amylopectin not the only factor contributes to give final moisture content. Percentage of starch and granule size of starch from the flour might also contribute. In addition, the using of 5% flour in formulation might not provide immense variation among flour used even though their physicochemical characteristics might different.

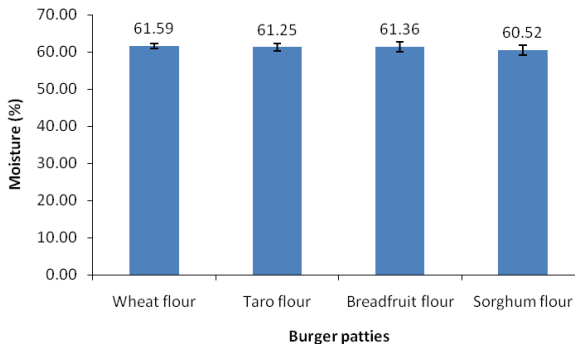


**Figure 1.** Moisture content of burger patties treated with various binders

Compared to other reports, moisture content of present study (60.52-61.59%) was in range of burger (46.72-69.37%) [10], but higher than that of burger (58.54-59.26%) [11]. Differences in formulation, preparation, and processing method were relevant with such variation result.


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Cooking loss and diameter reduction of burger patties treated with various binders are presented in Figure 2. Both cooking loss and diameter reduction among burger patties prepared were comparable. Cooking loss was resulted from the release of moisture from raw burger during grilling. Heat induced during cooking caused protein denaturation and starch gelatinization that decreased the ability to hold water. By the time of cooking, moisture in form of free water and immobilized water released during 5 min grilling. Thus, this phenomenon directly boosts diameter reduction of burger patties.

The results of cooking loss (8.31-9.23%) and diameter reduction (8.95-9.65%) of present study were in range of those of burger patties (5.32-11.01% and 2.58-6.71%, respectively) [1]. At the same time, present study exhibited lower diameter reduction compared to other report which found 16.56-18.42% [12]. Variation in both physical characteristics might associate with variation in thickness, formulation, temperature, and time of cooking.

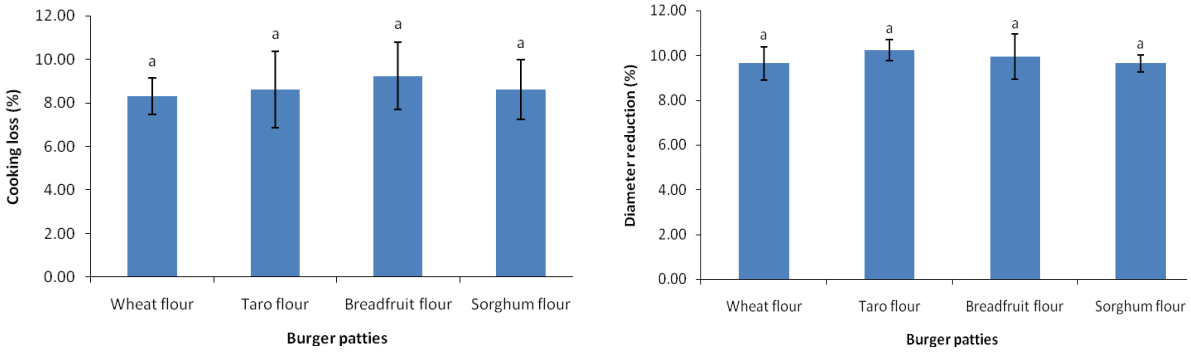



**Figure 2.** Cooking loss and diameter reduction of burger patties treated with various binders

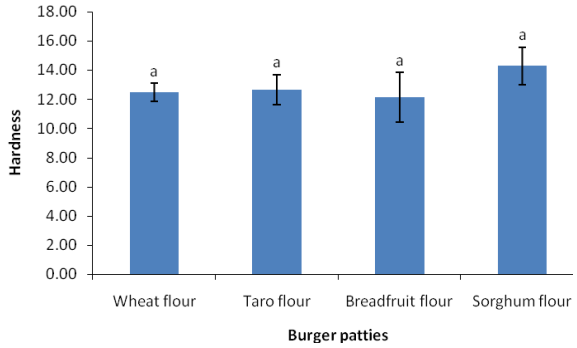
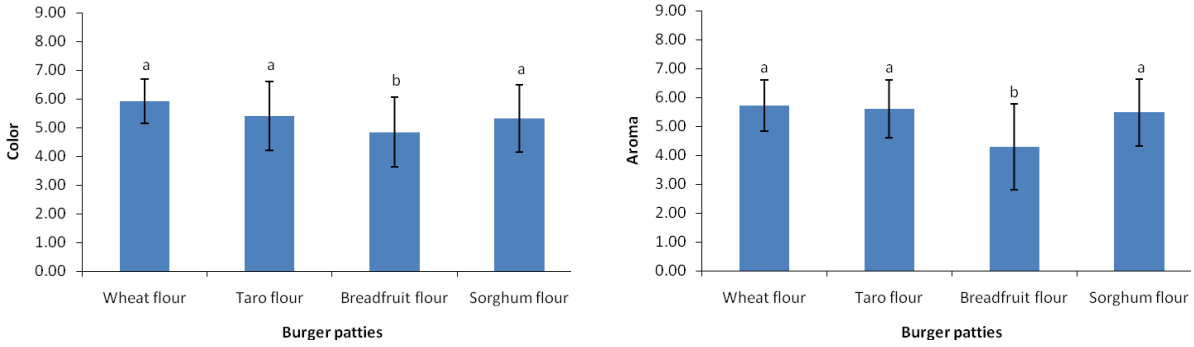



**Figure 3.** Hardness of burger patties treated with various binders

Hardness of burger patties treated with various binders is provided in Figure 3. From statistical analysis, there was no significant effect of various binders on hardness of burger patties (P≥0.05). As also explained previously, five percent binder used in formulation might not provide significant variation even though variation potency of such flour's characteristics might obtain. Somehow, during grilling the structure of patties transform from tender into compact states due to myofibrillar hardening. Heat induced during grilling changed the batter state from unpatable into patable and digestible [13].



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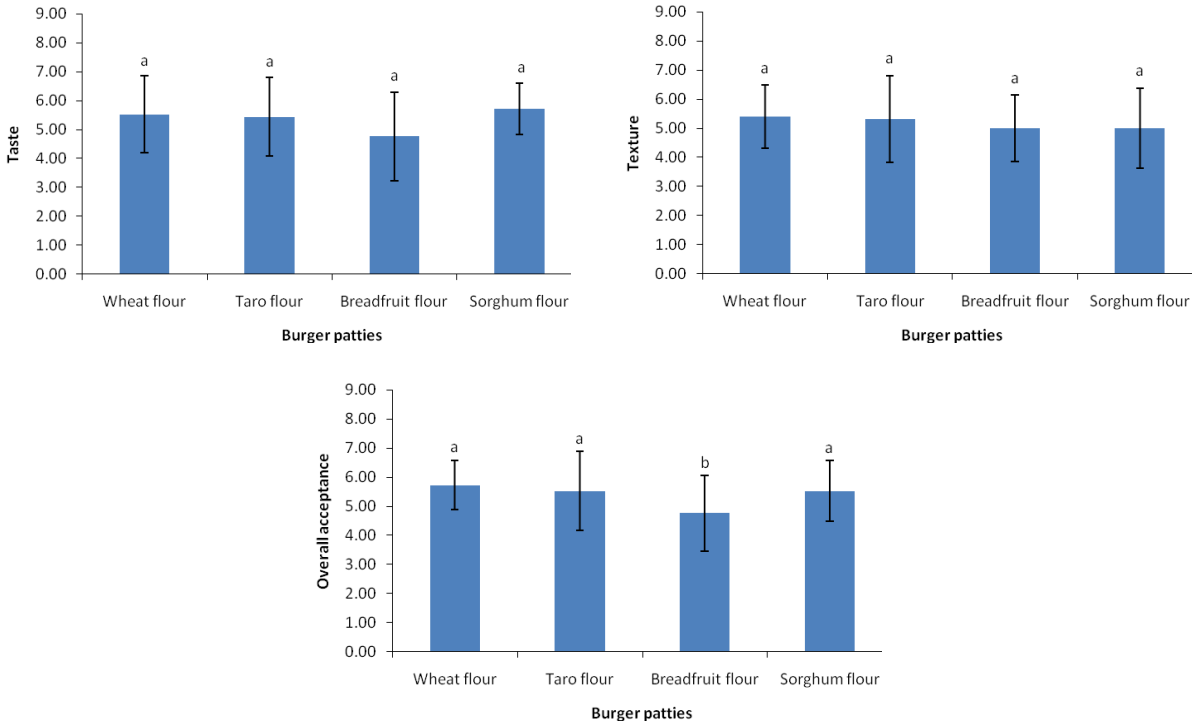


**Figure 4.** Sensory preference of burger patties treated with various binders

Sensory preference of burger patties treated with various binders' is could be seen in Figure 4. Color and aroma of patties treated with sorghum and taro flours seem to have similar characteristics with those of wheat flour, but higher than that of patties treated with breadfruit flour. At the same time, no significant effects on taste and texture among patties were obtained. Thus, higher overall acceptance of patties treated with sorghum and taro were resulted from their color and aroma.

Phenomenon in sensory acceptance of patties with breadfruit flour might associate with polyphenol oxidase that caused darker color and unexpected flavor of the flour. By using it in formulation, the patties produced also had parallel effect. This is in line with noted [14] which explained that polyphenol oxidase is responsible to the browning of fruits after cutting and thus also unfavorably affects the flavor. Other researchers also reported that the using of breadfruit also decreased the color acceptance in wheat: breadfruit flour noodle [15].

## 4. Conclusion

Application of five percent (5%) sorghum and taro flours (free-gluten flour) in burger formulation produces equal quality characteristics with that of patties with wheat flour (gluten-containing flour). Nevertheless, breadfruit flour caused lower acceptance in color, aroma, and overall acceptance. Five percent sorghum and taro flours could change the role of wheat flour in burger formulation and suitable developed as gluten-free binder on burger patties.

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