# Organoleptic Quality of Beef Meatball Filled with Jackfruit Seed Flour

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## Abstract

This research was aimed to analyze the effect of using jackfruit seed flour as filler on beef meatball quality, especially on its organoleptic quality. The used material were beef and jakcfruit seed flour as filler. This research used a completely randomized design with 4 treatments and 3 replications, and also used 15 panelists as replication on organoleptic test. The treatments were addition of jackfruit seed flour in various amount: 0% (T1), 5% (T2), 10% (T3), and 15% (T4). The measured variables were organoleptic characteristics include color, aroma, flavour, texture, suppleness, and shape. The obtained data were analyzed using variance analysis, and continued using Least Significant Different Test. The result of the research showed that using jackfruit seed flour as filler gave a significant effect on color, flavour, aroma, suppleness, texture, and shape of beef meatball.

**Keywords :** Beef, Jackfruit , Meatball , Organoleptic

## 1. Introduction

Beef is a livestock product that has a fairly complete nutritional content, but easily damaged and suffered a decrease in quality if not immediately handle after harvest. The cause of easy crushed of the meat is the presence of moisture and protein content that cause the chemical change activities and microbial contamination, in addition to the endogenous enzyme that speeds up the damage meat daging (Aberle *et.al*., 2001; Hafid dan Syam, 2007; Hafid *et al*., 2017).

Meatball is a very popular food in Indonesia. Meatball is a processed meat product, either beef, chicken, and fish without fiber and added with spices such as pepper, onions, salt, flour, and white egg as binder ingredients.

Meatball was formed in round shape either manually or using machine and cooked in boiled water (Sunarlim, 1992; Syam dan Hafid, 2002; Hafid dan Nuraini, 2005).

Jackfruit seed turn out not necessarily to be considered as waste and disposed. During this time, jackfruit seeds utilized just by boiling and then eating. Although jackfruits has a lower carbohydrate content (78,9 g) than rice (100 g), jackfruits seed can be utilized as an alternative to a fairly nuritious foodstuff because still has protein content. If compared with many types of plants that are commonly used as producer of carbohydrates such as milling rice, boiled corn, and cassava, jackfruits still has a relatively potential nutrient contents (Ashari, 2006).

The usual filler material use in meatball production is starch flour such as cornstarch, tapioca, and spices such as garlic, onion, and monosodium glutamate as flavor enhancer. The meatball then formed into round shape and boiled until cooked which is marked by floating of meatball (Syam dan Hafid, 2002; Hafid, 2017).

The process of making meatballs typically use tapioca flour. The useful of flour is to make a chewy texture, increase water holding capacity, and reduce cooking loss. To support local food diversification program, then the utilization of Southeast Sulawesi local foodstuff such as tuber and stem that contain starch can be used as flour in meatball making process. One of agricultural by-products that can be used is jackfruit seed. These materials can be used as flour after a series of processing such as drying out and milling. Based on the explanation above, it is considered to do a research about the effect of addition jacfruits seed flour on organoleptic characteristics of beef meatball.

## 2. Methods
### 2.1 Time and Location
This research was taken place in Laboratory of Livestock Processing Technology and Laboratory of Nutrition and Feed Technology, Faculty of Animal Science, Universitas Halu Oleo, Kendari. Research stage consisted of market and slaughtering house survey, application of research permission, material research preparation, preliminary research, and main research.

### 2.2 Research Material
The equipment used in sample preparation were meat grinder, digital scales, small bowl, spoon, fork, cutting board, knife, jar, plastic basin, sieve, pan, tissue, stove, camera and stationery. While, the material used were beef, jackfruit seed flour as filler, ice cubes, salt, pepper, and garlic.

### 2.3 Research Procedure

- **The making process of jacfruits seed flour**
The ripe jacfruits were peeled then the seeds were separated. The seeds simmer for 30 minutes, peeled, thinly sliced,and drying out using oven at 60-100$^0$C during 4 hours to reduce water content. Then the dried jackfruit seed are milled to obtain jackfruits seed flour.

- **The making process of beef meatball.**
The fat and connective tissues were separated from beef meat. The meat then cutted into small pieces and grinded using meat grinder. During grinding, the jackfruit seed flour then added according the level of treatments. The other ingredients also added, such as sugar, salt, garlic, onion, pepper, and ice cube. After mixed well, the dough then formed into small round shape with a diameter 2-3 cm. The meatball then boiled through 2 stages. The first stage, meatballs were boiled in a hot water with a temperature 60-80$^0$C for 7 minutes. The second stage, the meatballs then boiled into a boiling water during 3 until 20 minutes. The boiled meatballs then lifted and drained.

### 2.4 Experimental Design
This research used completely randomized design with 4 treatments and 3 replications for organoleptic characteristic test and used 25 panelists as treatments for organoleptic quality test. The treatments were addition jackfruits in various levels:

P1 = 250 g beef meat + 125 g starch + 8,5 g garlic + 7,3 g salt + 0,75 g pepper.
P2 = P1 + 12,5 g jackfruit seed flour (3%)
P3 = P1 + 25 g jackfruit seed flour (6%)
P4 = P1 + 37,5 g jackfruit seed flour (9%)

The data obtained were analyzed using analysis of variance. The formulation as describes bellow:

$$Y_{ij} = \mu + \alpha i + \varepsilon_{ijk} \qquad i = 1, 2, 3, 4 \qquad j = 1, 2, 3, ..., 15$$

While:
$Y_{ij}$ = The observation value
M = Mean of treatment

$\alpha i$ = The effect of addition jackfruit seed flour
$\varepsilon_{ij}$ = Value of error
The analysis then continued using Least Significant Different Test [9]

## 2.5 Measured Variables

The measured variables in this research were:

- Organoleptic characteristic consisted of color, aroma, flavour, texture, suppleness, and shape. These variables were measured using hedonic test. The hedonic test was described as bellow.
- Organoleptic quality consisted of color, aroma, flavour, texture, suppleness, and shape.

**Table 1**. The hedonic scale for color, aroma, flavour, texture, suppleness, and
shape of meatball measuring

| Organoleptic Parameter | Hedonic Scale | Criteria |
|---|---|---|
| Color | 5 | White |
| | 4 | Greyish white |
| | 3 | A bit grey |
| | 2 | Grey |
| | 1 | Smoky |
| Aroma | 5 | Very typical smell of meatballs |
| | 4 | The distinctive smell of meatballs |
| | 3 | Quite a typical smell of meatballs |
| | 2 | A slight smell of flour |
| | 1 | Very powdery smelling |
| Flavour | 5 | Very tasty |
| | 4 | Tasty |
| | 3 | Kinda tasty |
| | 2 | Bad taste |
| | 1 | Very bad taste |
| Texture | 5 | Very smooth |
| | 4 | Smooth |
| | 3 | Pretty smooth |
| | 2 | Rough |
| | 1 | Very rough |
| Texture | 5 | Very smooth |
| | 4 | Smooth |
| | 3 | Pretty smooth |
| | 2 | Rough |
| | 1 | Very rough |
| Shape | 5 | Very round |
| | 4 | round |
| | 3 | Pretty round |
| | 2 | Flat |
| | 1 | Irregular rounded |
| Suppleness | 5 | Very chewy |
| | 4 | chewy |
| | 3 | A bit chewy |
| | 2 | Not chewy |
| | 1 | Not very chewy |

Source: (Hafid dan Syam, 2007; Hafid *et al*., 2017; Nuraini *et al*, 2019).

## 3. Result and Discussion

Organoleptic test is a testing which is based on sensing process. Sensing can also mean as a sense reaction when senses get stimulation. This test was done using hedonic test which include flavor, color, shape, aroma, texture, suppleness (chewy), and shape. The result of the hedonic test can be seen on Table 2.

**Table 2**. The average of Organoleptic quality score of beef meatball

| Variables | Addition of jackfruits seed flour (g) | | | |
|---|---|---|---|---|
| | P1 (0%) | P2 (3%) | P3 (6%) | P4 (9%) |
| Color | 3.33± 0.90 [a] | 2.73± 0. 80 [b] | 1.73±0.80 [c] | 1.40± 0.63 [c] |
| Aroma | 3.67 ±0.62 [a] | 3.13 ± 0.74 [ab] | 2.80 ± 1.01 [b] | 2.73±1.33 [b] |
| Flavour | 3.93±0.46 [a] | 3.73±0.59 [a] | 3.20± 0.68 [b] | 3.20± 0.77 [b] |
| Texture | 3.60 ±0.63 [a] | 3.00 ± 0.65 [b] | 2.73 ± 0.80 [b] | 2.93 ± 0.80 [b] |
| Suppleness | 3.80±0.41 [a] | 3.40 ± 0.51 [ab] | 3.20 ± 0.86 [b] | 3.07 ± 0.88 [ab] |
| Shape | 2.80 ±0.94 [a] | 3.40± 0.63 [b] | 3.67 ± 0.49 [ab] | 3.47 ± 0.83 [b] |

Different superscript in the same line showed a significant different (P<0,05)

### Color

One of factors that affect meatball color is meat myoglobin. Beef include in red meat categories, so that its color will changes into pale red during cooking process. The result of variance analysis showed that addition of jackfruit seeds flour affected (P<0,05) meatball color. There were a significant different among all treatments, except P3 and P4. Based on hedonic scores, addition of jackfruit seed flour on beef meatball cause a less bright colors. The scores of meatball colors were ranging from 2,73 to 3,67. Similar result, that teh color of beef meatball using jacfruit seed flour doesn't like the color of meatball in general (Nuraini *et al.*, 2019). That using of starch as filler ingredient on beef meatball will affect its final color (Sunarlim, 1992; Kurniawati, 2008). The illustration of the difference in beef meatball color scores can be seen in Figure 1.
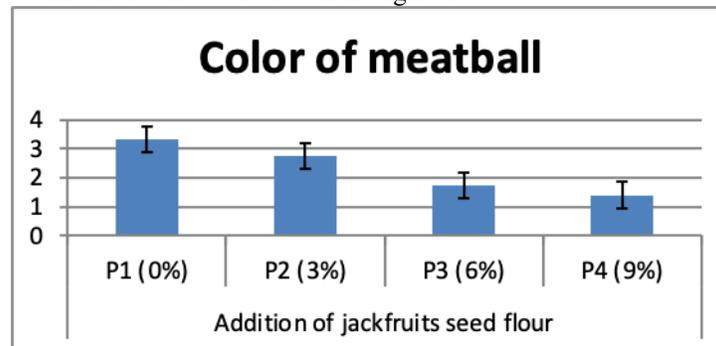


Figure 1. The illustration of the difference in beef meatball color scores

### Aroma

The result of variance analysis showed that addition of jackfruit seeds flour gave a significant effect (P<0,05) on meatball aroma. The P1 treatment differ with P3 and P4, but has a same aroma score with P2. The hedonic score of metball aroma on P1, P2, P3, and P4 were 3,33, 2,73, 1,73 and 1,40. This means the aroma of meatball which use jackfruit seed flour tends to be fairly distinctive smell of meatballs. The result of this research are supported by the result of (Schwedt, 2005; Sudrajat, 2007), who reported that the panelist response on the aroma of beef meatball using jackfruits seed flour were ranging from quite like to like. The meatball aroma was strongly affected by flour as fillers ingredient, distinctive aroma of meat, and other added ingredients. During meatball making process that started with mixing to boiling, there will be various reaction between filler, added ingredients and meat. These reaction could reduce the distinctive meat aroma. The illustration of the difference in beef meatball aroma scores can be seen in Figure 2.
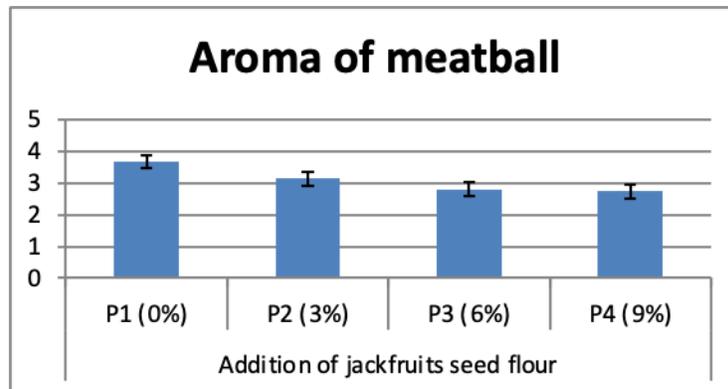
Figure 2. The illustration of the difference in beef meatball aroma scores

**Flavour**

The flavour was ranked first against the acceptance of the consumer against meatballs. Meatball taste was affected by several factors: chemical compounds, temperature, consistency, and interactions with other flavored components as well as the type and time of cooking. The result of variance analysis showed that adding jackfruit seed flour on beef meatball gave a significant effect on meatball flavour. Treatments P1 and P2 differ with P3 and P4. But, there were no significant different (P>0,05) between P1 and P2, and between P3 and P4. Addition of spices such as pepper, garlic and salt could affect the panelist acceptance against meatball (Hafid *et al.*, 2017). The illustration of the difference in beef meatball flavour scores can be seen in Figure 3.
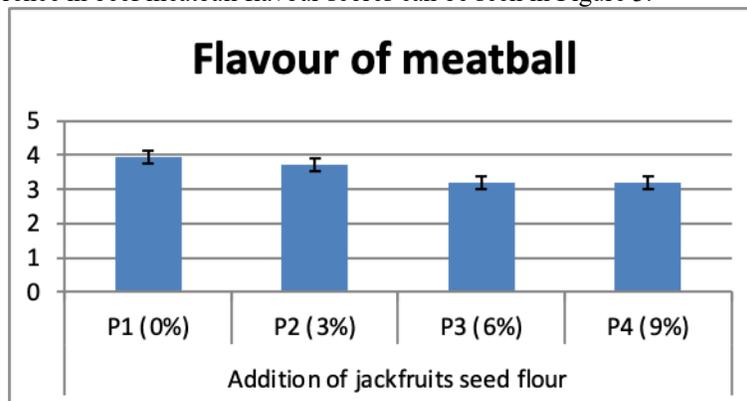


Figure 3. The illustration of the difference in beef meatball flavour scores

**Texture**

Meatball texture was determined by fat and moisture content of meat and type of carbohydrates. The high fat content will produce a meatball with many wholes, so that it can affect the meatball texture, while high moisture content will result in a mushy texture of meatballs (Octavianie, 2002). The result of variance analysis showed that addition of jackfruit seed flour gave a significant effect (P<0,05) on meatball texture. Treatments P2, P3, and P4 have a similar texture scores, but they were different with P1.

The texture score of meatball using jackfruit seed flour were ranging from 2,73 to 3,60. This means addition jack fruit seed flour on meatball cause a pretty rough to pretty smooth texture. This result is similar with (Hafid *et al.*, 2017; Hafid *et al.*, 2017). who reported that protein denaturation could cause a change of texture on food (for example form a gel), or undergoes a wrinkled. The illustration of the difference in beef meatball texture scores can be seen in Figure 4.
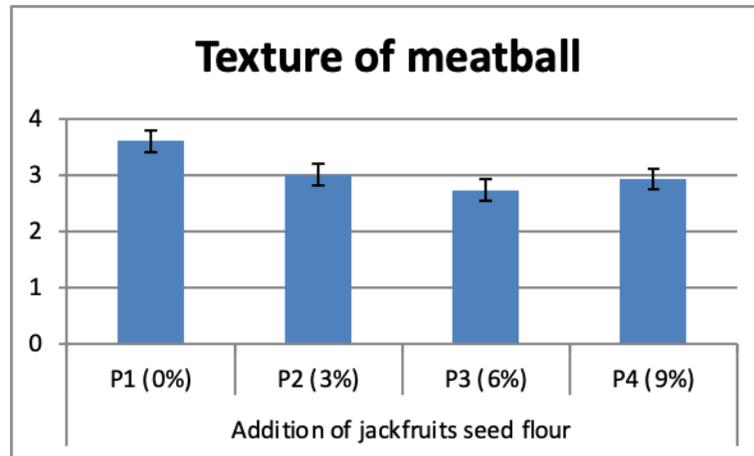
Figure 4. The illustration of the difference in beef meatball texture scores

## Suppleness

Suppleness is one of the atributes that are determined the consumens like and acceptance to meatball. The chewy meatball would taste rubery when chewed. The variance analysis resulted that P1 treatments differ with P3, but has a similar hedonic scores with P2 and P4. Addition of jackfruit seed flour affected ($P<0,05$) meatball suppleness. The average of suppleness score of meatballs of P1, P2, P3, and P4 were 3,80; 3,40; 3,20; and 3,07, respectively. This means meatballs used jackfruits seed flour were chewy. This result is similar with (Djafar, 2000) who reported that suppleness score of meatballs were ranging from a bit chewy to chewy. The illustration of the difference in beef meatball suppleness scores can be seen in Figure 5.
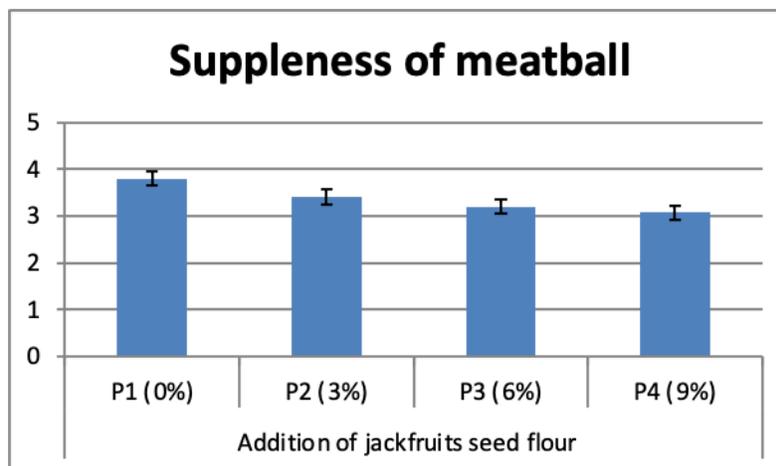


Figure 5. The illustration of the difference in beef meatball  suppleness scores

## Shape

The result of variance analysis showed that addition of jackfruit seed flour affected ($P<0,05$) meatball shape.P1 differ with P3 and P4, but has a similar shape score with P3. Meatballs produced in this research have shape score that are ranging from 2,80 to 3,67. This means that meatball with jackfruit seed flour tend to be round (spherical). That meatball is a product of processed meat that are formed into round shape (Diah, 2011). Therefore, meatballs are favored and accepted in round shape. The illustration of the difference in beef meatball  shape scores can be seen in Figure 6.
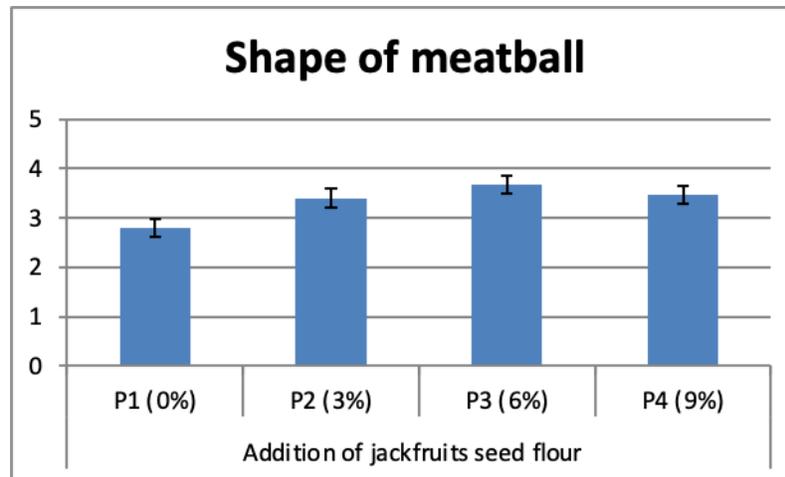
Figure 6. The illustration of the difference in beef meatball shape scores

## 4. Conclusions

It can be concluded that utilizing of jackfruit seed flour as filler ingredient gave a significant effect on color, aroma, flavour, texture, suppleness, and shape of beef meatball.

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## Biographies

**Harapin Hafid** is a senior professor in the field of animal science and technology at the Halu Oleo University. Has received two awards for his dedication as a lecturer from the President of the Republic of Indonesia. Has taught animal husbandry products technology, meat science and technology, livestock quality control, beef science and livestock and carcass evaluation since 1997.His passion for teaching and research has enabled him to provide trainings, speak at seminars and conduct publications both nationally and internationally. He has occupied several additional positions such as head of the animal science laboratory, vice dean of the academic field of the faculty of animal husbandry, chairman of quality assurance, monitoring and evaluation of university education and secretary of the board of professors at Halu Oleo University.

**La Ode Ba'a** was a senior lecturer at the faculty of the University of Halu Oleo Kendari, serving since 1992 and passed away in 2019.

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