

# PROCEEDING

INTERNATIONAL CONFERENCE ON SUSTAINABLE  
AGRICULTURE AND NATURAL RESOURCES MANAGEMENT

"DRIVING SUSTAINABLE AGRICULTURE THROUGH DEVELOPING GREEN GROWTH STRATEGIES"

May 23, 2017 Medan



FACULTY OF AGRICULTURE  
UNIVERSITY OF MUHAMMADIYAH SUMATERA UTARA



# PROCEEDING

**International Conference on  
Sustainable Agriculture and Natural Resources Management**

**ICoSAaNRM 2017**

Organized by



University of Muhammadiyah Sumatera Utara

Medan, May 23, 2017

# PROCEEDING

## International Conference on Sustainable Agriculture and Natural Resources Management ICoSAaNRM 2017

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## Study of Making Meat Analog: Use of Banana Head as an Alternative Business in Order to Make Food Security

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### ABSTRACT

The research on the study of making meat analog from flower banana (*Musa Acuminata*) by Complete Randomized Design (CRD) method with two (2) replications has been carried out. Factor I were the ratio flower banana : wheat flour,  $J_1 = 30\%:70\%$ ,  $J_2 = 40\%:60\%$ ,  $J_3 = 50\%:50\%$ , and  $J_4 = 60\%:40\%$ . Factor II were boiling time (L) consisting of four levels,  $L_1 = 5$  minute,  $L_2 = 10$  minute,  $L_3 = 15$  minute, dan  $L_4 = 20$  minute. The parameters observed: carbohydrates, protein, fibre, organoleptic texture and flavor. The statistical analysis was obtained, that ratio flower banana: wheat flour providing highly significant effect ( $P < 0.01$ ) to carbohydrates, protein, fibre and organoleptic texture and had no significant effect ( $P > 0.05$ ) to organoleptic flavour. The boiling time providing highly significant effect ( $P < 0.01$ ) to protein, organoleptic texture and had no significant effect ( $P > 0.05$ ) carbohydrates, fibre and organoleptic flavour. The interaction had no significant effect ( $P > 0.05$ ) to carbohydrates, protein, fibre, organoleptic texture and flavor

Key words : meat analog, flower banana and boiling time.

### INTRODUCTION

Indonesia has many different types of food produced, both of which come from animals and plants. Foods derived from animals such as meat, milk, eggs, while food derived from vegetables such as tempeh, tofu, soy sauce. Animal food in general has high protein and fat content to meet human needs (Dewi et al., 2012).

Meat is an animal food that has a high protein and fat content that lies between the fibers of meat. If eating too much meat can cause disruption to the digestive system even cause fatness due to accumulation of fat, is also at risk of cancer. In addition to causing disease in the long term meat prices are also relatively expensive in Indonesia. Banana plant is a species of shrubs that live in the tropics and easily found anywhere, in Indonesia. Utilization of the banana plant is still limited to the fruit and leaves alone and the rest into waste such as bonggol, stems and flowers of banana or heart of Banana (Dewi et al., 2012).

Utilization of banana heart is generally used as a cooking mixed with other vegetables. Nutritional content in the heart of bananas if processed carefully can add nutritional value such as making banana heart jerky and banana heart abon. The nutritional content of banana heart is high enough so it is good for health especially fiber content (Dewi et al., 2012).

Food diversification is a diversification of food products as an alternative to existing products as a form of creating a new product of a higher quality. Diversification of food in Indonesia started to run well, various food modification products have been created like artificial meat.

Artificial meat has long developed abroad as an alternative to meat substitutes, especially vegetarians who do not like meat. Nuraidah, (2013) in his research says artificial meat is a product made from vegetable protein from non-meat materials, but is appropriate or similar to the original meat. This artificial meat can get around the desire of consumers who want to continue to consume meat with relatively cheap prices and does not interfere with health.

Based on the above description, the authors are interested to conduct research on Artificial Meat Studies Of Banana Heart. In this study will be done with variations

Comparison of banana heart against wheat flour and boiling duration. The resulting artificial meat is observed carbohydrate content, protein content, fiber content, water content and organoleptic texture, color and flavor.

### MATERIALS AND METHOD

The ingredients used are Banana Heart, Wheat Flour, Salt, Water and chemicals: Alcohol 80%, Alcohol 10%, HCl 25%, NaOH 30%, H<sub>2</sub>SO<sub>4</sub> 0.02 N, NaOH 45%, Aquadest, NaOH 0.3 N, Ether, K<sub>2</sub>SO<sub>4</sub> 10%, C<sub>2</sub>H<sub>5</sub>OH 70%.  
The equipments used are knives, blenders, napkins, saucers, desiccators, stoves, sinks, basins, glass beads, ovens, analytical scales, kjeldal set of tools.

#### Research methods

The research method is done by Randomized Complete Random Design (RAL) which consists of two factors:

Factor I: Effect of Comparison (J) Banana Heart: Wheat flour consisting of 4 levels ie: J1 = 30: 70%; J2 = 40: 60%; J3 = 50: 50%; J4 = 60: 40%

Factor II: Influence (L) Boiling time consisting of 4 levels, namely: L1 = 5 minutes; L2 = 10 Minutes; L3 = 15 Minutes; L4 = 20 Minutes

The number of treatment combinations (Tc) is  $4 \times 4 = 16$ , then the number of replications (n) is as follows:

$$Tc (n-1) \geq 15$$

$$16 (n-1) \geq 15$$

$$16n - 16 \geq 15$$

$$16n \geq 31$$

$$n \geq 1.937$$

$n = 2$ , then for the accuracy of the study, repeated 2 (two) times.

#### Implementation of Research

##### Making Banana Hearts

The banana's heart is peeled off the rough skin to get the white part. Then the heart of banana split into two parts and do the chopping and washing until clean. Boil water with a 2: 1 ratio for blanching for 5 minutes. Appointed and drained. Then blend until smooth.

##### Artificial Meat Making

Blended banana hearts are mixed with wheat flour according to the treatment with 60% water content (from ingredients) and 2% salt. Done knead until blended and fused. The fused dough is wrapped in a cloth and washed with running water until the rinse water becomes clear again. Then boiling according to treatment 5 minutes, 10 minutes, 15 minutes and 20 minutes with a temperature of 100 OC. After finishing boiling, drained and analyzed: carbohydrates, protein, fiber and organoleptic levels (texture and flavor).

##### Observation Parameters

Observations were made based on analyzes including: carbohydrate levels, protein levels, fiber content and organoleptics (texture and flavor).

**RESULT AND DISCUSSION**

**Carbohydrate**

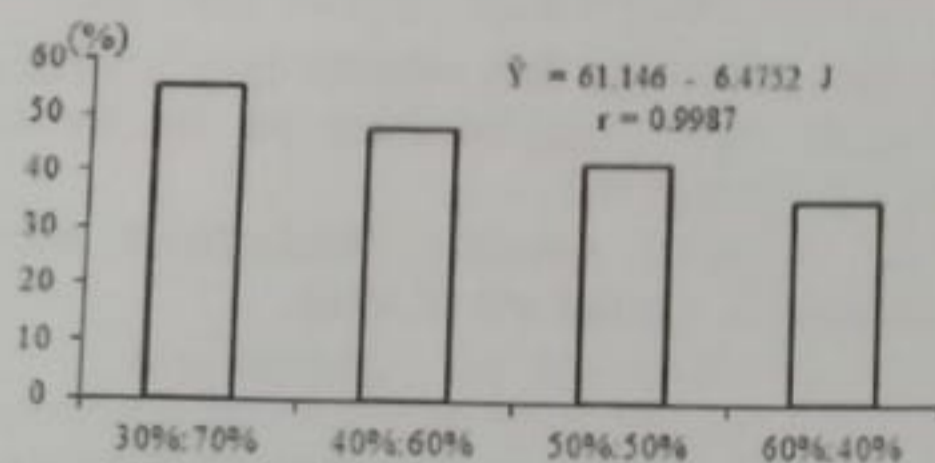


Figure 1. Graph of banana heart comparison relationship: wheat flour to carbohydrate

In Figure 1 it can be seen that the comparison of banana heart and wheat flour affects the artificial meat carbohydrate decreasing. This is due to the content of carbohydrate in wheat flour is higher than the banana heart, causing the less the amount of wheat flour added then the artificial meat carbohydrate content decreases. Because wheat flour comes from wheat which is a source of carbohydrates.

**The Effect of Old Boiling**

Based on the list of variance it can be stated that the duration of boiling has different effect on the carbohydrate content. This is suspected because during boiling takes place, the contact of boiling water against the material does not dissolve carbohydrates in materials that are a type of polysaccharides such as starch (in grains such as wheat) and cellulose (vegetable wall). Based on the variance list it can be stated that the interaction of the treatments has different effect on the carbohydrate.

**Protein**

**The Effect of Banana Heart Comparison: Wheat Flour**

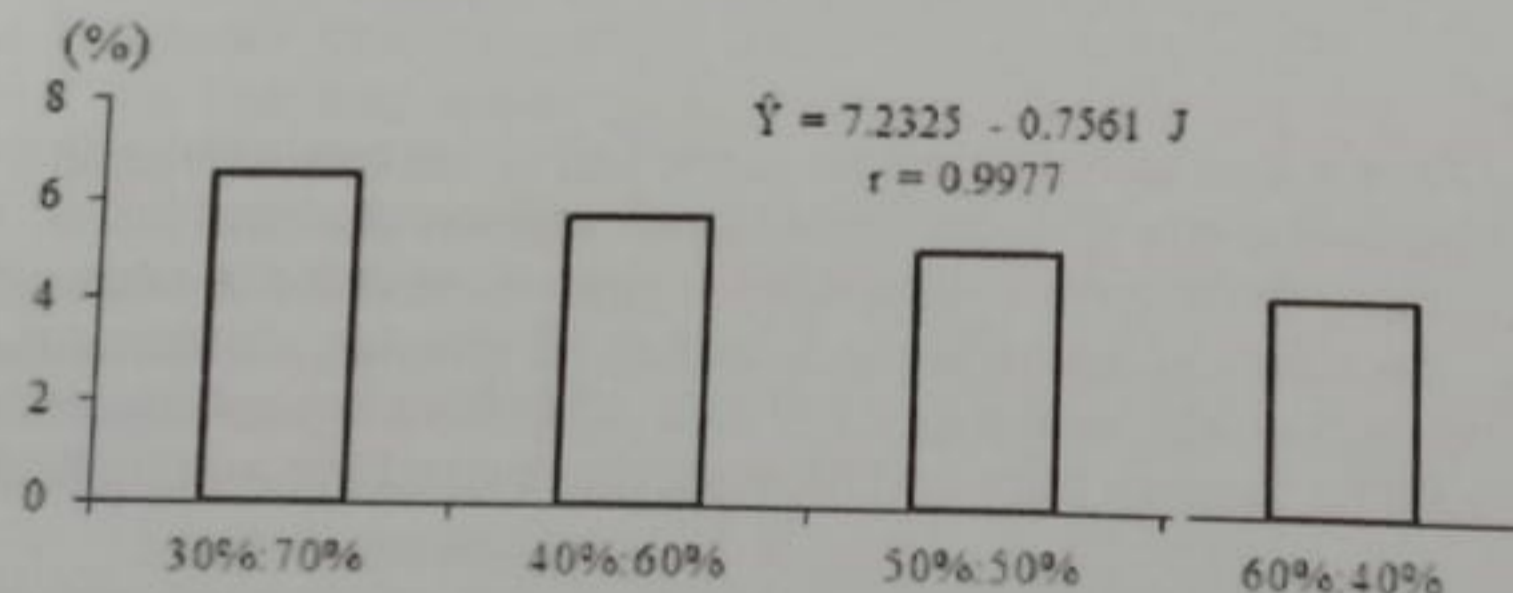


Figure 2. Graph of banana heart comparison relationship: wheat flour to protein

In Figure 2 it can be seen that the comparison of banana heart and different wheat flour affects the decreasing protein of the decoction. This is because the addition of wheat flour is less than the heart of banana. The advantages of wheat flour has a fairly good gluten content to processed foods. This is in accordance with the statement of Winarno (2002) which suggests the specialty of wheat flour compared with flour from other

cereals lies in the content of gluten that is not contained in other flour. Gluten is composed of gliadin and glutenin which is a component of proteins that are found only in wheat flour.

The Effect of Old Boiling

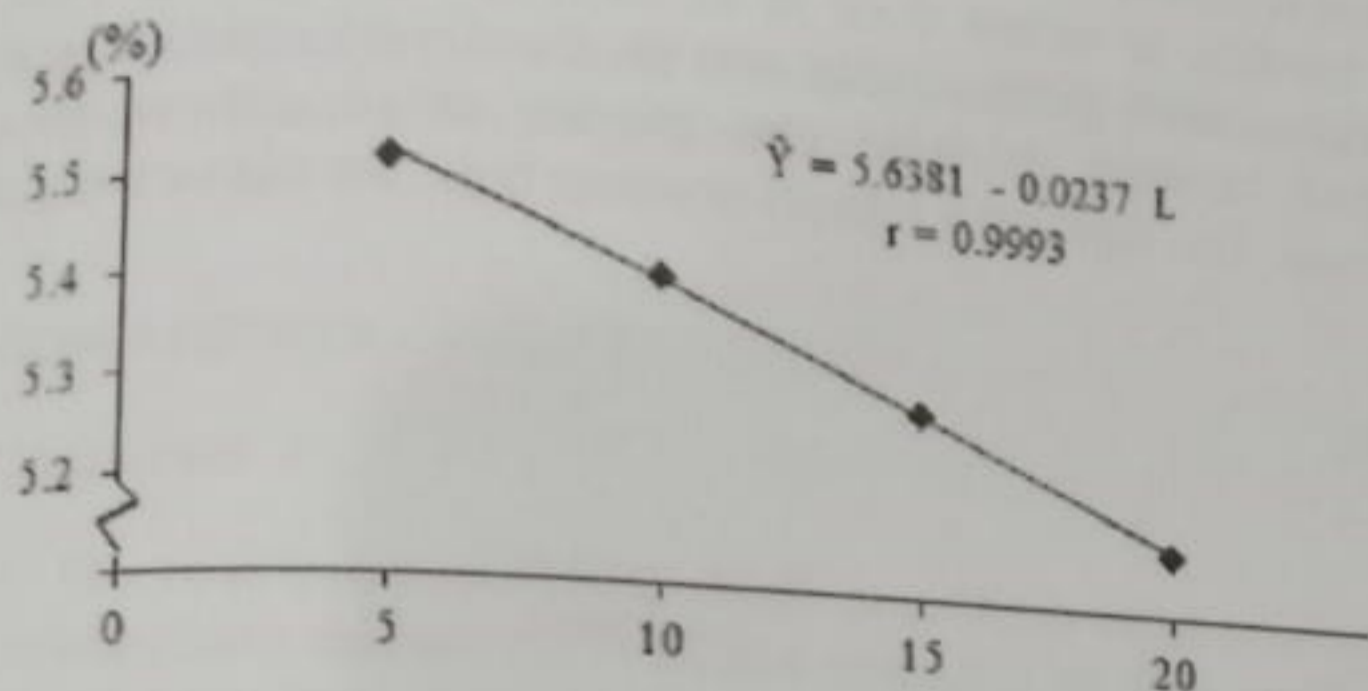


Figure 3. Graph of long boiling relationship to protein

From Figure 3 it can be seen that the longer boiling time the artificial meat protein level decreases. This is due to the direct contact of the product to the cooking water so that the heat generated from boiling water can cause the occurrence of protein denaturation. This is in accordance with the statement of Anjarsari, B., et al. (2009) states in general, the decrease in protein content in a food processing can occur, in which the protein in the food will be coagulated or denatured. The longer the boiling is done then the lower the protein content in a product. This is in line with Damayanti's (1994) statement, which states that proteins will undergo a process of chemical structure changes due to heating or denaturation, breaking the bonds in the molecule so that these protein molecules will easily tended to be attacked by digestive enzymes, but denaturation will reduce protein levels in the material. Based on the vocabulary list it can be stated that the interaction of the treatment had no significant effect on the protein.

Organoleptic Texture

The Effect of Banana Heart Comparison: Wheat Flour

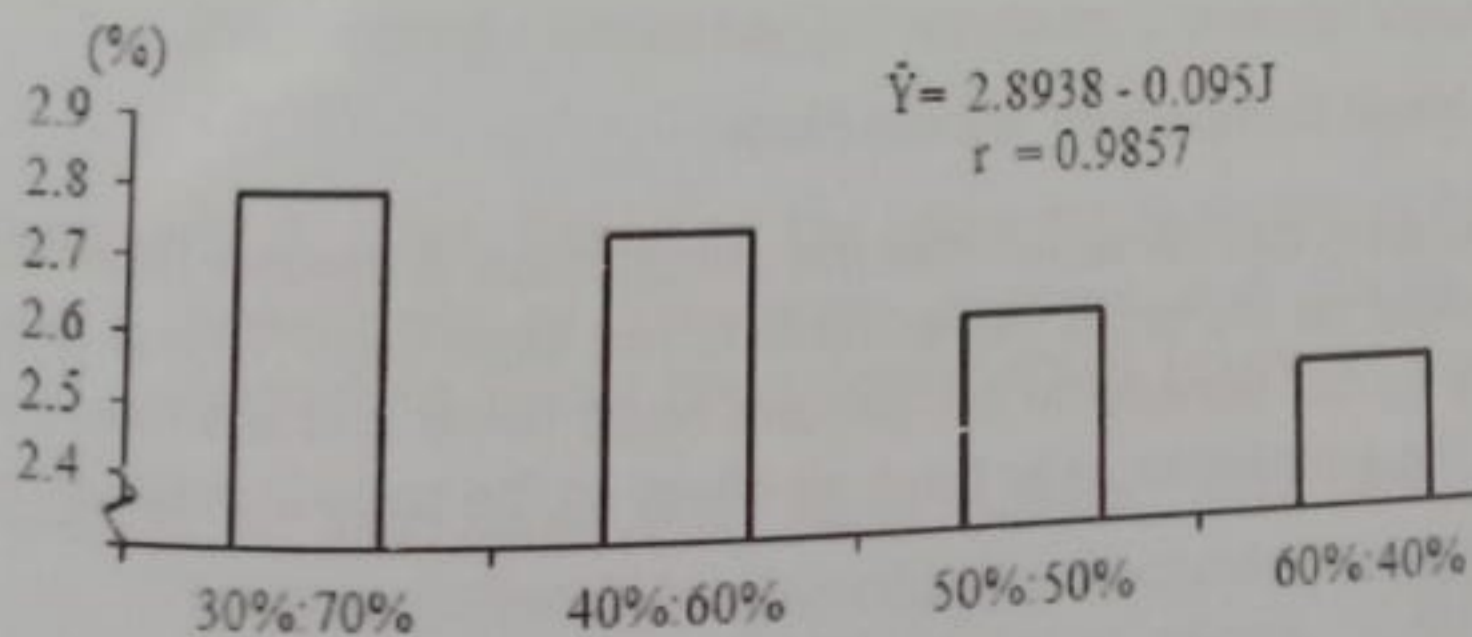


Figure 4. Graph of banana heart comparison relationship: flour to organoleptic texture

In Figure 4 it can be seen that the ratio of banana heart and wheat flour influences the decreasing organoleptic texture. It is presumed that the less flour given, the texture of the artificial meat produced less elastic, because the protein content is getting less and the lower the gluten. This is consistent with the statement of Murtado, T., (1999) which states that the main function of wheat flour is to form the structure of food or preparations. Wheat flour contains gluten, a clay and elastic clump formed at the time of water-insoluble wheat proteins (glutenin and gliadin) mixed with water and undergoing stirring process. The higher the protein of wheat flour, the higher the gluten content

#### The Effect of Old Boiling

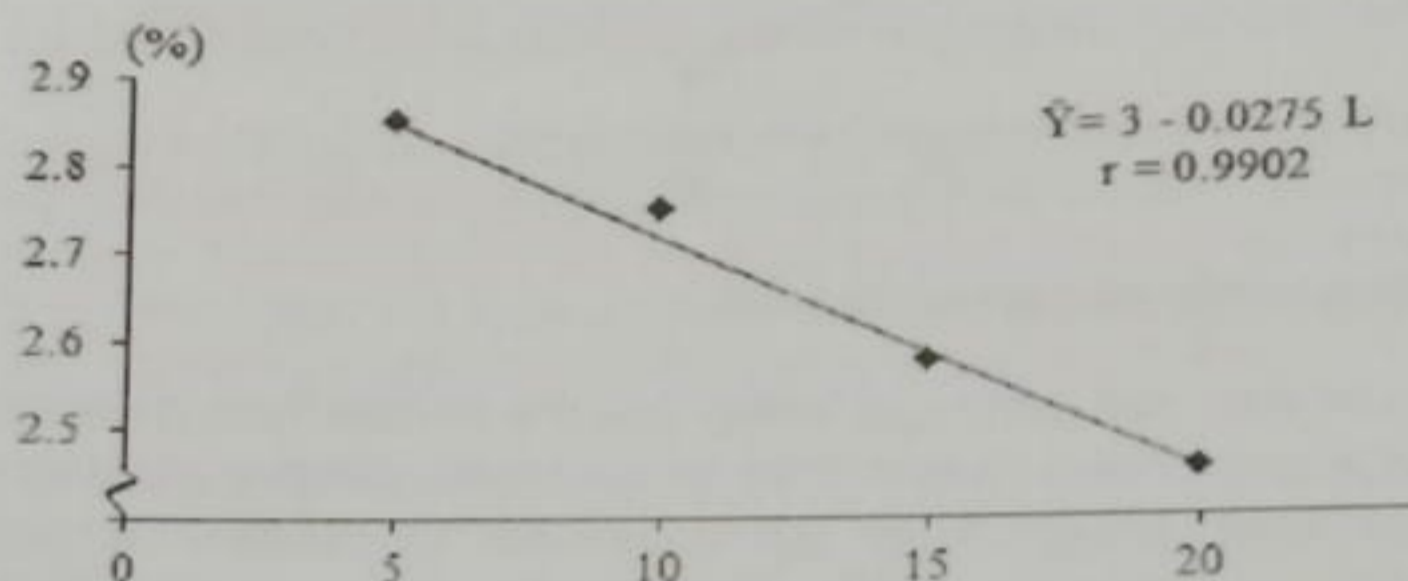


Figure 6. Graph of long boiling relationship on organoleptic texture

In figure 6 it can be seen that the longer the boiling time the texture of the artificial meat decreases. This is because the longer the boiling time the higher the absorption of the ingredients to the water so that boiling water content increases and high water content causes the texture on the lower the product. This is in accordance with the statement of Anjarsari, B., et al. (2009) states that the amount of boiling time will cause the product to absorb more water, the water content will increase and this is also in line with Robby's statement, et al. (2008) states Water content can affect the elasticity and texture, the higher the water content the naked balls produced less chewy. Based on the list of variance can be seen that the interaction treatment has no significant effect on the organoleptic texture.

#### Organoleptic Flavor

##### The Effect of Banana Heart Comparison: Wheat Flour

Based on the list of variance can be stated that the comparison of banana heart: wheat flour has a different effect on the organoleptic taste is not significant. This is because the dominant taste felt by the panelist is the banana heart flavor and the flavor of the flour less favorable to the panelist so as to have no effect on the taste in artificial meat.

##### The Effect of Old Boiling

Based on the list of variance, it can be stated that the duration of boiling has different effect on the taste organoleptok. This is because during the boiling process has no

effect on the taste in artificial meat and the absence of research will influence the boiling of the taste of a product such as artificial meat.

Effect of Interaction between Banana Heart Comparison: Wheat Flour and Boiling Time on taste organoleptok

Based on the list of variance can be stated that the interaction treatment has different effect is not real to taste organoleptok.

## CONCLUSIONS

### Conclusion

1. The best treatment in the study of artificial meat production from banana heart is carbohydrate content (J1 = 54,954 and L1 = 46,191), protein content (J1 = 6,484 and L1 = 5,516), fiber content (J4 = 3,458 and L1 = 2,826), organoleptic texture (J1 = 2,788 and L1 = 2,850) and flavors (J1 = 2,235 and L1 = 2,235).
2. Comparison of banana heart: wheat flour gives a very significant different effect on carbohydrate, protein, fiber content, organoleptic texture and not significantly different to organoleptic taste.
3. The duration of boiling has a very significant effect on protein, organoleptic texture and is not significantly different from carbohydrate and organoleptic levels of taste.
4. Treatment interaction between comparison of banana heart: wheat flour and boiling duration give no significant effect on carbohydrate, protein, organoleptic texture and taste.

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