Physical Characteristic and Chemical Composition of Maleo (Macrocephalon Maleo), Native chicken and Duck eggs

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ABSTRACT

The research was conducted as a comparative study concerning physical and chemical quality of eggs produced by Maleo (34 to 36 week old), native chicken (32 to 35 week old), and laying ducks (30 to 37 week old). Sampling was taken in the form of 9 eggs of ex-situ breeding Maleo at Lore Lindu National Park Central Sulawesi, 121 eggs of scavenger native chicken, and 90 eggs of ducks which were let free on rice field for 5 hours daily in Yogyakarta Province Special. The eggs were measured to see its' physical characteristics, and were broken followed by chemical analysis to see its chemical composition. Statistical analysis was done to evaluate mean and standard deviation values. The results indicated that Maleo's egg weight which was 220.5 g, it was 15.1% of body weight. Yellow color and weight of egg yolk was extremely higher, with lower albumen weight in the case of Maleo eggs compared to albumen of native chicken and duck eggs. Fat, cholesterol, and vitamin A contents were also higher on Maleo eggs compared to the other two poultry species. Similar status was found in the case of protein content. MUFA content of Maleo eggs were higher than duck eggs, and vice versa in the case of PUFA. SAFA contents of the three type of eggs were found relatively similar.

Key words: Physical and chemical quality, Egg, Maleo, Native chicken, Duck.

INTRODUCTION

The Maleo birds which are found in Central Sulawesi Indonesia have been critically found themselves are in endangered state. The birds were known as an endemic animals peculiarly found in a peculiar region, were included in the Red list Data Book of IUCN on the Appendix I CITES (IUNC, 2008). The reducing number of the population is mainly caused by uncontrolled quarry, continuous degradation and fragmentation of the habitat of the maleo birds, poor protection and low attention from the people on the habitat. The characteristics of these birds are that they do not hatch the eggs, and they do not look after the young. Hatching is done by nature, very much depend on the geothermal of the grooves or holes where the birds put their eggs (Dekker and Brom, 1990). The eggs are layed in holes of 63.29±8.4 cm deep with diameter of 41.6±9.7 cm. Various information or data such as physical characteristics and chemical composition are needed to be explored as basic data in the effort of increasing the birds' population numbers. The data can be used as basic information for the development of expanding life of maleo birds. Native chickens as another type of poultry animals in Indonesia were kept scavenging at remote villages, their feeding was based on whatever was found on the garden or backyard. It was so that the quality of their eggs varied based on the available feeds at the backyards (Yuwanta and Fujihara, 1999). On the other hands ducks which were also known as egg producers were kept by farmers herded around rice fields, ditches, or ponds for 5 to 8 hours per day and received additional feeding of rice bran and kitchen wastes. It made different quality of eggs being produced by ducks kept by different farmers (Harimurti et al., 2009). This research was conducted as a comparison study of physical characteristics and chemical composition of eggs produced by the three respective bird types which were kept free scavenging, a start leading to the increase of population numbers especially of those maleo birds.

MATERIAL AND METHODS

The research was started with eggs produced by Mateo birds of 34 week of ages having average bogy weight of 1.75 kg, which were kept ex situ in breeding housing at National Park of Lore Lindu, Palu Central Sulawesi. Free choice feeding was offered to the experimental birds. Eggs of Maleo birds were collected from the laying holes of 63 cm deep, and diameter of 42 cm. The collected Maleo eggs were weighed individually, was chicken eggs were randomly collected

from several groups of farmers who kept their chickens free scavenging during daytime looked for feeds on the backyard, and let the birds stayed in chicken housing in the evening and were fed with additional feeding of rice bran. Samples of duck eggs were collected from several groups of duck which were herded around rice fields or ponds for 5 to 6 hours per day. All of the collected eggs were broken, all underwent test to determine its' physical and chemical quality. The average values from the test results were to be compared between the three types of the experimental birds.

RESULTS AND DISCUSSION

It is shown in Table 1 that the eggs of Maleo birds was in average of 220.50 g, while native chicken eggs weight was in average of 41.62 g, and duck eggs was 69.85 g. The percentage values of Maleo egg was 15.1% of body weight, native chicken egg was 2.33%, and duck egg was 3.77% of body weight. Weight of Maleo eggs were extremely higher than the eggs of those the other two birds. In respect of the egg shell weight on the other hand, Maleo eggs had only 7.80% of the total egg weight, while native chicken eggs had 9.31%, and duck eggs had the biggest percentage of 11.63% (Hafsah et al., 2006). Different matter were found on the case of percentage values of albumen and egg yolk. Albumen of Maleo eggs was found 24.17% of the total egg weight, while on the case of native chicken and duck eggs were found approximately twice of it. Yolk of maleo eggs was found 67.84% while yolk of native chickens and ducks were found approximately half of it. Maleo consumed higher fatty feeds compared to the other two birds when they were out scavenging. Yolk color values of Maleo and duck eggs were found 14-15, were considerably higher than native chicken eggs of 8-9. The herded ducks consumed high biota from the sea and rice fields giving more intense yellow color values to the yolk (Harimurti et al., 2009).

Table 1. Comparison of physical characteristics of Mateo, native chicken and duck eggs

Physical characteristics	Mateo (n=9)	Native chicken (n=l 21)	Duck (n=90)
Egg weight (g)	220.50	41.62	69.85
Egg index(%)	72.94	74.81	81.75
Egg shell (%)	7.80	9.31	11.63
Albumen(%)	24.17	51.44	54.03
Yolk(%)	67.84	39.25	35.75
Haugh unit	67.41	76.92	77.52
Egg shell weight (%)	25.64	4.98	7.25
Shell thickness (mm)	0.39	0.35	0.44
Yolk color index	14-15	8-9	13-14

Shell thickness of duck eggs was 0.44 mm, which was thicker than Mateo eggs 0.39 mm and native chicken eggs 0.35 mm. Shell thickness of duck eggs was considerably higher than the eggs of the other two types of birds, due to high consumption of oysters and snails on rice fields.

The results from chemical analysis of the eggs are presented on Table 2. Moisture contents of Mateo and native chicken eggs were almost similar with the values of 69.93% and 67.50%, respectively. Moisture content of duck eggs was the highest with the value of 77.04%. Crude protein content (%/100 g) was found highest on Mateo egss with the value of 16.26%, and the lowest was found on native chicken eggs of 11.70%. Maleo eggs had extremely high fat content which was 38.89% which was caused by high consumption of high fat ingredient such as *kemiri (Aleuriies mollucana)* while duck eggs had fat content of only 9.49%. Maleo eggs also had very high cholesterol content of 405,92 mg/I 00 g egg yolk dry matter basis. Lower values of cholesterol content were shown on native chicken and duck eggs with the values of 226.13 mg/100 g and 223.36 mg/100 g, respectively. Status of cholesterol content was very much related to fat content of yolk, and associated with feed ingredients being consumed (Hafsah *el al.*, 2006 and Hafsah, 2009).

Table 2. Comparison of nutritive characteristics of Maleo, native chicken, and duck eggs (chemical composition)

Component	Maleo egg (n=3)	Native chicken egg (n=9)	Duck egg (n=10)
Water (%)	69.93	67.50	77.04
Protein (%)	16.57	11.70	13.14
Fat (%)	38.89	17.10	9.49
Ash (%)	3.55	3.17	3.71
Calcium (mg)	1.08	0.27	0.43
Phosphorus (mg)	2.48	0.76	0.33
Cholesterol (mg/100 g)	405.77	226.13	223.36

There was no dependable data on fatty acids composition of native chicken eggs as it is presented in Table 3. It was indicated that Maleo eggs containing considerably high of oleic acid (C18:1) and palmitic acid (C16:0) as much as 25.82% and 19.54%, followed by stearic acid (C18:0) with value of 9.27%. These values were much different with fatty acids content values found in duck eggs. It was also indicated that total MUFA content of Maleo eggs was found higher than MUFA found in duck eggs, but total PUFA content on the contraty is lower. SAFA content was found relatively similar between eggs of the two types of birds.

Table 3. Fatty acid composition(% relative in 1 g sample)

Component	Mateo egg (n=3)	Duck egg (n=4)
Miristat (C14:0)	4.90	1.65
Palmitat (Cl 6:0)	19.54	1.64
Palmitoleat (Cl6:1)	1.31	0.23
Stearat (Cl 8:0)	9.27	1.28
Oleat (Cl8:1)	25.82	1.80
Linoleat (Cl 8:2)	3.65	0.73
Linolenat (Cl8:3)	0.66	0.28
Arachidonat (C20:0)	0.38	-
Eicosatetraenoic acid	-	2.46
Eicosapentaenoic acid	-	1.63
Doxosahexaenoic acid	-	1.16

CONCLUSSION

Results from study indicated that the egg weight of Maleo bird was 220.5 g which was 15 .1% of its body weight. Weight of egg yolk and its yellow color of Maleo bird had extremely high values, while its albumen percentage was lower than native chicken and duck albumen. Fat and cholesterol contents were shown higher in Mateo eggs, so was the value of protein content of the albumen. MUFA content in Maleo eggs was higher than MUFA content in duck eggs, but on the contrary was in the case of PUFA content. SAFA contents of the three bird types was relatively similar.

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