The Quality of Salted Egg Using Kemangi Leaf (*Ocimum basillicum L.*)

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ABSTRACT

The objective of this research were to determine the optimal percentage of kemangi leaf addition on salted egg. The method used in this research were using laboratory experiment consisted 5 treatments and 3 replications. The used of kemangi leaf in salted egg formulation were 0%, 5%, 10%,15%, and 20%. The data were analyzed using analysis of variance (ANOVA) and continued by Duncan Multiple Range Test. The result showed that the addition of kemangi leaf gave highly significant($P<0.01$) on the quality of salted egg including reduced level of moisture content, reduced level of pH, and increased antioxidant activity of salted egg. The conclusion of this research was the used 20% kemangi leaf gave the best quality of salted egg with water activity 0.94, moisture content 84.83%, pH 7.11 and antioxidant activity 7.73%

Keywords: Salted egg, kemangi leaf, antioxidant activity

INTRODUCTION

The products of animal have high nutritional value, one of them are the high content of animal protein, so it's easy to get damaged both physically, chemically and biologically damaged due to the activity of pathogenic microorganisms because protein is one of the main needs for the growth of pathogenic microorganisms, in order that preservation effort is very important to maintain egg quality. Food preservation technology is needed to increase the shelf life and at the same time increase the nutritional content in the food product in order to become functional food. One of the preservation of duck eggs is processing into salted eggs. Duck eggs have some unadvantages such as having large pores of the shell so it is very easy for pathogenic microorganisms to enter the duck eggs, and the smell is fishy, so the preservation of duck eggs is done by salting or marinating method to decrease the growth of microorganisms. The marinating method that done until now is soaking in salt or coating solution with salt dough and red brick powder or salt and ash dough. The time that required for immersion or dressing is approximately 14 days .

Kemangi leaf is a plant that is very easy to find and easy to grow anywhere, especially when the rainy season comes. Kemangi leaf have many benefits for the body such as antibacterial and antioxidants. The benefits contain in basil leaves , such as kemangi leaf is very good to fight free radicals, this is because kemangi leaf have excellent antioxidants to fight free radicals that will enter into the body, and as antibacterial. Antioxidants in the form of flavonoids and also eugenol can prevent the growth of bacteria, viruses, and fungi (Cahyani, 2014). Kemangi leaeves have atsiri oil content that is useful to decrease the damage and increase the taste in the food. Flavonoid is used as an antioxidant and tannin as an anti-

bacterial so it can increase shelf life on food storage. Flavonoids have the ability to alter or reduce free radicals as well as anti-free radicals (Giorgi, 2000).

MATERIALS AND METHODS

Materials. The materials used in the process of making salted eggs are duck eggs, salt, brick powder, water, and kemangi leaves of 3000 g. Sixty fresh duck eggs, the age are one day with weight range from 50 to 60 g comes from the farm of Mr. Gino Turen area, Malang. The equipment used in this research is oven, analytical scale brand Hwh type Dj3001A, Duran's dessicator, UV-Vis spectrophotometer, Aw meters from Ro-tronic hygropalm and Orion's pH meter.

Methods. The research method used in this research was experiment laboratory with Completely Randomized Design (CRD). The treatments included P0 ie without addition of kemangi leaves, P1 addition of kemangi leaves as much as 5%, P2 addition of kemangi leaves as much as 10%, P3 addition of kemangi leaves as much as 15%, and P4 addition of kemangi leaves as much as 20% of total paste dough. The ripening time of salted egg was 14 days. The pH of salted egg was measured using pH meter, the moisture content and water activity according to the method of AOAC (2005), antioxidant activity using DPPH radical scavenging activity was measured using the method of Nagwa *et al*. (2012)

Statistic. The data were analyzed using analysis of variance (ANOVA), if there were significant effect continued by Duncan Multiple Range Test.

RESULTS AND DISCUSSION

The result of variance analysis showed that the addition of kemangi leaf gave highly significant effect ($P < 0.01$) on water activity and salted egg antioxidant activity. The result of variance analysis showed that the addition of kemangi leaf didnot gave difference effect ($P > 0.05$) to the moisture content of white and pH of salted egg. The mean value of the effect of addition of kemangi leaf (*Ocimum basillicum L.*) on the production of salted eggs to the water activity, moisture content of egg white, pH and antioxidant activity is presented in Table 1.

Table 1. The mean value of the effect of addition of kemangi leaf (*Ocimum basillicum L.*) on salted eggs to the water activity, moisture content, pH and antioxidant activity

Treatment	Water activity	Moisture content (%)	pH	Antioxidant activity (%)
P0	0,96 ^{c} ±0,07	85,36 ±0,41	7,34 ±0,23	1,88^{a} ±0,51
P1	0,95 ^{b**}±0,01	85,34 ±0,67	7,29 ±0,09	3,11^{b**}±0,83
P2	0,95 ^{b} ±0,01	85,12 ±1,93	7,23 ±0,25	4,80 ^{c} ±0,83
P3	0,95 ^{b} ±0,02	84,89 ±0,46	7,18 ±0,10	6,46 ^{d} ±0,06
P4	0,94 ^{a} ±0,04	84,83 ±0,37	7,11 ±0,24	7,73 ^{e} ±1,09

Keterangan: ** = Different superscript within the same column gave a highly significant effect ($P < 0.01$)

Water activity. The results of the variance analysis showed that the addition of basil leaf gave highly significant effect (P <0.01) on Aw of salted egg. The highest Aw was obtained from the treatment without the addition of kemangi leaves 0.96(control). The lowest Aw is obtained from P4 that is by treatment of addition of kemangi leaves with concentration as much as 20% equal 0.94. The higher addition of kemangi leaves, the lower the activity of water in salted eggs.

The addition of kemangi leaf can decrease the activity of water in salted eggs, because the content of tannin compounds that exist in kemangi leaf. Tannin compound has function as an egg tanner that can reduce evaporation of water in duck eggs, this is accordance with the explanation Budisutiya and Arisandi (2006) which explains that the tannin compound can close the pores in the eggshell so it can inhibit the evaporation of water, inhibit microbial growth due to bitter taste in tannins that are not preferred by microbes. The decrease in the value of Aw is also caused by the salt used by the curing (NaCl) converted into Sodium (Na +) ions and Chlor (Cl) ions which have the ability to bind water causing Aw on salted eggs to decrease. Estiasih and Ahmadi (2009) said that the way to decrease the value of Aw is by adding a compound that can bind water. This is accordance with research that researchers have done by doing the process of marinating duck eggs.

The results of Aristyan, Ibrahim and Rianingsih (2014) have a range of water activity values of 0.73 to 0.78. However, the lowest value of water activity in salted egg research of kemangi leaf addition was higher than Aristyan *et al*. (2014) have done. This is allegedly due to the addition of kemangi leaves then the water activity when curing has increased.

Moisture content. The average data moisture content of salted egg with kemangi leaf addition can be seen in Table 1. The result showed that the addition of kemangi leaf did not gave significant effect (P> 0.05) to the moisture content of salted egg. The highest water content obtained from treatment without addition of kemangi leaves of 85.36%. The lowest moiture content obtained from P4 that is 84.83% with 20% kemangi leaf addition treatment. The higher the addition of kemangi leaf can decrease the moisture content in salted eggs.

The addition kemangi leaf can decrease the water content of salted egg, but did not gave significantly affect to the moisture content in salted duck eggs. The decrease in moisture content is caused by the tannin content that contain in kemangi leaves which can inhibit the evaporation of water, accordance with the statement of Budisutiya and Arisandi (2006) that the tannin compound can close the pores found in the eggshell so it can inhibit the evaporation of water and inhibit the microbial growth. Decrease in water content is directly proportional to the value of Aw where moisture content decreases with decreasing of Aw value. This is due to the salt content used as a paste that is hygroscopic so it can absorb water. Eggs have not storaged so that the water content of white part is low. Lisawati *et al.* (2002) explained that the amount of salt will affect the water content, the less salt that given the moisture content will increase and the more salt that given will decrease the moisture content.

pH value. The average data of pH salted egg analysis result with basil leaf addition can be seen in Table 1. The result of variance analysis showed that the addition of basil leaf did not gave significant difference (P> 0.05) to pH value on salted egg. The highest pH obtained from P0 with treatment without the addition of kemangi leaves of 7.34, and the lowest pH value obtained from P4 that is by treatment of addition of basil leaf with percentage as much as 20% equal to 7,11. The higher the addition of kemangi leaf, the lower the pH value in salted eggs.

The decrease of pH is because of the kemangi leaf with the different concentration that cause the evaporation of $C0_2$ dan H_2O inhibited. Budisutiya and Arisandi (2006) said that tannin compound can close the pores of eggshell so it can inhibited the water evaporation and inhibited the microbial growth. Tannin content also has a role to affect the pH of salted egg

because tannin has a role as ingredient for tanner of eggshell or skin thickening (Vieira, Lelis, da Silva, and Oliveira., 2011), so it can prevent the release or the CO_2 evaporation in salted egg. Tannin compound is astringent compound that has bitter taste from polyphenol group that can bind and precipitate or shrink the proteins. This also cause by the correlation between moisture content of salted egg and kemangi leaf had pH lower than salted egg pH. The lower of moisture content then the salted egg will more acid or decrease.

The decrease in pH value is also influenced by the pH of kemangi leaf which is the value is close to acid. Susmiati (2014) explains that the average value of white egg pH value is 7.55 to 8.06. The eggs that marinating have a rise in pH, but the addition of red galangal juice can reduce the pH value. The results are similar to this study where basil leaves themselves have a pH value of 5.5 to 6.5 where the value is close to the acid value resulting in a decrease in the pH of salted duck eggs by the addition of kemangi leaves. According to Lukman (2008), pH change in the process of marinating is not too high. The process of making salted eggs using both wet and dry methods can show a relatively slow change in yellow pH value, but others do not show any difference.

Antioxidant activity. The result of variance analysis showed that the effect of kemangi leaf significantly different effect ($P < 0.01$) on antioxidant activity on salted eggs. The highest antioxidant activity obtained from P4 with 20% kemangi addition(7.73%). The lowest antioxidant activity obtained from without treatment of adding kemangi leaf(1.88%).

Increased antioxidant activity occurs due to the addition of antioxidant substances from kemangi leaves which then move and enter into salted eggs so that the content of antioxidants in salted eggs with the addition of kemangi leaves is higher than the salted eggs without the addition of kemangi leaves. Some of the bioactive components in kemangi leaves include linalol 3.94 mg / g, estragol 2.03 mg / g, eugenol 0.896 mg / g, and 0.288 mg / g sineol which have antioxidant activity. Antioxidants are compounds that protect compounds or tissues from the destructive effects of oxygen tissue or oxidation effects. Antioxidant function is used as an effort to minimize the oxidation process from fat and oil, minimize the occurrence of damage process in food, and extend the life of material in food industry (Susanti, 2015).Some natural antioxidants, such as vitamin C, phenolic, vitamin E, beta-carotene and flavonoids. Flavonoids are some types of natural pigments in plants that are present in green fruits and vegetables. Substance composed of this type of compound has strong antioxidant properties, because it can overcome the effects of free radicals in the body and improve body health. Some sources say that these compounds have anti-cancer, anti-allergic and anti-inflammatory properties and some have hormonal effects. Increased antioxidant content is thought to be influenced by low water activity and moisture content in salted eggs, because eugenol and flavonoids in kemangi leaves are oil-like and slightly soluble in water, so if the lower the moisture content the antioxidant content in salted eggs increases.

The research from Suryatno *et al*.(2012) on salted eggs added with ginger extract increase from day-to-day, whereas in salted eggs without the addition of ginger extract tended to be the same, almost there's no change from the duration of curing 7 days to 20 days. The longer the curing process on salted eggs added with ginger extract, the higher the antioxidant activity. The results are similar to this research because of the similarity of antioxidant content in ginger and basil leaves that contain antioxidants which, when added in foodstuffs can increase the antioxidant content of the food.

CONCLUSIONS

It could be concluded that by using kemangi leaves as much as 20% gave the best quality of salted egg which has water activity 0.94 ± 0.004; moisture content 84.83% ± 0.37; pH values of 7.11 ± 0.24 and antioxidant activity of 7.73% ± 1.09.citations, what the findings of this research imply for animal production and (or) biology.

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