

Physical, Chemical, and Microbiological Characteristics of Healthy Drink that Contains Honey and Duck Egg Yolk in Difference Age

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Abstract

Egg as a source of protein has many benefits. All parts of the egg could be used as a source of food; for instance, egg yolk is used as an ingredient for herbal drinks. Mixing raw eggs in drinks like herbal medicine, energy drinks or food have become a habit for some people. The addition of egg yolk into drinks such as herbal medicine had to be supervised because it usually used raw eggs. Raw eggs are easily contaminated by bacteria during storage. The objective of this research was to analyze physical, chemical and microbiological characteristics of herbal drinks that contain duck egg yolk and honey. Complete Randomized Design with two-factor factorial pattern was used in this experiments design. The first factor was the treatment of honey addition (addition of honey and without addition of honey) and the second factor was the difference in age of the egg (day 2, day 5, and day 8). Data was processed by using ANOVA, then the results that showed significant effect was further analyzed by using Tukey's test. Data on the microbiological properties were analyzed descriptively. The temperature increased significantly with honey addition. pH decreased significantly with honey addition and increased significantly during storage. The interaction between honey addition and the difference in age of the egg had significant effect in viscosity, water contents and protein contents of herbal drink. Honey was not only known as calorie source but also it had ability to reduce the amount of microbial contamination in herbal drink that contained egg yolk. The result of microbiological test showed that duck egg yolk was safe to eat until day 8 of storage.

Keywords: duck egg yolk, herbal drinks, honey, storage

Introduction

Egg is one of the animal origin food nutritious because it contains nutrients needed by human body such as proteins with a complete amino acid, fat, vitamins, minerals and have a high digestibility. Despite of as a source nutrition for humans, food

derived from animal is a food source for microorganisms. Eggs as a source of animal protein should be guaranteed safety for consumers, because eggs are perishable food. One is the use of eggs as an ingredient for health drinks. Mixing raw eggs in drinks like herbal medicine, energy drinks or food have become a habit for some people. The addition of egg yolk into drinks such as herbal medicine had to be supervised because it usually used raw egg. Raw eggs are easily contaminated by bacteria during storage. As a health drink, duck egg yolk usually mix with honey. It is necessary to study of physical, chemical and microbiological characteristics health drink that contains honey and duck egg yolk in difference age.

This objective of this research was to study physical, chemical and microbiological characteristics health drink that contains honey and duck egg yolk in difference age.

Materials and Methods

Location and Time

This research was done in the Integrated laboratory at Faculty of Animal Husbandry, Bogor Agricultural University, in August-December 2010.

Materials

Egg samples used in this study were duck eggs which different age (day 2, day 5 and day 8). Egg samples used were obtained from farms in Leuwiliang, Bogor.

Procedures

Samples of duck eggs wiped with alcohol before broken. After a broken egg, each egg was separated between albumen and yolk. Duck egg yolk was treated by adding honey in the ratio 2:1. The yolk was added with honey, whipped homogeneously. The characteristics studied were physical, chemical and microbiological.

Parameters were measured

Physical properties testing conducted on the study include color, viscosity and temperature. Testing chemical properties measured were pH value (AOAC, 1995), protein content, and moisture content (SNI 01-2891-1992). Microbiological quality included: total plate count (TPC), *Salmonella*, *Escherichia coli* and *Coliforms* (DSN, 1992).

Experimental Design

Complete Randomized Design with two-factor factorial pattern was used in this experiments design. The first factor was the treatment of honey addition (with and without addition of honey) and the second factor was the difference in age of the egg (day 2, day 5, and day 8). Data was processed by ANOVA, then the results

that showed significant treatment effect was further analyzed by using Tukey's test. Data on the microbiological properties were analyzed descriptively.

Results and Discussion

Microbiological Characteristics

Based on Table 1 can be assumed that health drink contained honey and duck egg yolk had lower of total plate count than without the addition of honey. Based on the SNI 01-7388-2009 (DSN, 2009) until the eighth day, duck egg yolks are safe for consumption.

According to Tonks (2003), honey has antimicrobial activity or anti-bacterial, because honey has a moisture content that is relatively low at less than 20% and a high sugar content. The condition do not support to the growth of microorganisms due to osmotic effects that can kill microorganisms. Honey has a low pH levels that can inhibit the growth of microbes, has a large osmotic pressure and the carbon to nitrogen ratio is high (Rosita, 2007). In addition, honey can inhibit the growth of microorganisms through a compound of hydrogen peroxide produced.

Contamination of *Salmonella* and *E. Coli* were not found in duck egg yolks with or without the addition of honey. However, *Coliform* contamination was found in duck

Table 1. Microbiological characteristics of duck egg yolk with or without addition of honey in difference age

Difference age	Addition of honey	Without addition of honey
Total Plate Count	CFU / g.....	
Day 2	< 30×10 ¹ (1x10 ¹)	< 30×10 ¹ (1.5x10 ¹)
Day 5	< 30×10 ¹ (6,5x10 ¹)	< 30×10 ¹ (12.5x10 ¹)
Day 8	< 30×10 ² (0,9x10 ²)	< 30×10 ² (1.1x10 ²)
Coliform	CFU / g.....	
Day 2	< 30×10 ¹ (1×10 ¹)	< 30×10 ¹ (2x10 ¹)
Day 5	< 30×10 ¹ (1,5x10 ¹)	< 30×10 ¹ (2.5x10 ¹)
Day 8	< 30×10 ¹ (0,6x10 ¹)	< 30×10 ² (0.4x10 ²)
Salmonella	/ 25 g.....	
Day 2	Negatif	Negatif
Day 5	Negatif	Negatif
Day 8	Negatif	Negatif
<i>E. coli</i>	CFU / g.....	
Day 2	< 30×10 ¹ (0×10 ¹)	< 30×10 ¹ (0×10 ¹)
Day 5	< 30×10 ¹ (0x10 ¹)	< 30×10 ¹ (0x10 ¹)
Day 8	< 30×10 ¹ (0x10 ¹)	< 30×10 ¹ (0x10 ¹)

egg yolks with or without the addition of honey. *Coliform* contamination in duck egg yolk without the addition of honey was higher than the addition of honey. *Coliform* increased during storage. Until the eighth day, both the duck egg yolks with the addition of honey or without the addition of honey were not in accordance with SNI 01-7388-2009 (DSN, 2009) which states in food Coliform limit is 3 CFU/g. Honey could inhibit the growth of pathogenic bacteria such as *E. coli*, *Salmonella* Typhimurium, *Listeria monocytogenes*, *Bacillus cereus* and *Staphylococcus aureus* (Taormina *et al.*, 2001).

pH value

The analysis showed that the pH range duck egg yolk significantly different ($P < 0.05$) by differences in age of duck eggs and highly significant ($P < 0.01$) by the addition of honey treatment (Table 2). There is no interaction between factors A (addition of honey) and factor B (aged eggs) to the pH value of egg yolk. pH value of duck egg yolks with the addition of honey was lower than without the addition of honey. The addition of honey made reducing of pH value because honey has pH at 3.65 – 4.96 and duck egg yolk has pH at 6-6.5.

Differences in the age of eggs used also showed differences in the pH of the yolk. pH increased during storage, this might be caused by H₂O and CO₂ evaporation in the eggs. Evaporation of CO₂ in the egg caused by compounds that break down into NaOH, NaHCO₃, and NaOH will decompose back into ions Na⁺ and OH⁻ (Silverside and Scott, 2000).

Table 2. pH value of duck egg yolk with or without addition of honey in difference age

Difference age	Addition of honey	Without addition of honey	Average
Day 2	5.78±0,04	6.08±0,02	5.93 ^b
Day 5	5.83±0,04	6.15±0,08	5.99 ^{ab}
Day 8	5.86±0,09	6.19±0,05	6.02 ^a
Average	5.82 ^B	6.14 ^A	

Note: Means in the same coloumn with different superscript differ significantly $P < 0.05$

Means in the same row with different superscript very differ significantly ($P < 0.01$)

Temperatures

Duck egg yolk temperature affected highly significant ($P < 0.01$) by the addition of honey treatment, but did not differ ($P > 0.05$) by differences in age of eggs and also there is no interaction between both factors. Average temperature can be seen in Table 3. Temperature of duck egg yolks with the addition of honey was higher than without the addition of honey. Honey contains carbohydrates especially fructose which is nutrients as an energy source.

Viscosity

The treatment of honey addition, age of the egg and interaction had highly significant effect on viscosity ($P < 0.01$) (Table 4). The addition of honey increased on viscosity of health drink, but viscosity decreased during storage.

Water Content

The treatment of honey addition and age of the egg had no significant effect on the water content. The average of water content was 42.97% (Table 5).

Table 3. Temperature of duck egg yolk with or without addition of honey in difference age

Difference age	Addition of honey	Without addition of honey	Average
Day 2	24.13±0.12	23.77±0.40	23.95
Day 5	24.03±0.25	23.7±0.20	23.87
Day 8	23.97±0.15	23.53±0.32	23.75
Average	24.04 ^A	23.67 ^B	

Note: Means in the same row with different superscript very differ significantly ($P < 0.001$).

Table 4. Viscosity of duck egg yolk with or without addition of honey in difference age

Interaction	Factor A x Factor B	Viscosity (dpa.s)
1	KT ₀ H2	7.33±0.58 ^A
2	KT ₀ H5	4.70±0.26 ^B
3	KT ₀ H8	3.73±0.25 ^C
4	KT ₁ H2	1.83±0.21 ^D
5	KT ₁ H5	0.93±0.06 ^E
6	KT ₁ H8	0.73±0.06 ^E

Note: Means in the same column with different superscript very differ significantly ($P < 0.001$).

Table 5. Water content (%) of duck egg yolk with or without addition of honey in difference age

Difference age	Addition of honey	Without addition of honey	Average
Day 2	42.58±2.63	42.64±0.46	42.61
Day 5	42.92±0.87	43.13±1.32	43.03
Day 8	43.32±1.74	43.23±1.11	43.28
Average	42.94	43.00	

Table 6. Protein content (%) of duck egg yolk with or without addition of honey in difference age

	Addition of honey	Without addition of honey	Average
Day 2	13.07±1.79	18.50±0.36	15.79
Day 5	11.89±0.43	17.77±1.00	14.83
Day 8	12.75±2.69	18.13±1.18	15.44
Average	12.57 ^B	18.13 ^A	

Note: Means in the same row with different superscript very differ significantly (P<001).

Protein Content

The treatment of honey addition had highly significant effect on protein content (P<0.01) (Table 6). Protein content of duck egg yolks with the addition of honey was lower than without the addition of honey. Decreasing of protein content of duck egg yolk with honey addition was caused by increasing of water content.

Conclusion

Honey was not only known as calorie source but also it had ability to reduce the amount of microbial contamination in herbal drink that contained egg yolk. Based on total plate count test, duck egg yolk was safe to eat until day 8 of storage. Otherwise based on coliform test, duck egg yolk was not safe to eat until day 8 of storage.

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