

REPRODUCTIVITY AND EGG QUALITY OF H'MONG CHICKEN

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ABSTRACT

This study was carried out at the experimental farm of Vietnam National University of Agriculture (VNUA) during six months from August, 2016 to February, 2017. H'mong chickens were raised in three plots in order to observe reproductive performance and egg quality. The results showed that productive performance of H'mong chickens was low in comparison with other local breeds. On average, the first egg laying age was 151.67 days when their body weight was 1323.8 grams. Twenty two to forty two week-old hens resulted in the average reproductive performance as 24,12 eggs/hen, laying rate as 17.23 percents, and FCR as 6.58 kg/10 eggs. Egg quality of H'mong chickens conformed to all standards of high-quality local eggs.

Key words: H'Mong chicken, reproductive performance, egg quality

1. INTRODUCTION

The conservation of genetic resources for indigenous chickens has been lately focused to study in Vietnam. According to Moula et al. (2011), population of native chickens in Vietnam was estimated at 86.63 – 93.30 millions, including popular local breeds such as Ri, Mia, Mong, Ho, Dong Tao, H'Mong, etc.. Overall, characteristics of these breeds are adapted to the regional environmental conditions and strong disease resistance. In addition, local chickens produce favorable meat quality for residential consumers. Nevertheless, local poultry breeds were barely evaluated at high-competitive level due to low growth and reproductive performance. For this reason, vast array of external high-yielding chicken breeds has been imported to improve the performance of local poultry. Although numerous model hybridizations generated countless preeminent products, they put indigenous breeds in danger of quality degradation and genetic loss.

H'Mong chicken was the native breed raised by the H'Mong ethnic group domestication in Son La province. At present, H'Mong chickens are mostly raised in households under the popular free-range farming method. These birds were characterized by black skin, black meat, black bone and considered as medical chicken. Recently, given such unique values, the conservation and

sustainable development toward this chicken breed had been concentrated to research. Measurements on reproductive performance and egg quality are necessarily to contribute to the database of H'Mong chickens, heading to propose effective solutions for enhancing breed quality, maintaining and preserving the original H'Mong chickens.

2. MATERIAL AND METHOD

2.1. Material

A total number of 27 H'mong purebred chickens was raised in the practical farm of VNUA. Egg quality and reproductive performance was monitored and evaluated during the periode from 22 to 42 weeks of age.

2.2. Methods

2.2.1. Evaluating the reproductive performane of H'Mong chicken

Twenty seven H'mong chickens were divided into three categories, resulting in 9 chickens in each experimental plot (1 male: 8 female). The same condition in farming and disease prevention were applied for all categories. Chickens were fed with concentrated feed mixed with corn, rice bran and paddy, of which a kilogram supplied chickens with 16% crude protein and 2800 Kcal ME. Feed was weighed and recorded daily, while as chickens were weighed at 22 weeks old and 42 weeks old. Indicators were observed including first-egg laying age (day), body weight at first-egg laying age (grams), number of eggs/hen at 42 weeks old, birth rate (%) and FCR/10 eggs (kg).

2.2.2. Quantitative traits of H'Mong chicken eggs

Thirty eggs laid by 28 week-old hens were collected to measure quantitative traits. Egg quantitative analyses were carried out at the laboratory of Faculty of Animal science, VNUA. Egg-quality indicators consisted of weight (gram), shape index, yolk index, albumen index, egg-shell thickness (mm), egg-sell strength (kg/cm^2), proportion of egg shell (%), proportion of yolk (%), proportion of albumen (%), yolk color, Haugh unit (HU).

2.2.3. Chemical composition of H'mong chickeneggs

Chemical composition of H'mong chicken were analyzed on 12 eggs laid by 28 week-old hens. Indicators consisted of dry materials (%), total minerals (%), protein (%), lipid (%) and evaluated based on Vietnamese standards as TCVN-4326-86, TCVN-4329-86, TCVN 4328-86 and TCVN-43311-86, respectively.

2.3. Statistical analysis

Data was analyzed using descriptive statistics method by MILITAB 16 with some statistical parameters such as mean, SE.

III. RESULTS AND DISCUSSION

3.1. Reproductive performance of H'mong chicken

On average, H'Mong hens were typical for first-egg laying age as 151.67 days old when body weight reached 1323.8 gram (table 1). According to Nguyen Viet Thai et al. (2011), H'mong chickens generally laid the first egg at 154 days old when their body weight were 1276.30 gram. Furthermore, in another study, authors reported first-egg laying age of backyard H'mong chickens was 152 days old (Pham Cong Thieu, 2009). It can be seen that the similarity between our findings and those from other corresponding researches were considerable.

Table 1. Reproductive performance of H'Mong chicken

Indicators	Mean ± SE
First-egg laying age (day)	151,67 ± 0,33
Body weight at first-egg laying age (g)	1323,8 ± 5,57
Body weight at 42 week-old stage (g)	1634,20 ± 6,24
Number of eggs laid at 42 week-old stage (eggs/hen)	24,12 ± 0,11
Laying rate (%)	17,23 ± 0,75
FCR/10 eggs (kg)	6,58 ± 0,03

Overall, H'Mong chicken presented low reproductive performance. This conclusion came from the fact that average number of eggs laid at 42 week-old stage was counted as 24,12 eggs/hen and laying rate was only 17,23%. Meanwhile, results from the work of Nguyen Viet Thai (2012) demonstrated that H'Mong chicken at 41-44 week-old stage showed laying rate as 33.96%. FCR was measured as 6,58 kg/10 eggs. This ratio was previously reported at 3.44 kg/10 eggs (Nguyen Viet Thai et. al, 2011) and 3.46 kg/10 eggs (Luong Thi Hong et. al, 2007) for purebred H'Mong chickens. Therefore, our research on H'Mong hens identified higher FCR in comparison with those published in studies above.

3.2. Quantitative traits of H'Mong chicken eggs (table 2)

3.2.1. Egg weight (gram)

Average weight of H'mong eggs laid by 28 week-old hens was measured as 38.10 gram. Meanwhile, H'Mong egg's weight was reported as 37.94 g for 29 week-old hens (Pham Cong Thieu et al, 2009) and 39.32 g for 26-27 week-old hens (Nguyen Viet Thai, 2012). Analyzed on

Ri chickens, egg weight laid by 28 week-old hens was counted as 36.5g on average (Nguyen Huy Dat et al., 2006).

3.2.2. Shape index

Shape index is related to the hatching rate. Our results on the shape index of H'Mong chicken eggs was 1.27. This ratio was lower than shape index published in other studies toward both purebred and hybrid H'Mong chickens, which were 1.31 on the purebred H'Mong and 1.32 on the F1 hybrid (H'Mong x Egypt) (Luong Thi Hong et al., 2007), 1.39 on purebred and 1.31 on the F1 hybrid (H'Mong x Egypt) (Nguyen Viet Thai, 2012). In summary, our results were quite equivalent to above results and within the range of mean value of the breed.

3.2.3. Egg-shell strength (kg/cm²)

Egg-shell strength is normally used to measure the tolerance of eggs during transport and evaluate the hatching rate. In this study, average force that H'Mong eggs possibly suffered was 3,82 kg/cm². This indicator was previously found as 3,44 kg/cm² and 3,48 kg/cm² on H'Mong eggs (Nguyen Viet Thai, 2012 and Luong Thi Hong et al., 2007, respectively), 3,45 kg/cm² on Ac chicken eggs (Nguyen Viet Thai, 2012), and 3,66 kg/cm² on Ri chickens (Nguyen Ba Mui and Pham Kim Dang, 2016). It can be observed that our results were higher than those reported by the authors mentioned above.

3.2.5. Yolk index

This is the indicator showing the condition and quality of yolk. Yolk index of H'Mong eggs was calculated as 0.41. The results of our study were lower than yolk index of hybrid Egypt eggs (Diem Cong Tuyen, 2010) but roughly equivalent to the results on Ri chicken eggs (0.41) and the hybrid (Ri- Sasso-Luong Phuong) chicken eggs (0.46) (Nguyen Ba Mui and Pham Kim Dang, 2016).

3.2.6. Albumen index

In this study, albumen index of H'Mong eggs was 0.10. This result was corresponding with albumen index reported by Pham Cong Tuyen et al. (2010) and Nguyen Viet Thai (2012) but slightly higher than those reported by Nguyen Ba Mui and Pham Kim Dang (2016).

3.2.7. Eggshell thickness

Eggshell thickness is one of typical hereditary traits, which is important for hatching rate. Eggshell thickness of H'Mong chicken was measured as 0.37 mm. According to Luong Thi Hong et al. (2007), eggshell thickness of H'Mong chicken and F1 hybrid (H'Mong x Egypt)

chickens were 0.38 mm and 0.36mm on average, respectively. Meanwhile, eggshell thickness of purebred Egypt chickens was reported as 0.33 mm (Nguyen Viet Thai, 2012). Therefore, eggshell thickness of H'Mong eggs were proved to be higher than Egypt eggs and F1 hybrid (H'Mong x Egypt) eggs. Our results on eggshell thickness of H'Mong eggs were corresponding with previous published documents.

3.2.8. Proportion of egg shell, albumen and yolk

The percentage of egg shell, albumen and yolk on H'Mong chicken eggs were 11.26%, 29.67% and 59.07%, respectively. These measurements were reported as 13.22%, 27.75% and 60,51%, respectively (Ho Ngoc Tra My et al., 2010).

3.2.9. Haugh unit (HU)

Haugh Unit (HU) is popularly calculated to evaluate egg quality. Best qualified eggs showed 80 - 100 HU (lower levels as 65-79 HU (good), 55-64 HU (moderate) and <55 HU (bad)) (Bach Thi Thanh Dan, 1995). In this study, H'Mong eggs showed 89,42HU. This result was slightly higher than those reported in previous studies on H'Mong chickens (Luong Thi Hong et al., 2007 and Nguyen Viet Thai, 2012). Compared to hybrid Egypt chickens, our study showed alike results (89.15 HU). In another study, a local chicken (Chum Long Dau) showed 68.73 HU (Lam Thi Ha, 2011). Thus, H'Mong eggs possessed good quality with indicators within normal standards for chicken eggs.

Table 2. Quantitative traits of H'Mong chicken eggs (n=30)

Indicators	Mean ± SE
Egg weight (g)	38,10 ± 0,79
Egg Large diameter (mm)	47,87 ± 0,34
Egg small diameter (mm)	37,43 ± 0,31
Shape index	1,27 ± 0,79
Eggsell strength (kg/cm ²)	3,82 ± 1,05
Yolk index	0,40 ± 0,01
Proportion of yolk	29,67 ± 0,22
Albumen index	0,10 ± 0,00

Proportion of albumen	59,07 ± 0,34
Eggshell thickness (mm)	0,37 ± 0,01
Proportion of eggshell (%)	11,26 ± 0,16
Yolk color	8,08 ± 0,28
Haugh unit (HU)	89,42 ± 0,98

3.3. Chemical composition of H'Mong chicken eggs

Chemical composition is an essential indicator for egg quality and varies among different poultry species. Table 3 summed up the proportion of important chemical components analyzed on H'Mong chicken eggs.

Table 3. Chemical composition of H'Mong chicken eggs (n=12)

Components	Mean ± SE	Mean ± SE
	Yolk	Albumen
Dry matter (%)	50,51 ^a ± 1,01	12,18 ^b ± 0,05
Crude protein (%)	9,45 ^a ± 0,09	16,51 ^b ± 0,76
Crude Lipid (%)	29,50 ^a ± 0,73	0,06 ^b ± 0,01
Total minerals (%)	2,43 ^a ± 0,1	0,57 ^b ± 0,02

Note: Means with different superscript letters are significantly different (P<0,05)

The analyses showed that dry matter were the major components of yolk, accounting for 50,51 percent of yolk volume, followed by protein (9,45%), lipid (29.50%) and total minerals (2.43%). Meanwhile, in egg, albumen, the content of dry materials was also dominant in comparison with other components, however, they only covered 12,18% of total volume (protein, lipid and minerals covered 16,51%, 0.06% and 0.57%, respectively). According to Ho Ngoc Tra My et al. (2010), albumen protein, lipid and minerals accounted for 9.78%, 0.60% and 0.34% of total volume, respectively. Another study revealed that the albumen of chicken egg contained 11.43% of protein and 0.02% of lipid, while as yolk composition consisted of protein and lipid accounting for 16,59% 33,72% of total volume, respectively (Al-Obaidi, 2011). These positive results implied that H'Mong eggs possessed good quality with important indicators found within standards for domestic poultry breeds.

IV. CONCLUSIONS

In conclusion, H'mong chickens belong to the group of local chickens exposing low productive performance, evaluated through important indicators such as late first-egg laying age (151,67 days) and heavy body weight at first-egg laying age (1323,8 grams). During the stage from 22-42 weeks old, reproductive performance were assessed through number of eggs (24,12 eggs/hen), and FCR /10 eggs (6,58kg). All quality measurements of H'Mong chicken's eggs were found within standards of local eggs in general and evaluated as valuable.

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