

Research Article

The Influence of Clove Addition on Physico-Chemical and Organoleptical Characteristics of Burger Meat

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Abstract: The research is aimed to understand the influence of the addition of clove on (physico-chemical and organoleptical characteristics of burger meat). Research design is Complete Random Planning using a control and various levels of clove such as 0.25 %, 0.50 % and 0.75 %. Data are tested with Analysis of Variance, and followed by Tukey Test and Friedman Test for organoleptical characteristics. The results showed that the addition of cloves were significantly effected ($p < 0.05$) on pH, water holding capacity, and cooking losses of the burger, but not affected significantly ($P > 0.05$) toward the water content burger. The highest pH was obtained in R0, i.e. 6.40 ± 0.00 and the lowest was in R1, i.e. 6.15 ± 0.06 . Meanwhile, the highest water holding capacity was found in R1, i.e. 30.31 ± 1.92 , while the lowest one was in R0, i.e. 23.58 ± 2.14 . Subsequently, the highest cooking losses was revealed in R0, i.e. 24.36 ± 0.70 , while the lowest one was in R3, i.e. 19.93 ± 0.85 . Organoleptical test is conducted against burger meat with clove addition to understand color, aroma, texture, and taste. Each panelist provides different rate. It is shown that the sample with the highest rated color is Sample 560 (without clove addition) and the lowest is Sample 573 (with clove addition). Aroma, texture and taste of the sample of burger meat are also examined.

Keywords: Cow Meat, Clove, pH, Water Holding Capacity, Cooking Loss

INTRODUCTION

Burger is a popular fast-food meal despite its limited quantity and relatively expensive price. Meat is base material of burger, and this makes burger practical to be a breakfast. Lipid is an important content of burger. The processing method is very simple. Sugar, salt and naturally modified spices are combined and safe for consumption [1] admits that every space can empower color, aroma, taste and texture of burger [2].

Some spices have quite strong antimicrobial activity, such as white onion (*Allium sativum L.*), ginger (*Zingiberofficinale*), turmeric (*Curcuma domestica*), and clove (*Syzqiumaromaticum*). Spices are usually used to preserve the processed meat because they are good antimicrobials and also play important role to improve taste and aroma of cooking [3]. Clove and white onion are useful as flavorings for cook and able to suppress bacterial growth [4]. However, researches about the use of clove in combination with other spices such as red onion, white onion, and nutmeg in the preparation of burger meat are still limited.

Clove (*Syzqiumaromaticum*) is a spice that has been long used as a natural source of flavor in various

processed foods. Clove contains volatile oil, lipid, protein within lipid oil, and eugenol compound as the antimicrobial [5-6].

MATERIAL AND METHODS

Site and Time

Materials

The sample of burger is 1.2 kg cow meats. The meat is obtained from meat seller in Pasar Bersehati Manado. The sample is stored in ice-filled thermos and brought to laboratory.

Sample Treatment

Meat is weighted to ± 300 gram and milled. Treatment of meat involves sugar (0.75g), salt (0.75g), red onion (23.5g), white onion (23.5g), nutmeg (0.5g), tapioca powder (115g), milk (100g), flavors (8g), yolk (2 grains), and butter (2 spoons). Clove is added into treatment in various levels, such as 0.25 %, 0.50 % and 0.75%. Physico-chemical characteristics (pH, water content, water holding capacity, cooking loss) are analyzed.

Organoleptical characteristics are measured with Hedonic Scale (1-7) which is anchored from 1 =

very dislike to 7 = very like. The scale involves 40 panelists comprising of 20 lecturer panelists and 20 student panelists from Department of Livestock Product Technology, Faculty of Animal Husbandry, University of Sam Ratulangi Manado.

Data Analysis

Each treatment is analysis with ANOVA, and followed by Tukey Test and Friedman Test to understand organoleptical characteristics.

RESULTS AND DISCUSSION

Burgers were generated by the addition of clove showed differences in pH, water binding power,

different cooking shrinkage. Table I sample burger pH is around 6.15- 6.40%, water content 39.94-40.27, while the water-binding power 23.58-30.31%, followed by cooking shrinkage 19-24.36%

The panelists organoleptic scores of burger samples with the addition of clove on Table 2. visible level of acceptance of the burger was a panelist on a sample of 560 (love) without clove while the burger samples showed 573 panelists (somewhat like) with the addition of cloves.

The physicochemical Burger with Cloves Addition

Table-1: The physicochemical properties of meat burgers*)

Clove Level	pH	Water Content (%)	Water Holding Capacity (%)	Cooking Loss (%)
R0 = Without Clove	6.40 ± 0.00 ^a	40.52 ± 0.84	23.58 ± 2.14 ^b	24.36 ± 0.70 ^a
R1 = 0.25 %	6.35 ± 0.06 ^a	39.94 ± 0.84	30.31 ± 1.92 ^b	22.92 ± 0.51 ^b
R2 = 0.50 %	6.20 ± 0.00 ^b	40.27 ± 0.88	29.78 ± 1.99 ^b	21.56 ± 0.49 ^b
R3 = 0.75 %	6.15 ± 0.06 ^b	40.22 ± 0.76	29.08 ± 1.49 ^a	19.93 ± 0.85 ^c

*)mean with standard deviation followed by the same letter within a column are not significantly different but gives a real difference (p <0.05) was the different letters

DISCUSSION

pH

Result of analysis shows that clove addition into burger meat has obviously different influence (p < 0.05) on pH of burger. The highest pH of burger is obtained in Control, by rate 6.40 ± 0.00, while the lowest is found in Clove 0.75 %, by rate 6.15 ± 0.06. The lowest pH of burger with clove addition may be due to the presence of phenol compound which is the derivation of eugenol and also the low-strength alcohol. Phenol compound at low pH will have positive load which is hardly to be ionized[7].

The structure of hydroxyl cluster of phenol compound plays important role in antibacterial activity where low pH is evident due to alkylation and hydrolysatation reactions such that it improves the distribution of phenol in liquid and lipid phases in bacterial cell membrane[8].

Water Content

Result of analysis indicates that clove addition into burger meat does not give obvious influence (p > 0.05) on water content of burger. The highest water content of burger is obtained from the addition of clove 0.50 %, by rate 40.27 ± 0.88, while the lowest is acquired from the addition of clove 0.25 %, by rate 39.94 ± 0.86. Four treatments of clove addition are not influencing water content of burger.

Water Holding Capacity

Result of analysis has shown that clove addition into burger meat has given obvious influence (p < 0.05) on water holding capacity of burger. The highest water holding capacity of burger is obtained from the addition of clove 0.25 %, by rate 30.31 ± 1.92, while the lowest is shown by the control, by rate 23.58 ± 2.14. Water holding capacity of burger is varied possibly because low pH of burger weakens the influence of water holding capacity. The rate of water holding capacity in meat is shown by the exiting liquid from meat (*drip*). Water holding capacity is influencing meat juiciness and also closely related to meat palatability[9-10]. Meat protein structure can change in elongated storage and it may debilitate the ability of meat to hold liquid[11-12].

Cooking Loss

Result of analysis has indicated that clove addition into burger meat has given obvious influence (p < 0.05) on cooking loss of burger. The highest cooking loss of burger is shown by the control, by rate 24.36 ± 0.70, while the lowest is found in the addition of clove 0.75 %, by rate 19.93 ± 0.85. The low rate of burger cooking loss is related to low pH. Water holding capacity of protein has big impact on cooking loss. Meat with low pH and low water holding capacity may lose liquids much such that meat weight is reduced and time for roasting is also short. According to Lawrie et al [10], water holding capacity is influencing cooking loss

of meat because high water holding capacity will reduce

cooking loss of meat during cook works.

Organoleptical Characteristics of Burger with Cloves Addition

Table 2. The Results of organoleptic scoring test of meat burger*)

Sample Code	Color	Aroma	Texture	Taste
560 = Without Clove	2.96 ^a	2.95 ^a	2.99 ^a	3.05 ^a
791 = 0.25 %	2.68 ^a	2.76 ^b	2.78 ^b	2.54 ^a
862 = .50 %	2.41 ^b	2.53 ^b	2.79 ^b	2.25 ^b
573 = 0.75%	1.95 ^b	1.76 ^b	1.45 ^b	2.16 ^b

*) means with different letters in the column gave significant differences ($p < 0.05$) on the organoleptic

Color

Result of analysis of variance has found obvious difference ($p \leq 0.05$) on burger color. Result of Wilcoxon test over color of burger with clove addition is elucidated as follows. The highest predilection rate of panelists is shown by sample code 560 with notation A, by rate 5.93 (like), while the lowest predilection rate of burger is shown by sample code 573 with notation B, by rate 5.28 (rather like). Different color is caused by different raw material, flavor type, and flavor dose in burger processing. The color may be different due to heating [13]. Maillard reaction can produce brownish color in the roasted product during the heating. Color change is a non-enzymatic reaction between protein and reducer sugars during the cook works[14].

Aroma

Result of analysis of variance has found obvious difference ($p \leq 0.05$) on aroma of burger with clove addition. Result of Wilcoxon test over aroma of burger with clove addition is explained as follows. The highest predilection rate of panelists on burger aroma is shown by sample code 560 with notation A, by rate 5.63 (like), while the lowest predilection rate is shown by sample code 573 with notation B, by rate 4.43 (rather like). Different type and dose of raw material used in preparation of burger with clove addition can influence aroma. The emergent aroma from burger with clove specific aroma, precisely aromatic compound of volatile oil, may then produce psychological effect, by rate strong scent. Yu and Zhang [13]) have reported that taste and aroma are so prominent because of Maillard reaction, temperature, timing, pH, water content and natural spices. This finding is supported by De Souza et al [15] that the use of spices in processed food may improve taste and aroma.

Texture

Result of analysis of variance has found obvious difference ($p \leq 0.05$) on texture of burger with clove addition. Result of Wilcoxon test over texture of burger with clove addition is elaborated as follows. The highest predilection rate of panelists on burger texture is shown by sample code 560 with notation A, by rate 5.83 (like), while the lowest predilection rate is shown by sample code 573 with notation B, by rate 4.68 (rather like).

Different texture of burger may be due to different spices or different dose of spices. The processing of burger through manual method can produce texture that is considered as similar by panelists. The ability of protein to absorb and to hold water plays important role in establishing the texture of food[16].

Antimicrobial and antioxidant compounds in natural spices, including clove, can maintain the quality of product although the sense quality attributes such as color, texture, taste and nutrient are changing due to oxidation [17].

Taste

Result of analysis of variance has found obvious difference ($p \leq 0.05$) on taste of burger with clove addition. Result of Wilcoxon test over taste of burger with clove addition is stated as follows. The highest predilection rate of panelists on burger taste is shown by sample code 560 with notation A, by rate 5.88 (like), while the lowest predilection rate on burger taste is shown by sample code 573 with notation B, by rate 5.25 (rather like).

Different taste of rather liked burger is possibly due to the presence of oleoresin compounds which give psychological effect on chilly scent and hot taste. Saumya et al [18] assert that antioxidant and taste properties of natural spices, including clove, may have double effect, which is resolving rancid smell and providing unique taste into processed meat. Iwanegle et al [19] have evaluated sense aspects of smoked and vacuumed rabbit meat which is processed with sugar, salt and spices, and stored at 8°C and 26°C for 0, 2, 4, 6 and 8 weeks. Their result indicates that the highest sense evaluation on flavor is obtained from the combination of meat+sugar+salt+spices, while tasty and tenderness are shown by the combination of meat+spices.

CONCLUSION

Based on the discussion, it is concluded that physico-chemical characteristics (pH, water holding capacity, cooking loss) and organoleptical characteristics (color, aroma, taste, texture) of burger meat with clove addition are not influencing the burger and is safe for consumption product because it is a

source of natural herbs, It can be said that processing burger with cloves yet available.

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