THE USE OF KECOMBRANG (*Etlingera elatior*) AS ANTIBACTERIAL FOR FRESH BEEF WITH CONCENTRATIONS VARIETY AND SOAKING TIMES

ARTICLE

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THE USE OF KECOMBRANG (*Etlingera elatior*) AS ANTIBACTERIAL FOR FRESH BEEF WITH CONCENTRATIONS VARIETY AND SOAKING TIMES

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ABSTRACT

The purpose of this study is to determine the effect of the extracts concentration of kecombrang (Etlingera elatior) and soaking time of beef on kecombrang extracts, so as to reduce the total bacterial colonies on beef. The Model experimental design used in this study is a randomized block design with three (3) factors, performed 3 (three) replications, thus acquired 27 units of trials. Experiments variables consists of extracts concentrations which are 5%, 10% and 15% and the soaking times are 30 minutes, 60 minutes and 90 minutes. Microbiological response that was done is analyzing the total of bacterial colonies and organoleptic response to the color, aroma, texture and taste. The results of the research that was the obtained are the extract concentration of kecombrang can has the effect on total reduction of bacterial colonies on fresh beef, color, aroma and taste. The soaking times can effect the total reduction of bacterial colonies and the interaction among the extracts concentration of kecombrang flowers and the soaking times of fresh beef can affect the total reduction of bacterial colonies and the color of the beef.

Keywords: Kecombrang (Etlingera elatior), antibacterial and extract

I. PRELIMINARY

1.1 Background

Beef is one of the foodstuffs that has high nutrition value. Other than as the source of animal protein, beef is also the source of fat that is highly needed for human growth and human gain. Nutrition value that is contained in beef really supports the microorganisms lives especially bacterials. Microorganisms activities can lower the quality of beef that is shown with the change of color, taste, flavor, or even foul. (Kuntoro, 2007).

Beef is the animal foodstuffs that is easy to rot caused by microorganisms activities. The beef that is rotten caused by contaminations will cause the change of smell, texture, flavor and color. The contaminations of microorganisms can also cause the storability of beef become low, so that it needs some handling efforts in order to raise the duration of the beef (Astawan, 2007).

The handling that can be done in lowering the bacterials activities to extend the time of storability is preservation. Preservation is the effort of hampering the damage of foodstuffs caused by spoilage microbes that might produce toxics.

The goals of the preservation are to hamper the damages, to keep the quality, to avoid the toxication and to help the handling and storability of foodstuffs (Afrianti, 2010).

Some techniques used in extending the foodstuffs are using refrigeration or heating, fumigation and using the foodstuffs preservatives either synthetic or natural (Wulandari, 2014).

Antibacterial chemicals as preservative is the chemical that can hamper the growth and the activities of microbes. The use of antimicrobes for foodstuffs is to control the process of natural fouling (food preservation) and to control the growth of microorganisms, including pathogen microorganisms (Hudaya, 2010).

One of the natural preservatives that is safe to consume is the preservative from herbs and spices. The use of natural

preservatives is easy to find, is cheap and will not cause negative effects to health. One of the spices having potential to become antibacterial substance that can naturally extend the storability time is kecombrang (*Etlingera elatior*) (Kuntoro, 2007).

Kecombrang (*Etlingera elatior*) is the herb type of *Zingiberaceae* known as one of the vegetables. Kecombrang is used by people as the nutritious foodstuffs to preserve the food because of the active substances contained in it, such as saponins, flavonoids, and polyphenols (Naufalin, 2005).

Kecombrang contains polyphenols that has the antimicrobes activities. The contents of flower phytochemical, rod, rhizome and kecombrang leaves are alkaloids, saponins, tannins, phenolics, flavonoids, triterpenoids, steroids and glycosides that have the active role as antibacterial (Naufalin, 2005).

The active chemicals in kecombrang can have the role as antibacterials because they can hamper or even stop the bacterial cells by spoiling and going through the cell walls and precipitating bacterial cell walls so that the cell permeabilities will be hampered that can lose the components of the cell so that the cell walls will not be formed or will be formed imperfectly. In high rate the active chemical like phenols can cause the protein coagulation and membrane cell will get lysis, that case causes the bacterial growth activities can be hampered or even can be dead (Wulandari, 2014).

1.2 Problem Identifications

The problem identification in this research was to see the extent of the influence of the kecombrang extracts concentrations (*Etlingera elatior*), the time of soaking and the interaction between the concentration of kecombrang extracts and the time of soaking for the quality of the fresh beef.

1.3 Purpose and Goals of the Research

The purpose of this research was to learn the differences between the concentration of kecombrang extracts and the extent of the time of soaking for the quality of fresh beef.

The goals of this research were to understand the potential of the kecombrang extracts as antibacterial for the fresh beef and to use the resource of vegetables as the alternative for antibacterial substances.

1.4 Benefit of the Research

The result of this research was expected to give the information scientifically to the people about kecombrang extracts (*Etlingera elatior*) as the antibacterial, to elevate the use value and economic value of kecombrang, to elevate the development of science and technology.

1.5 Framework

The preservation using the natural stuffs becomes the alternative to extend the time of storability without giving negative effects if it's consumed. The herb that can be used as antibacterial is kecombrang because this herb contains the active chemicals as antimicrobes.

The result of the research from Jaafar (2007) on the leaves, rods, flowers, and rhizome of kecombrang showed that there's some type of essential oils that is bioactive. Based on this research it reveals that the most essential oil contents is on the leaves of 0,0735%, rods of 0,0029% and rhizome of 0,0021%. The main components on the leaves are *β-pinene* (19,7%), *caryophyllene* (15,36%) and *β-farnesene* (27,9%).

The result of the research from Naufalin (2010), it showed that the pulp come from the powder of kecombrang flower with the pulp concentration of 3% (b/v) can extend the time of storability of tofu into 3 days or 72 hours. While for the fish, the treatment of the pulp from the fresh kecombrang flower with the concentration of 5 % and the storability of 5 days is the best treatment interaction seen from the characteristics of fresh fish, it obtained the fish with the microbes value total of 1,41 x 10^5 cfu/g, this total is still under the threshold of reasonable consumption of Indonesia National Standard (maximum 5,0 x 10^5 cfu/g).

The result of antibacterial examinations on kecombrang leaves extracts for *Staphylococcus aureus* with the concentration of 20 %, 40 %, 60 %, 80 % and 100 % obtained blocking zone of 8,663 mm, 14,223 mm, 15,33 mm, 20,00 mm, and 21,36 mm. The result of the examinations of antibacterial activities showed that the higher extracts concentration, the higher inhibitory (Sukandar, 2011).

Based on the previous research, kecombrang is useful as antimicrobes. The research used the kecombrang flower extracts from ethyl acetate and ethanol which are able to obstruct 7 growth of bacterial types such as *Stapyllocaccus aures, L.monocytogenes, Bacillus cereus, S. Typhimurium, E. Coli, A. Hydrophila* and *P. aeruginosa* (Naufalin, 2005).

Based on the research from Naufalin (2005), it showed that kecombrang flower doesn't show the antibacterial activities on hexane extracts (nonpolar), but it's able to obstruct the bacterial activities of *Staphylococcus aureus, Listeria monocytogenes, Bacillus cereus, Salmonella Typhimurium, Escherichia coli, Aeromonas hydrophilia* and *Pseudomonas aeruginosa* on ethanol extracts (semi polar).

Based on the previous research, it proved that the average of the total of bacterials on the milkfish soaked in galangal solvent extracts of 0%, 5%, 10%, 15% respectively are 1,29 x 10^6 cfu/g, 5,54 x 10^5 cfu/g, 4,91 x 10^5 cfu/g, 4,07 x 10^5 cfu/g. The use of galangal dose of 15% is the highest dose in lowering the total of bacterial compared to the other doses. This case is shown on the galangal dose of 15% that showed the average of the least bacterial total compared to the doses of 5% and 10% (Suryawati, 2011).

1.6 Hypothesis

Based on the framework, then the hypothesis was submitted that it's expected that there's the influences of kecombrang extracts concentration, soaking times and the influences of interaction between the concentration of kecombrang extracts and the soaking times to the quality of fresh beef.

1.7 Time and Place of Research

The research was done from June 2016 until September 2016, held in Research Laboratorium of Department of Food Technology, Technique Faculty, Pasundan University, Setiabudi St. No 193 Bandung.

II. MATERIALS, TOOLS, AND METHOD OF RESEARCH

2.1. Materials and Tools

2.1.1. The Used Materials

The materials used in this research were the tigh of fresh beef that was got from Slaughterhouse at Ciroyom, kecombrang leaves, kecombrang flowers and clear water.

The materials used for the analysis of TPC and antioxidant were the alcohol of 80%, aquades, beef samples, plate count agar, methanol and the solvent of DPPH.

2.1.2. The Used Tools

The used tools in this research were measuring glass, chemical glass, erlenmeyer tube, colony counter, cooler box, incubator, stiring stick, bunsen, digital weigher, pipette, test tube, tweezers, porcelain cup, stopwatch, filtering papers, knife, tissues, plastic containers, cutting board, spoon, blender, refrigerator, microscope, evaporator and spectrophotometer.

2.2. Method of Research

2.2.1. Preliminary Research

Preliminary research that was done was to choose the parts of kecombrang between the flower and leaves as antibacterial for fresh beef and determination of extractions to be created as extracts. The examinations were done by creating the leaves extracts and kecombrang flower extracts with 3 different treatments, they are 1x, 2x, and 3x cycle of extractions. Then, soaking the fresh beef on flower extracts and leaves extracts separately with the concentration of 10% around 60 minutes. Then, doing the examinations of TPC to the all samples in order to know the samples that have the least growths of microorganisms and then doing the examinations of organoleptic method of hedonic on the beef with attributes od color, texture and the smell of the soaking result of raw beef and attributes of the taste of boiled beef.

The solvent of kecombrang extracts that was chosen would be done the analysis of antioxidant in order to know the total of the antioxidant contents contained in the solvent of kecombrang extracts.

2.2.2. Main Research

The main research was the next research of the preliminary research with the purpose to decide the influence of kecombrang extracts concentration and the soaking times to the quality of fresh beef.

2.2.2.1. Treatment Design

1). First factor : the concentrations of kecombrang extracts (A) divided by

3 stages are a_1 (5%), a_2 (10%) and a_3 (15%).

2). Second factor : the time of beef soaking on kecombrang extracts (B) divided by 3 stages are (b_1) 30 minutes, (b_2) 60 minutes and (b_3) 90 minutes.

2.2.2.2. Trials Design

The trials design for this research was The Group of Random Design (GRD) with the factorial patterns 3 x 3, each treatment was repeated three times, so that it got 27 treatments. Variables that were used were the determination of kecombrang extracts concentration (A) as the main factor (a_1: 5%, a_2: 10%, and a_3 : 15%) and the soaking times (B) which was the second factor(b_1 : 30 minutes, b_2 : 60 minutes and b_3 : 90 minutes).

Table 1. Matrics of the Model of Random Design Group Factorial Patterns 3 x 3

Kecombrang Extracts Concentration	Soaking Times	Groups		
		I	II	III
5 % (a_1)	30 minutest (b_1)	a_1b_1	a_1b_1	a_1b_1
10 % (a_2)		a_2b_1	a_2b_1	a_2b_1
15 % (a_3)		a_3b_1	a_3b_1	a_3b_1
5 % (a_1)	60 minutes (b_2)	a_1b_2	a_1b_2	a_1b_2
10 % (a_2)		a_2b_2	a_2b_2	a_2b_2
15 % (a_3)		a_3b_2	a_3b_2	a_3b_2
5 % (a_1)	90 minutes (b_3)	a_1b_3	a_1b_3	a_1b_3
10 % (a_2)		a_2b_3	a_2b_3	a_2b_3
15 % (a_3)		a_3b_3	a_3b_3	a_3b_3

2.2.2.3. Analysis Design

Based on the previos trials design, then it's done the variance analysis.

Table 2. Variety Analysis (ANAVA)

Variety	DF	ST	MS	F Counts	F Tab.
Groups	r-1	STG	JKK/(r-1)		
Treatments	ab-1	STT			
Factor A	a-1	ST(A)	MS(A)	MS(A)/ MSG	
Factor B	b–1	ST(B)	MS(B)	MS(B)/ MSG	
Factor AB	(a-1)(b-1)	ST(AB)	MS(AB)	MS(Ax B)/MSG	
Error	(ab)(r-1)	STE	MSG		
Total	rab-1	STT			

(Source: Gaspersz, 1995)

Description :

r = replication (repeatition)

A = kecombrang extracts concentration

B = the soaking times of beef on the kecombrang extracts

DF = degree of freedom

ST = square total

MS = middle square

Based on the previous variety analysis, then it's found the area of rejection and hypothesis acceptance, such as:

1. The hypothesis is rejected, if F was counts ≤ F table at the stage of 5% if kecombrang extracts concentration and the soaking times didn't effect the quality of beef on each treatment at stage of 5%
2. The hypothesis is accepted, F was counts > F table at the stage of 5% if kecombrang extracts concentration and the soaking times effected the quality of beef and did the Duncan further examination to see the differences of treatments from each treatment at the stage of 5%.

The analysis is done if there was the real effects between the average from each treatment ($F_{counts} > F_{table}$) is by doing the Duncan double distance examination to see the samples group that has the contrast difference (Gaspersz, 1995).

2.2.2.4. Response Design

The response design that would be done in the main research was microbiological response and organoleptic responses.

(1). Microbiological Response

Microbiological response which is the determination of bacterial colonies total by doing the method of TPC (*Total Plate Count*). The examination was done on the day 0, 2, 4 and 6 with beef storability at the chiller temperature of 10ºC.

(2). Response Organoleptic

Response organoleptic aimed to determination consumer against receipt of fresh ground beef that has been through a process of soaking in the extract part kecombrang selected. Testing was conducted by hedonic test with 30 panelists. Attributes are tested include color, aroma and texture on raw beef and taste on braised beef that has been done on day 2, 4 and 6.

III. RESULTS AND DISCUSSION

3.1 Preliminary Research

Preliminary research was conducted to select part of the kecombrang between flowers and leaves as an antibacterial of fresh beef, such research is to make extract leaves and flowers extract kecombrang with 3 different treatment, i.e. the 1x extraction, 2x and 3x cycle of extraction. Then, do the test total colony of bacteria and testing organoleptic hedonic method with the attributes of color, texture and aroma on raw meat and flavor attribute on an already boiler beef against 30 panelists. Furthermore, do an analysis of antioxidants in the aqueous extract of the antioxidant content to know the total contained in the extract solution was selected

3.1.1 Analysis of the Total of Bacterial Colonies

Table 3. The Result of the Total of the Bacterial Colonies TPC Method for Soaked Beef on Kecombrang Flower and Kecombrang Leaf

Samples	Colonies/gram		Real Degree
	Day-0	Day-3	
b1	$1{,}24 \times 10^3$	$1{,}02 \times 10^3$	b
b2	$1{,}24 \times 10^3$	$9{,}80 \times 10^2$	b
b3	$1{,}24 \times 10^3$	$7{,}60 \times 10^2$	a
d1	$1{,}24 \times 10^3$	$1{,}15 \times 10^3$	b
d2	$1{,}24 \times 10^3$	$1{,}01 \times 10^3$	b
d3	$1{,}24 \times 10^3$	$8{,}90 \times 10^2$	a

Description :

b1 : (1x extraction of kecombrang flower)

b2 : (2x extractions of kecombrang flower)

b3 : (3x extractions of kecombrang flower)

d1 : (1x extraction of kecombrang leaf)

d2 : (2x extractions of kecombrang leaf)

d3 : (3x extractions of kecombrang leaf)

Based on the results of the calculation of total bacterial colonies on Table 3, show that the variation between the flower and leaf of kecombrang has not affected the total decrease in bacterial colonies, while variation of the amount of extraction effect on total reduction of bacterial colonies. This indicates that the active substance contained in the flower and leaf have the same effectiveness against growth of bacterial colonies, but the effectiveness will increase with the growing number of extraction cycle that was repeated. In accordance with the result of the study, show that treatment with 3x the extraction of more significant result toward a decrease in the total bacterial colonies compared with the treatments 1x and 2x extraction.

3.1.2 Organoleptic Analysis

Based on the analysis of variance (ANOVA) showed that the leaf and flower kecombrang as well as the number of extractions carried affect the color, aroma, texture and taste of the beef raw or already boiled.

Table 4. The Results Organoletic for Meat Soaked In the flowers and leaves kecombrang

Samples	Color	Aroma	Texture	Taste
b1	4,40 b	4,67 b	4,10 a	4,00 a
b2	4,50 b	4,20 b	4,10 a	3,90 a
b3	**4,73 b**	**4,53 b**	**4,20 a**	**4,44 b**
d1	3,70 a	3,60 a	3,80 a	4,07 a
d2	3,93 a	4,00 a	4,06 a	3,47 a
d3	4,33 b	3,70 a	4,20 a	3,87 a

Table 5. The best result

Samples	Result of TPC	Organoleptic	Total
b1	5	5	10
b2	6	5	11
b3	**6**	**6**	**12**
d1	5	4	9
d2	6	4	10
d3	6	5	11

Description :

b1 : (1x extraction of kecombrang flower)

b2 : (2x extractions of kecombrang flower)

b3 : (3x extractions of kecombrang flower)

d1 : (1x extraction of kecombrang leaf)

d2 : (2x extractions of kecombrang leaf)

d3 : (3x extractions of kecombrang leaf)

3.1.3 Analysis of Antioxidant (Selected Sample)

The Antioxidants contained in the sample with 3x kecombrang flower extraction has an IC_{50} of 978.03 µg/ml by using DPPH method. These Antioxidants are included in the category of antioxidants is weak, because it has IC_{50} is more than µg/ml. According Armala (2009), the level of the antioxidant power assay of the test

compounds using DPPH method can be classified it had of weak IC_{50} more than 150 µg/ml.

3.2 The Main Research

The main research is a continuation of a preliminary study that aims to determine the effect of concentration kecombrang flower extract and soaking time on the quality of fresh beef. The response is a microbiology in the form of determination of the total bacterial colonies using the TPC (Total Plate Count) on day 2, 4 and 6. The organoleptic responses test by the hedonic method to the 30 panelists. Attributes are tested include color, aroma and texture of the raw beef and taste attributes of beef that has been boiled performed on days 2, 4 and 6.

3.2.1 Testing Total Bacterial Colonies

3.2.1.1 Testing Day - 2

Table 6. The Effect of Concentration of Flower Extract kecombrang of TPC Day - 2

Concentration of Flower Extract kecombrang (A)	Total Bacterial Colonies (*cfu*/g)	Real Degree
a1 (5%)	$1{,}35 \times 10^3$	c
a2 (10%)	$1{,}20 \times 10^3$	b
a3 (15%)	$1{,}08 \times 10^3$	a

Description: Each of the different letters indicate significant differences at the level of 5%

Table 7. The Effect of Soaking Times of Beef (B) of TPC Day - 2

Soaking Times (B)	Total Bacterial Colonies (*cfu*/g)	Real Degree
b1 (30')	$1{,}36 \times 10^3$	c
b2 (60')	$1{,}19 \times 10^3$	b
b3 (90')	$1{,}07 \times 10^3$	a

Description: Each of the different letters indicate significant differences at the level of 5%

3.2.1.2 Testing Day – 4

Table 8. The Effect of Concentration of Flower Extract kecombrang of TPC Day - 4

Concentration of Flower Extract kecombrang (A)	Total Bacterial Colonies (*cfu*/g)	Real Degree
a1 (5%)	$2{,}03 \times 10^3$	c
a2 (10%)	$1{,}54 \times 10^3$	b
a3 (15%)	$1{,}27 \times 10^3$	a

Table 9. The Effect of Soaking Times of Beef (B) of TPC Day - 4

Soaking Times (B)	Total Bacterial Colonies (*cfu*/g)	Real Degree
b1 (30')	$1{,}87 \times 10^3$	c
b2 (60')	$1{,}60 \times 10^3$	b
b3 (90')	$1{,}37 \times 10^3$	a

Ket. : Setiap huruf yang berbeda menunjukkan perbedaan yang nyata pada taraf 5%.

3.2.1.3 Testing Day – 6

Table 10. The Effect of Concentration of Flower Extract kecombrang of TPC Day - 6

Concentration of Flower Extract kecombrang (A)	Total Bacterial Colonies (*cfu*/g)	Real Degree
a1 (5%)	$0{,}81 \times 10^4$	c
a2 (10%)	$1{,}85 \times 10^3$	b
a3 (15%)	$1{,}45 \times 10^3$	a

Description: Each of the different letters indicate significant differences at the level of 5%

Table 11. The Effect of Soaking Times Beef (B) of TPC Day - 6

Soaking Times (B)	Total Bacterial Colonies (*cfu*/g)	Real Degree
b1 (30')	$0{,}80 \times 10^4$	c
b2 (60')	$1{,}81 \times 10^3$	b
b3 (90')	$1{,}59 \times 10^3$	a

Description: Each of the different letters indicate significant differences at the level of 5%

Table 12. The Effect of Concentration of Flower Extract kecombrang (A) and Soaking Times (B) of TPC Day - 6

Concentration of Extract (A)	Soaking Times (B) (*cfu*/g)		
	b1 (30')	b2 (60')	b3 (90')
a1 (5%)	C $2{,}03 \times 10^4$ c	C $2{,}15 \times 10^3$ b	C $1{,}91 \times 10^3$ a
a2 (10%)	B $2{,}11 \times 10^3$ b	B $1{,}82 \times 10^3$ a	B $1{,}63 \times 10^3$ a
a3 (15%)	A $1{,}64 \times 10^3$ b	A $1{,}47 \times 10^3$ b	A $1{,}23 \times 10^3$ a

Direction: Lowercase read direction horizontal and vertical directions read in uppercase letters.

The lower the concentration given, then the active substance that are dissolved in the water extract of the flowers

kecombrang is getting the less interest. This is accordance with the research by Hudaya (2010), that the determination of the concentration of water extracts of flowers kecombrang great influence on the formation of inhibition zone produced by the bacteria *Escherichia coli* and *Staphylococcus aureus*, where the lower the concentrations are given, then the smaller the diameter of the inhibition zones are formed.

In kecombrang flowers contain active compounds such as alkaloids, saponins, phenolic, flavonoid, triterpenoid, steroid and glycoside which can serve as an antimicrobial (Naufalin et al., 2009).

Flavonoids have the ability to inhibit the activity of bacteria by forming a complex with a particular structure on the bacterial cell wall, leading to death on bacteria (Cowan, 1999).

The Antioxidants contained in the flowers of kecombrang is able to prevent or slow the breakdown of fat due to the reaction of free radicals that play a role in the oxidation process (Naufalin et al., 2005).

3.2.2 Color

3.2.2.1 Testing Day - 2

Table 13. The Effect of Concentration of Flower Extract kecombrang of color Day - 2

Concentration of Flower Extract kecombrang (A)	Average	Real Degree
a1 (5%)	3,715	a
a2 (10%)	4,067	b
a3 (15%)	4,156	b

Description: Each of the different letters indicate significant differences at the level of 5%.

Table 14. The effect of Interaction of Color Day - 2

Concentration of Flower Extract kecombrang (A)	Soaking Times (B)		
	b1 (30')	b2 (60')	b3 (90')
a1 (5%)	A 3,94 b	A 3,52 a	A 3,68 a
a2 (10%)	A 3,98 a	B 4,20 a	B 4,02 a
a3 (15%)	B 4,29 a	B 4,04 a	B 4,13 a

3.2.2.2 Testing Day – 4

Table 15. The Effect of Concentration of Flower Extract kecombrang of color Day - 4

Concentration of Flower Extract kecombrang (A)	Average	Real Degree
a1 (5%)	3,911	a
a2 (10%)	3,974	a
a3 (15%)	4,156	b

Table 16. The effect of Interaction of Color Day - 4

Concentration of Flower Extract kecombrang (A)	Soaking Times (B)		
	b1 (30')	b2 (60')	b3 (90')
a1 (5%)	A 3,88 a	A 4,01 a	A 3,84 a
a2 (10%)	A 3,98 a	A 3,83 a	B 4,11 b
a3 (15%)	A 4,10 a	B 4,09 a	B 4,28 a

Direction: Lowercase read direction horizontal and vertical directions read in uppercase letters.

3.2.2.3 Testing Day - 6

Table 17. The Effect of Concentration of Flower Extract kecombrang of color Day – 6

Concentration of Flower Extract kecombrang (A)	Average	Real Degree
a1 (5%)	3,863	a
a2 (10%)	4,048	b
a3 (15%)	4,178	b

Table 18. The effect of Interaction of Color Day – 6

Concentration of Flower Extract kecombrang (A)	Soaking Times (B)		
	b1 (30')	b2 (60')	b3 (90')
a1 (5%)	A 3,98 b	A 3,92 a	A 3,73 a
a2 (10%)	A 4,07 a	A 3,98 a	B 4,10 a
a3 (15%)	A 4,05 a	A 4,14 a	B 4,33 b

In kecombrang flowers on the compound there is a flavonoid that is the form of the red pigment anthocyanin on the flowers. Anthocyanin compounds including the flavonoids contained in its spread of pigment red flower (Naufalin, 2005).

3.2.3 Aroma

3.2.3.1 Testing Day – 2

Based on analysis of sources of variance (ANOVA), showed that the concentration of the kecombrang flowers extract (A), soaking times (B) and their interaction does not affected the aroma of fresh beef on a day - 2 so no need for further test of Duncan.

Beef with various treatment concentrations of extract of kecombrang flower and soaking time does not affected the aroma of fresh beef, aroma generated tend to be similar, likely fresh aroma typical kecombrang.

3.2.3.2 Testing Day – 4

Table 19. The Effect of Concentration of Flower Extract kecombrang of Aroma Day - 4

Concentration of Flower Extract kecombrang (A)	Average	Real Degree
a1 (5%)	3,774	a
a2 (10%)	3,778	a
a3 (15%)	3,959	b

Description: Each of the different letters indicate significant differences at the level of 5%.

3.2.3.3 Testing Day – 6

Table 20. The Effect of Concentration of Flower Extract kecombrang of Aroma Day - 6

Concentration of Flower Extract kecombrang (A)	Average	Real Degree
a1 (5%)	3,719	a
a2 (10%)	3,704	a
a3 (15%)	3,885	b

Description: Each of the different letters indicate significant differences at the level of 5%.

The higher the concentration of the extract, then the higher valuation panelists on the 6th day of storage, it is because of the volatile compounds contained in the extracts of the flowers of kecombrang already seeped into the meat so that it can cover the stench that of the beef.

3.2.4 Texture

3.2.4.1 Testing Day – 2

Based on analysis of sources of variance (ANOVA), showed that the concentration of the kecombrang flowers extract (A), soaking times (B) and their interaction does not affected the texture of fresh beef on a day - 2 so no need for further test of Duncan.

3.2.4.2 Testing Day – 4

Based on analysis of sources of variance (ANOVA), showed that the concentration of the kecombrang flowers extract (A), soaking times (B) and their interaction does not affected the texture of fresh beef on a day - 4 so no need for further test of Duncan.

3.2.4.3 Testing Day – 6

Based on analysis of sources of variance (ANOVA), showed that the concentration of the kecombrang flowers extract (A), soaking times (B) and their interaction does not affected the texture of fresh beef on a day - 6 so no need for further test of Duncan.

Based on the data analysis of variance showed that soaking the beef on the concentrations of kecombrang flowers extract and soaking time does not affected the texture of fresh beef. It shows that the higher the concentration of the extract and the longer the soaking process, will give the same effect on the texture of fresh beef during storage.

The decline in the value of the texture of the meat due to the presence of microbes that degrade the content of carbohydrates, protein and fat on the meat, so that its structure becomes does not compact, but can inhibit the occurrence of kecombrang plant degradation of the components on the meat (Naufalin, 2010). Moreover, the addition kecombrang can reduce the water content of the meat so that the texture of the meat is remains compact (Naufalin et al., 2010).

There was no effect on the texture attributes because various types of meat taken from cattle that are the same as the layout of the same muscle (thigh muscle) so that does not give effect to the texture attributes.

3.2.5 Taste

3.2.5.1 Testing Day – 2

Table 21. The Effect of Concentration of Flower Extract kecombrang of Taste Day - 2

Concentration of Flower Extract kecombrang (A)	Average	Real Degree
a3 (15%)	4,085	a
a2 (10%)	4,152	a
a1 (5%)	4,337	b

Description: Each of the different letters indicate significant differences at the level of 5%.

3.2.5.2 Testing Day – 4

Table 22. The Effect of Concentration of Flower Extract kecombrang of Taste Day - 4

Concentration of Flower Extract kecombrang (A)	Average	Real Degree
a3 (15%)	4,037	a
a2 (10%)	4,170	b
a1 (5%)	4,163	b

Description: Each of the different letters indicate significant differences at the level of 5%.

3.2.5.3 Testing Day – 6

Based of analysis of variance (ANOVA), showed that the concentration of the extracts kecombrang flowers (A), soaking times (B) and the interaction among the concentration of the extracts kecombrang flowers (A) and the long soaking times (B) does not affectes the taste of the beef that has been boiled, so no need for further testing of Duncan.

IV. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Based on the study of the research that has been done, these are the conclusions that can be given:

1. Based on preliminary research it can be concluded that the flowers of kecombrang with 3 x extraction, concentration of extract flowers kecombrang 10% and long soaking time is 60 minutes can effect on the total of colonies of bacteria that is equal to 7,60 x 10^2 cfu/g and is superior to the hedonic test results.
2. The Concentration of extract of flowers kecombrang effect the total of bacterial colonies, namely a total of bacterial colonies 1.45 x 10^3 cfu/g, affect on the color on day 2,4 and 6, the taste on day 4 and 6, as well as a sense of the day 2 and 4, but has no effect to the texture of the meat on day 2, 4 and 6.
3. The soaking times effect on the total of bacterial colonies, namely a total of bacterial colonies 1,59 x 10^3 cfu/g, but does not affected the color, aroma, texture and taste on days 2, 4 and 6.
4. The Interaction between the concentration of the extract of the kecombrang flowers and soaking times affected on the total of bacterial colonies,namely a total of bacterial colonies 1.23 x 10^3 cfu/g and affect on the color of the meat on the day 2, 4 and 6, but does not affected the aroma, texture and taste on day 2, 4 and 6.

4.2 Feedback

Based on the evaluations of the research that has been done, these are the feedbacks that can be given:

1. It's necessary to do the research of other extraction methods, in order to get the best antioxidant substances.
2. It's necessary to do the further research, in order to know the resistance and the storability of the beef soaked with kecombrang extracts.
3. It's necessary to do the further research about the effectiveness of the other parts contained in kecombrang as antibacterial for beef.

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