



## The Effect of Adding Section and Level of Different Banana Heart on the Organoleptic Qualities of Beef Sausage

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### Abstract

This study aims to determine the effect of adding parts of different level banana heart and the interaction between parts of different level banana to the organoleptic quality of beef sausages. The study design was completely randomized factorial 3 x 3. Factors A banana is a part where the A1 (the inside of the banana white), A2 (the outside of the heart of the banana light purple), and A3 (a mixture of the inner and outer parts banana heart). Factor B is the level where the addition of banana B1 (0%), B2 (15%), and B3 (30%). Parameters measured were the level of resilience, color, aroma, taste and preference. The research result of addition of a section banana heart at different levels indicate that there are highly significant effect on the elasticity, color, aroma, taste and preferences of beef sausage with the average value of 2,804, which means a bit chewy, 2.767 indicates that the sausages brown, 2.433 which shows sausage savoury aroma, which shows the value 2,352 sausages taste bad, 2, 815 which shows the value of rather like. Based on the results of this study concluded that the addition of banana heart mixture of the inner and outer generate resilience, aroma, and taste of the sausages were better than those just added to the inside or the outside only. Additions to the level of 30% better than the addition of 15% and without the addition (0%). Interaction factor and level parts of banana heart showed a different response at the level of resilience, color, aroma, taste and preference of beef sausage.

**Keywords:** sausage beef, banana heart and appearance quality

### A. Introduction

Various studies conducted by health experts managed to unravel the properties of banana heart was excellent for health. Without knowing a lot banana heart contains nutrients that are beneficial to the body, which are: 12.05% protein, carbohydrates 34.83% and 13.05% total fat. In addition to carbohydrates, banana also contains protein, minerals (especially phosphorus, calcium, and iron), as well as a number of vitamins A, B1 and C (Astawan, 2008). Another important component is at the heart of banana fiber food is very beneficial for health.

The utilization banana heart to be processed into sausage banana heart is attractive for development, particularly for small and middle-scale industry. The processing of heart bananas into banana heart sausage is relatively easy and requires only a simple technology that can be applied by small-scale industries and households. Banana has a fiber structure that is almost similar to the fiber structure of the meat (Aspiatun, 2004), thus allowing it to be added to the processed meat products such as sausages. This study aims to determine the effect of adding

different level parts of banana heart and the interaction between different levels of parts of banana heart to the organoleptic quality of beef sausages.

## B. Methodology

This research was conducted in January and February 2016 in Unit Teaching Livestock Products Processing Industry Hasanuddin University, Makassar.

### 1. Materials

The ingredients used are fresh meat (thigh beef), fresh banana heart, ice cubes, sugar, salt, garlic, tapioca flour, low-fat milk powder, pepper, STTP and flavourings. While the tool used is a grinder (display devices), minced (for milling and manufacture of dough), Stauffer (crusher materials), blender, tissue, knives, pots, tablespoons, teaspoons, rope Rafiah, cutting board, bowl, shells sausage, gas stoves, ice plastic, scales, and stationery.

### 2. Method

Fresh beef which is part of the thigh cleaned and removed parts of fat and tendon. Selection of banana heart. This study used a banana heart of stone. Banana heart skin is the outermost dark purple and hard discarded. The separation among parts of the banana heart. The inside of the banana heart is the dominant part white, the outside is part of light purple, and parts of the mixture is a mixture of white inner and outer light purple.

**Table 1. Formulation Materials for Beef Sausages with Extra Banana Heart**

No	Factor A	Factor B ( Gram/Gr )								
		I	II	III	IV	V	VI	VII	VIII	IX
1	The outside part	0	45	90	-	-	-	-	-	-
2	The inside part	-	-	-	0	45	90	-	-	-
3	Mix	-	-	-	-	-	-	0	45	90
<b>Mixed Materials</b>										
1	Fresh meat	300	300	300	300	300	300	300	300	300
2	Ice cube	90	90	90	90	90	90	90	90	90
3	Tapioca flour	60	60	60	60	60	60	60	60	60
4	Milk powder	60	60	60	60	60	60	60	60	60
5	Seasoning	10	10	10	10	10	10	10	10	10

Organoleptic quality assessment was conducted on the:

- Elasticity
- Color
- Aroma
- Taste
- Preference

### 3. Research design

Data obtained from observations, further processed by using a completely randomized design (CRD) factorial pattern of  $3 \times 3$ .

A factor is part of the heart bananas. Where in this section A1 (the inside of the banana heart of white color), A2 (outer light purple), while the A3 (a mixture of the two sections). While the provision to Factor B is the level of banana heart where B1 (0%), B2 (15%), and B3 (30%).

### 4. Data analysis

Data were analyzed by analysis of variance based on completely randomized design factorial pattern of  $3 \times 3$ , which is processed in SPSS mathematical model as follows:  $Y_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \epsilon_{ijk}$

## C. Result and Discussion

### Sauce Elasticity

The series of organoleptic assessment are to determine the quality of the sausages one of which is suppleness. The average value of elasticity of beef sausage with the addition of banana heart can be seen in Table 2. The results showed that the plasticity ranges between 1,500 who

showed less chewy up to 3,589 which show the value chewy, with the average 2, 804 that shows the meaning rather chewy.

### Effect of the Part of Banana Heart

The results indicate that the variance analysis there is a significant influence on the banana heart to the elasticity of sausage. Parts of banana heart used is the inner part that contain a lot of starch, the outer which contain fiber, and a mixture of the inner and outer parts of banana heart. Real difference test results showed that the experiment shows that the inner and the mixture have a higher level of resilience compared with the outside of banana heart. This shows that the fibers contained in a banana heart outer can result in low elasticity beef sausages. According to Fauziah (2014) that the content of amylopectin starch content primarily in the manufacture of sausages additional material effect on resilience. Giving higher amylopectin provide better resilience. Thus the banana heart outer has a lower content of amylopectin.

**Table 2. Effect of Parts and the Levels of Banana Heart Against Suppleness Sausage**

Part of Banana Heart	Level of Banana Heart			Mean
	0%	15%	30%	
The Inner	1,500	3,467	3,733	2,900 <sup>b</sup>
The Outer	1,500	3,000	3,367	2,622 <sup>a</sup>
Mix	1,500	3,500	3,667	2,889 <sup>b</sup>
Mean	1,500 <sup>x</sup>	3,322 <sup>y</sup>	3,589 <sup>z</sup>	2,804

Explanation: - Different superscripts in the same row and column showed significant differences ( $P < 0.05$ ).

- Elasticity value: 1 = Not very chewy, 5 = very chewy

### Effect of Banana Heart Level

Analysis of variance showed that the addition of banana heart levels of to manufacture beef sausages very significant effect. The test results showed that the smallest real difference in levels of the addition of premises 15% (3.322) and 30% (3,589) resulted in a higher elasticity compared with no addition (0% of 1,500). It shows that more and more parts of are added the better the level of resilience sausage. Increased elasticity sausages by the addition of banana heart may be caused by the content of amylopectin of banana heart (Hui et al., 2001). The other thing is the possibility of their binding properties of water or the binding of meat owned by banana heart, where the sap contained therein have this capability.

### Effect of Interaction

Results of analysis of variance showed that the interaction between the addition of parts and banana heart level to the level of resilience sausage very significant effect. This can be seen in Figure 1, of the average value of the addition of the inner and the mixture continued to increase in suppleness to the addition of 15% and 30%. However, the level of resilience highest in the inside and the addition of a mixture of the inner and outer of banana heart with a level of 30% which is constantly increasing, while the addition of the outer occur lower level of resilience in the addition of 15% and 30%

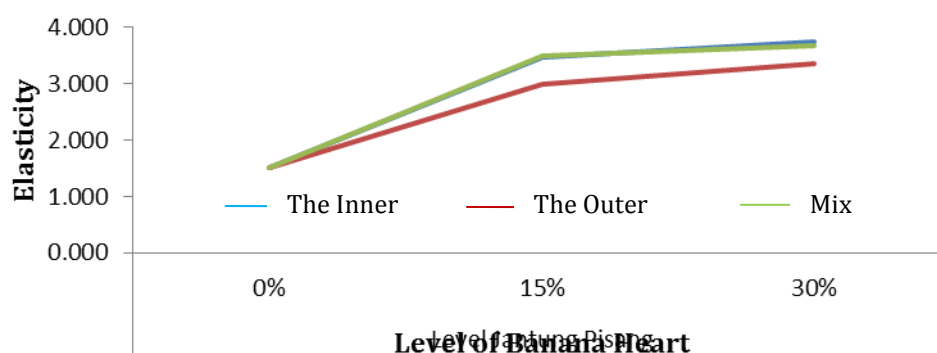


Figure 1. Interaction addition of parts and the level of banana in the level of resilience beef sausages.

### Sausage Color

Color is the most physical first sectional views of consumers, the color can also provide the appeal of a product. In the experiment of making sausage of beef with the addition of a section and the level of banana heart color was tested by panellists who provide an objective assessment (Aberle, 2001). The average value of beef sausage color with the addition of banana

heart can be seen in Table 3. The results show that the color of sausages ranging between 2.667 which shows yellowish color, up to 2,856 which shows a brownish color, with the average 2.778 which shows a brownish color. Brownish color on the sausage of beef, written by banana heart likely resulted from the sap contained in banana heart. Described by Effie (1980) that the brownish color that is contained in of banana heart can be reduced by boiling banana heart that had been cut into pieces and then milled and mixed into the dough. With the addition of milk and flour to the dough can also reduce the brown color on the sausage.

### Effect of Banana Heart Part

The results indicate that the variance analysis there is a significant influence on the banana heart part of sausages color. Parts of banana heart used are the inner part that contains the duke, the outer which contain fiber, and mixed (mixture of the inner and outer parts of banana heart). The results of the experiment showed that the inside (2711) and mixed (2767) has better colors low compared with the outside of banana heart (2822).

**Table 3. Effect of Part and the Levels of Banana Heart against the Color of Sausage**

Part of Banana Heart	Level of Banana Heart			Mean
	0%	15%	30%	
The Inner	2.667	2.633	2.833	2.711 <sup>a</sup>
The outer	2.667	2.933	2.867	2.822 <sup>b</sup>
Mix	2.667	2.767	2.867	2.767 <sup>a</sup>
Mean	2.667 <sup>x</sup>	2.778 <sup>y</sup>	2.856 <sup>z</sup>	2.767

Explanation: - Different superscripts in the same row and column showed significant differences (P <0.05).

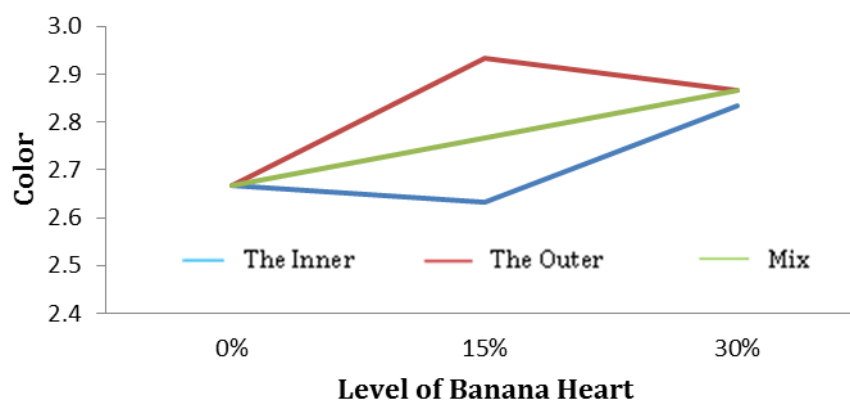
- The color values: 1 = pale, 5 =reddish brown

### Effect of Provision Level

Analysis of variance showed that the addition of banana heart level to beef sausage-making a very significant effect on the quality of color. The test results showed that the smallest real difference in addition to the level of 15% (2.778) and 30% (2,856) to produce a better color compared with no addition of banana heart (0% ranging from 2.667). It shows that the higher the levels of the better the addition of color sausages.

### Effect of Interaction

Results of analysis of variance showed that the interaction between addition and level parts of banana heart against color levels sausage very significant effect. This can be seen in Figure 4, of the average value of addition the inner and the mixture continued increase in color on addition of 15% and 30%. In addition is the color on addition decreased 15%, addition of the outer continues an increase to the level of addition of 15% and decreased the level of 30%, while in the mixture continued to increase to the level of color stability addition of 30%. But the best color levels in this experiment, there on the addition of the outer level increments of 15%.



Figur 2. Interaction addition of parts and levels of banana heart on the color of beef sausage.

### Sausage Aroma

A pleasant aroma will invite the appetite of consumers to try the sausage meat added with banana heart in experiments conducted average value of beef sausage aroma with the addition of banana heart can be seen in Table 4. The results showed that the scent range between 1.267

which shows aroma very savoury up to 3,233 which shows the value rather savoury, with the average 2.433 which shows the unpleasant aroma of sausage.

**Effect of Banana Heart Part**

The results indicate that the variance analysis there is a significant influence on the level of banana heart against aroma of sausage. Parts of banana heart used is the inner part that contain a lot of starch, the outer which contain fiber, and a mixture of the inner and outer parts of banana heart. Real difference test results showed that a mixture of the inner and outer has a higher rate of aroma compared to only use the inside and outside of the heart bananas.

**Table 4. Effect of Parts and the Levels of Banana Heart on the Aroma of Sausage**

Part of Banana Heart	Level of Banana Heart			Mean
	0%	15%	30%	
The inner	1.267	2.300	3.333	2.300 <sup>a</sup>
The outer	1.267	2.900	3.133	2.433 <sup>a</sup>
Mix	1.267	3.200	3.233	2.567 <sup>b</sup>
Mean	1.267 <sup>x</sup>	2.800 <sup>y</sup>	3.233 <sup>z</sup>	2.433

Explanation: - Different superscripts in the same row and column showed significant differences (P <0.05).  
 - Value aroma: 1 = very untasteful, 5 = Very tasteful

**Effect of Provision Level**

Analysis of variance showed that the addition of banana heart level to manufacture beef sausages very significant effect. The test results showed that the smallest real difference in levels of additional premises 15% (2.800) and 30% (3,233) resulted in higher sausage aroma compared with no addition (0% of 1,267). It shows that more and more of the addition better for increasing the aroma of sausage. This is probably caused by the content of banana heart is almost the same as the content of the beef. Similar content is mutually binding so that the aroma of banana heart and bacon balanced.

**Effect of Interaction**

Results of analysis of variance showed that the interaction between the addition and level part of banana on the aroma of sausage was highly significant. This can be seen in Figure 3, with the average value addition is continued improvement aroma mixture on the addition of 30%. The level of best fragrance contained in the addition part in increasing the level of the addition of 30%. While on the outside and mix only increased from the level of addition of 0% to 15% while the 30% level is not too increased of quality aroma.

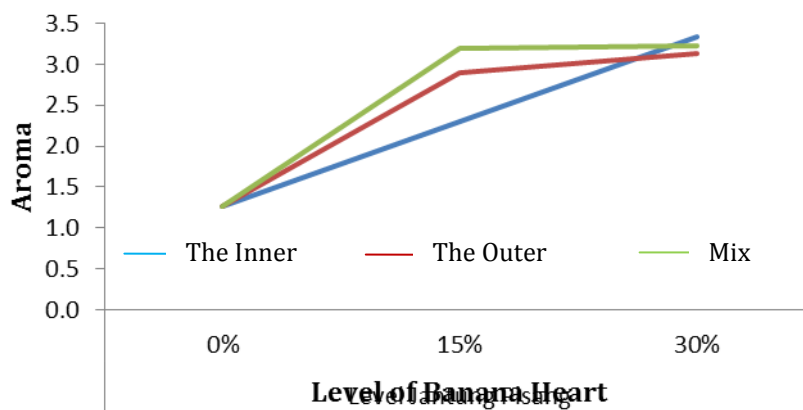


Figure 3. The interaction of addition of part and the level of banana in the aroma of beef sausages.

**Sausage Flavor**

The average value of beef sausage flavor with the addition of banana can be seen in Table 5. The results showed that the taste of sausage ranged between 1.667 indicating sausage tastes very bad up to 2,911 which show the value of a little tastier sausage flavor, with the average 2,352 which shows the value of sausages bad taste.

**Table 5. Effect of Part and the Level of Banana on the Aroma of Sausage**

Part of Banana Heart	Level of Banana Heart			Mean
	0%	15%	30%	
The inner	1.667	2.300	2.400	2.122 <sup>a</sup>
The outer	1.667	2.400	3.033	2.367 <sup>a</sup>
Mix	1.667	2.733	3.300	2.567 <sup>b</sup>
Mean	1.667 <sup>x</sup>	2.478 <sup>y</sup>	2.911 <sup>z</sup>	2.352

Description: - different superscript in the same row and column showed significant differences ( $P < 0.05$ ).

- Value flavors: 1 = very bad, 5 = Very tasty

### Effect of Banana Heart Part

The results indicate that the variance analysis there is a significant influence on the banana to the taste of sausage. Part of banana used is the inside that contains the duke, the outside of which contain fiber, and mixed (mixture inside and the outside of the heart of the banana). Real difference test results showed that a mixture of the inner and outer part (2.567) higher compared to the inside (2.122) and outer (2.367). It is caused by the content of starch and fiber on the inside and the outside of banana each binding so that the resulting flavor is better when compared to which use of the outside or inside of the banana alone (Sukaeni, 2014).

### Level Effect of Provision

Analysis of variance showed that the addition of banana heart level to manufacture beef sausages was highly significant. The test results showed that the smallest real difference in addition to the level of 15% (2.478) and 30% (2.911) produces a better taste than without the addition (0% amounting to 1.667). It shows that the more part are added the better the level of the resulting flavor. Improved taste of sausage, one of which, can be influenced by the content of banana fiber which almost the same as meat fibers (Rust, 1987).

### Influence of Interaction

Results of analysis of variance showed that the interaction between the addition and level part of banana to taste the sausage was highly significant. This can be seen in Figure 4, the level of the best flavors are on the addition of a mixture of the inner and outer parts of banana which continues to rise to the level of the addition of 30%. The inner has increased, but only at the level of the addition of 15% and the addition of 30%, while on the outside is constantly increasing and on the inside have increased but not too much.

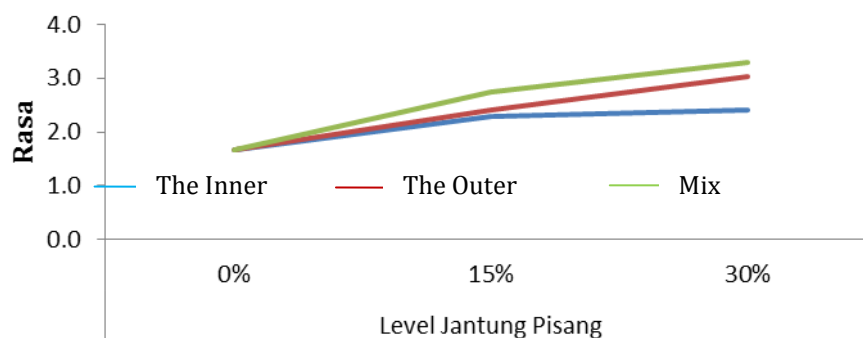


Figure 4. Interaction addition of part and the level of banana flavor beef sausages.

### Sausage Fondness

The series of organoleptic assessment to determine the quality of the sausages is a favorite or commonly referred to as the hedonic test. The average measurement results can be seen in Table 5. The results showed that the level of preference ranging from 2,044 panellists which showed strongly dislike up to 3.389 which shows a little like, with the average 2, 815 which shows the value of a little love. According to Lawrie in Parakkasi, A. (2003, Ed.), that the taste, color, appearance and elasticity of food will affect preference level panellists to food.

**Table 5. Effect of Part and the Level of Banana Against Fondness of Sausage**

Part of Banana Heart	Level of Banana Heart			Mean
	0%	15%	30%	
The inner	2.133	3.067	3.567	2.922 <sup>b</sup>
The outer	2.000	3.133	3.433	2.856 <sup>b</sup>
Mix	2.000	2.833	3.167	2.667 <sup>a</sup>
Mean	2.044 <sup>x</sup>	3.011 <sup>y</sup>	3.389 <sup>z</sup>	2.815

Description: - Different superscripts in the same row and column showed significant differences ( $P < 0.05$ ).  
 - Value flavors: 1 = very unhappy, 5 = very fond.

### Influence of the Part of Banana Heart

Results of analysis of variance showed that there was a significant influence on the level of banana against fondness of sausage. Part of banana used is the inside that contains the duke, the outer of which contains fiber, and mixed (the inner and the outer of the heart of the banana). The results of organoleptic test showed that the panellist preference level of the of sausage of beef with a mixture of banana tends to be higher in the additional part in the banana compared to the outside and the mixture.

### Influence of Addition Level

Analysis of variance showed that the addition of banana heart level to manufacture beef sausages was highly significant. The test results showed that the smallest real difference in addition to the level of 15% (3.011) and 30% (3.389) produce a better flavor compared with no addition (0% of 2,044). It shows that the more part are added the better level of panellists' fondness.

### Influence of Interaction

Results of analysis of variance showed that the interaction between the addition and level part of banana on the level of sausage fondness was highly significant. This can be seen in Figure 5, level of the best flavors is on the addition of the inner of banana which continues to increase to the level of the addition of 30%.

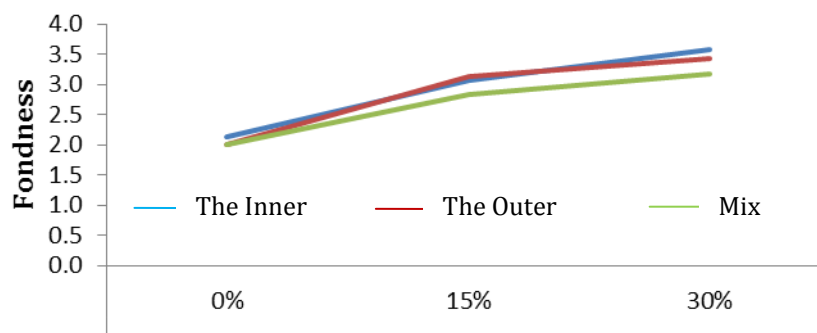


Figure 5. The interaction of addition of part and the level of banana in the level of preference beef sausages.

### D. Conclusion

Based on the results and the preceding discussion, it can be concluded that the addition of banana which is a mixture of the inner and outer generate resilience, aroma, and taste of the sausages were better than those just added to the inner or the outside only. Addition to the level of 30% is better than the addition of 15% and without the addition (0%). The interaction of factor and level part of banana showed a different response at the level of resilience, color, aroma, taste and preference of beef of sausage.

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