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Effect of Storage Period Eggs on Egg Quality Characteristics Naked Neck Chicken

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ABSTRACT: Eggs are one of the farm products that have a high market share, prices are relatively cheap and protein with a complete amino acid. Therefore egg storage must be considered because it will affect to egg quality. The aim of the study was to examine the effect of storage periods egg on egg quality external and internal characteristics. The research using egg Naked Neck chicken 60 grains (20 grains per treatment). For treatment 3 and 7 days eggs stored at room temperature. To examine the external and internal egg quality used by egg multi tester EMT-5200.The results showed that almost all the external and internal quality variables egg Naked Neck chicken was not affected by storage period, except for the egg weight, yolk weight and Haugh unit (HU) score. Eggs at stored 7 days different significantly with treatment 0 and 3 days ($P < 0.05$) at 41.25±9.07 vs. 35.59±6.14 vs. 35.59±6.14 (egg weight) and 14.81±3.72 vs. 11.55±2.35 vs. 12.16±2.12 (yolk weight). As for the best HU score is at 0 day storage period eggs (fresh) ($P < 0.05$) compared with 3 and 7 days. The percentages of yolk color almost evenly for all treatments ranging from a score of 3-10. It can be concluded that the characteristics of the external and internal egg quality of Naked Neck chicken foremost influenced by egg storage time period is the score of HU.

Keywords: Naked Neck Chicken, Storage Periods, Egg Quality

INTRODUCTION

The quality of chicken eggs is determined by external and internal egg quality. Both are very important for the egg industry (Roberts, 2004). Currently concern about the quality of the egg continues to grow (Kemps *et al*., 2006). During the egg storage will change the content, so the quality will decline. Storage time seems to be a factor that affects the quality of the albumen or Haugh unit (HU). Haugh unit (HU) is a standard for measuring the internal quality of the egg (albumen quality and freshness of eggs) (Keener *et al*., 2006). The higher the HU score, the higher the quality of the egg whites. Eggs were stored longer will reduce the viscosity so that the egg whites HU score will decrease (Raji *et al*., 2009; Tona *et al*., 2013).

As a model, in studies using eggs Naked Neck chicken. Naked Neck chicken is the type of chicken that naturally do not have feathers on the neck and is one of the local Indonesian chicken germplasm. Naked Neck chicken originated from Transylvania, Romania and spreads all over the world were brought by the Dutch East India Company in order to trade around the 17th century (Ramsey *et al*., 2000). According to Islam and Nishibori (2009), Naked Neck chicken have good adaptation to tropical environments and low nutrient nutrition, and disease resistance, and superior to the normal feathered chickens in terms of growth, egg production, quality of eggs and meat. Based on the above, the study was conducted to determine and obtain information on the effect of storage period on the external and internal quality characteristics of eggs Naked Neck chicken.

MATERIALS AND METHODS

Samples of eggs

Eggs are used in the study were collected from the chicken complex Indonesian Research Institute for Animal Production (IRIAP) approximately 60 grains. Each treatment consisted of 20 items. For the treatment period of 3 and 7 days of storage, eggs stored at room temperature.

Measurement characteristics of external and internal egg quality

All variable characteristics of the external and internal egg quality in research are measured automatically using egg multi tester EMT-5200 (Robotmation, Co., Ltd., Tokyo).

Grade eggs

To grade eggs, using standard research from the United States Department of Agriculture (USDA) (2000) is the standard eggs generally has three grades, namely Grade AA, grade A and grade B. HU score 72 or more, egg white of not colorless and still static including AA quality. HU score of 60 to 71 with egg white looks limpid and somewhat static include quality A, while the quality of the eggs with a HU score of 31 to 59 with egg white looks limpid but already somewhat liquid and not static then include quality B.

Statistical analysis

Data were analyzed using One Way ANOVA with SPSS 17.0 by a factor of egg storage period. If the results analysis of treatment are different, then followed by Duncan's comparison Multiple Range Test (Steel and Torrie, 1995). As for the color of egg yolks analyzed description (percentage).

RESULTS AND DISCUSSION

External quality characteristics of eggs

Statistical analysis showed that the external quality eggs Naked Neck chicken for variable weight and thickness of eggshell showed no difference ($P>0.05$), whereas for egg weight 7 day storage period shows the influence of different ($P<0.05$) with storage periods 0 and 3 day (Table 1). This is due at the beginning of egg retrieval for each randomized treatment, egg weight only known after weighing for each treatment. However, the weight of the eggs used in the research is still in the normal range, with the range of 30 to 50 g.

Table 1.External quality characteristics of eggs Naked Neck chicken according to the storage period (average ± standard deviation)

Storage Period (day)	Egg Weight (g)	Eggshell Weight (g)	Thick Shell (mm)
0 (fresh)	35.59a±6.14	2.52a±0.66	0.45a±0.03
3	36.24a±5.59	2.41a±0.98	0.44a±0.05
7	41.25b±9.07	2.79a±1.20	0.42a±0.04

Description: The letters are not the same as the direction of the columns indicate significant differences ($P<0.05$).

Judging from its weight, the weight of egg Naked Neck chicken in research to three treatments egg weighs about the same as the results Uddin *et al*. (2007), Yakubu *et al*. (2008), Faruque *et al.* (2010) and Udoh *et al*. (2012), which ranged from 40.55 to 45.82 g. But lower than the results of the study Rajkumar *et al*. (2009), Isidahomen *et al.* (2013) and Usman *et al.* (2014)

who get egg weight between 52.70 to 57.52 g. Variations in egg weight reported adversely affected by differences in the age of chicken, ambient temperature, nutrient content in the diet, time of feeding and body weight of chickens. According to Rajkumar *et al.* (2009) egg weight gradually increase with age cock and showed a positive correlation between egg weight and age.

Statistical analysis of the heavy shell of the three treatments was no different due to egg storage period. The mean value of the eggshell weight Naked Neck chicken in the study ranged from 2.41 to 2.79 g, with the heaviest in the treatment eggshell are egg storage period on day 7 in the amount of 2.79 g ± 1.20. This is due to heavy shell has a positive correlation with the weight of the egg (Rajkumar *et al*., 2009). This is reinforced by the results of the research, in which the storage period of 7 days to get the average egg weight and egg shell weight higher than the other treatments. However, the average weight of eggshell in this study was lower than the weight of the eggshell Naked Neck chicken raised in Nigeria and India in the amount of 4.48 g (Yakubu *et al.*, 2008) and 5.07 g (Rajkumar *et al*., 2009).

Eggshell thickness reflects the strength of the egg. Eggshell thickness in the study showed no significant differences due to treatment storage period. Average of eggshell thickness Naked Neck chicken ranged from 0.42 to 0.45 mm, thicker than the thickness of chicken eggshell chicken Wareng Tangerang and Arabic, respectively ranged from 0.30 to 0.33 and 0.33 to 0.35 mm (Iskandar *et al*., 2007; Sari, 2012).

Internal quality characteristics of eggs

Unlike the external quality characteristics, the results of statistical analysis of the internal quality of eggs, there are two variables that are affected by storage period i.e. yolk weight and score Haugh unit (HU) (Table 2). As for the weight of albumen had no differences (P>0.05).

Table 2.Internal quality characteristics of eggs Naked Neck chicken according to the storage period (average ± standard deviation)

Storage Period (day)	Yolk Weight (g)	Albumen Weight (g)	Haugh Unit
0 (fresh)	11.55a±2.35	23.23a±5.13	62.56b±11.11
3	12.16a±2.12	23.83a±3.82	54.30a±10.19
7	14.81b±3.72	26.36a±5.84	56.19a±12.76

Description: The letters are not the same as the direction of the columns indicate significant differences (P<0.05).

The percentage of egg yolk around 30 to 32% of the weight of the egg, this is evidenced by the results of the study showed the following results, the treatment 7 days storage yolk weight heavier than the storage period of 3 days and 0 day. Likewise, of 3 day storage period, the egg yolk weight heavier than of 0 day storage period. It is influenced by the weight of the eggs, as already mentioned at the beginning, where the weight of the eggs that get treatment period of 7 days storage heavier compared to 3 days and 0 day, respectively (41.25 vs. 36.24 vs. 35.59 g).The mean weight of yolk in this study was lower than the results Rajkumar *et al.* (2009) 17.12 g. However, the lower the weight of the egg yolk shows that it has a lower fat percentage (Rajkumar *et al.*, 2009).

Results of research for albumen weight showed no significant differences between egg storage periods ranging from 23.23 to 26.36 g (Table 2), but the 7 days storage period showed the highest albumen weight. The mean weight of albumen in the study is similar to the weight of albumen Naked Neck chicken which was reported Udoh *et al.* (2012) in the amount of 23.89 g. But higher than the results of the study Yakubu *et al.* (2008) that the average weight albumen at 20.53 g. Statistical analysis showed that the storage period score HU significantly (P<0.05). The

higher the score HU showed superiority albumen quality. However, a score of HU in this study was lower than the results of the study Uddin *et al.* (2007) and Yakubu *et al*. (2008) can achieve a score of 73 to 73.22.

Scoreyolk color

One indicator that can determine the quality of the egg is the color of egg yolks. The higher the score yolk color, the better the quality of the eggs. The results showed that score the color of egg yolks Naked Neck chicken vary from 3 to 10 (Table 3).

Variationin the color of the yolk in the study was not caused by the influence of the storage period, but more determined by the presence or absence of xanthophyl. If the feed has a lot of yellow plant pigments known as xanthophyl will be stored in the yolk, causing yolk color becomes soupy (Dunga, 2013). Xanthophyl is pigment carotene from food that was eaten by chicken. The pigment is transferred into the blood stream and egg yolks. As a result, more pigment deposited in the yolk. This has resulted in a layer of light and dark on the yolk material. The total thickness of the dark and bright parts for stockpiling 24 hours is approximately 1.5 to 2.0 mm (Yumna *et al.*, 2014). Isidahomen *et al.* (2013) says that the egg yolk color was more influenced by environmental rather than genetic factor. The influence of genes is not clear to score yolk color.

Table 3. Characteristic of egg yolk color Naked Neck chicken according to the storage period (percentage)

Scoreyolk color	Storage Period (day)		
	0 (fresh)	3	7
3	-	-	5
4	25	15	25
5	50	70	20
7	15	10	20
8	-	-	20
9	10	5	5
10	-	-	5

CONCLUSIONS

From the data obtained it can be concluded that the characteristics of the external and internal egg quality Naked Neck chicken foremost influenced by egg storage time period is HU score. HU Score 0 today provide greater value than the HU scores 3 and 7 days.

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