How to Cite:
Giang, T. V., Co, N. T. K., & Dung, T. Q. (2022). Biological characteristics of Egyptian chicken in family scale in Danang, Vietnam. *International Journal of Health Sciences*, *6*(S1), 25-41. https://doi.org/10.53730/ijhs.v6nS1.4744

Biological Characteristics of Egyptian Chicken in Family Scale in Danang, Vietnam

Tran Van Giang
University of Education, Hue University, Hue city, 49000, Vietnam

Nguyen Thi Kim Co
University of Education, Hue University, Hue city, 49000, Vietnam

Tran Quoc Dung
University of Education, Hue University, Hue city, 49000, Vietnam

***Abstract*---**Egyptian chicken was imported into Vietnam from 1997 with precious traits such as good heat tolerance, free-range chicken breed, high egg yield, high meat quality. The study was carried out on 100 chickens aged from 0 to 45 weeks old kept in captivity according to household size in Danang for identifying some biological characteristics. The survival rate of Egyptian chicken decreased gradually from hatching to 6 weeks of age, then it was stable up to 24 weeks of age (65%). Cumulative growth in plot 2 reached 1444.50 g/head. which was higher than plot 1 with 1400 g/head The absolute growth was almost same in the 2 experimental plots with 8.23 g/head/day (plot 1) and 8.49 g/head/day (plot 2). The Egg yield was 56.56 eggs/hen/45 weeks. The average birth rate at 26 and 45 weeks of age were 27.38% and 67.14%, respectively. Egg quality of at 45 week old chicken showed that the shape, yolk and white index were 1.37, 0.42 and 0.01, respectively. In addition, the observed eggshell thickness at this stage was 0.42 mm. The highest hatching rate of broodstock was 90.99%.

***Keywords*---**blood physiology, egg yield, Egyptian chicken, growth, meat yield, reproduction.

Introduction

Animal husbandry is an important sector in the structure of Vietnam's Agriculture industry. This is an industry that brings great profits and has strong potential for development. In which, chicken raising has a long tradition, which is developing strongly in terms of scale, productivity and quality. Currently, in

***Corresponding author**: Giang, T. V.; Email: tranvangiang@dhsphue.edu.vn*
Manuscript submitted: 27 Nov 2021, Manuscript revised: 18 Feb 2022, Accepted for publication: 09 March 2022

addition to good meat-oriented chicken breeds, egg-oriented chicken breeds are also increasingly interested, focusing on investment and development. In Vietnam, the Egyptian breed is one of the chicken breeds with high yield, good egg quality and ability to adapt to climate changes. This breed of chickens adapts well to many care conditions as well as different ecological environments. More specifically, its egg price is always 1.2 to 1.5 times higher than other industrial chicken eggs and more preferred by consumers. In the area of Danang city, there are many farmers who raising Egyptian chickens according to the farm model that brings high economic efficiency. Poultry quality issues generally focus on carcass and tenderness. Along the growth of the market, from a mainly raw poultry product has been replaced by a diversified and modern industry focusing on shredded meat, de-boned and ready-to-eat products. This requires a change in quality. As the market continues to evolve, then it is necessary to define and improve the criteria for product quality. In addition, the quality assessment is based on market mechanisms, influencing prices and consumer preference is more production-oriented which depended on statistical control and product homogeneity. Vaccination in poultry production is inadequate and limited, leading to disease outbreaks in chicken flocks. Farmers still have many difficulties in diagnosing and preventing diseases for chickens. Therefore, it is necessary to study the growth, reproduction and blood physiological parameters in the conditions of chicken raised in households in order to determine and evaluate egg and meat productivity of Egyptian chickens. Understanding the physiological state of the body and the influence of environmental factors that may contribute to the detection of some abnormalities in chickens for timely treatment. This is a scientific basis for perfecting the chicken raising process Egypt chicken in Danang city.

Materials and Methods

Research materials

The experiment was conducted on 100 newly hatched Egyptian chickens supplied from the National Institute of Livestock Production. Raising from 0 to 45 weeks of age and periodically monitoring growth, fertility, blood physiology and egg production in captivity at household scale in Danang City. Chickens were arranged in 2 experimental plots, plot 1 and plot 2. Homemade feed was used for batch plot 1 and industrial feed for the remaining batch. Both of them were determined all research parameters including HC quantity, hemoglobin content, BC quantity, BC formula.

Research methods

While the research parameters on growth and reproduction are based on the method of Doan et al. (2011), the parameters of blood physiology followed the method of Maxine & Benjamin (1985).

Determined ability to grow

Survival rate is defined as the percentage of individual that survived at the end of the period compared to the total number of individual at the beginning.

$$\text{Survival rate (\%)} = \frac{\text{Number of animals alive at the end of the period}}{\text{Number of animals at the beginning of the period}}\ x\ 100$$

Growth ability

Cumulative growth: Chicken was weighed weekly in the morning before feeding, especially, each individual was weighed separately using a dedicated scale. Then, from the data obtained to calculate the weekly weight gain according to the formula:

$$\text{Absolute growth: A} = \frac{\text{P2}-\text{P1}}{\text{T2}-\text{T1}}.$$

In which: A is the absolute growth (gram/head/day); T1 is the time of previous survey (date of age); T2 is the time of the following survey (date of age); P1 is body weight at time T1 (g); P2 is the body weight at time T2 (g).

Determination of fertility

The age of laying egg is determined at the time when the hen lays her first egg and reaches 5%. Egg yield is the number of egg laid by a hen in a given time, usually in 1 week, 1 month, 3 months or 1 year.

$$\text{Egg yield (eggs)} = \frac{\text{Total eggs laid during the period (eggs)}}{\text{Average number of breeding hens present during the period (chicken)}}$$

Egg laying rate: Every day, accurately count the number of eggs laid, select hatching eggs and hens. Birth rate and the percentage of hatching eggs is determined by the formula:

$$\text{Laying rate (\%)} = \frac{\text{Total number of eggs laid in a week (eggs)}x\ 100}{\text{Total number of hens present during the week (chicken)}}$$

The average egg weight (eggs): Egg weight is one of the important parameters to evaluate egg quality and absolute egg production of poultry. Two chicken breeds that have the same egg production but different egg weights result in very different total egg weights. Therefore, the egg wieght directly affects to productivity, price and income. During a laying hen's life, egg weight increases from the first time of laying until the frequency and number of chicken egg is stable. Therefore, to determine the egg weight of one breed, the most appropriate time to determine in egg laying hens and broiler chickens is at 28 - 32 and 30 - 34 weeks of age, respectively. Egg was weighed individually using a clock scale with an accuracy of ± 0.1 g (Doan et al., 2011). Egg weight (P eggs) was calculated as follows:

$$\text{P eggs (g)} = \frac{\text{Weight weight of eggs (g)}}{\text{Number of eggs weighed (eggs)}}$$

Egg quality

Shape index: The egg shape of different species and breeds of poultry is different. It depends on genetic characteristics, structure, and contraction characteristics of the oviduct during egg production. The shape index was calculated using the formula:

$\text{Shape Index} = \frac{D}{R}$. Where: D is the maximum length, R is the maximum width.

Yolk Index: The yolk index represents the state and quality of the yolk. The higher this index the fresher the poultry eggs. This index changes depending on the characteristics of species, varieties and individual. It gradually decreases with the time of egg preservation. The height (H) and diameter (D) of the yolk were measured with a specialized instrument. Based on the obtained results to determine the yolk index (CSLD). Yolk index was calculated by the formula: $\text{The yolk index (ID)} = \frac{hD}{dD}$. Where: ID is the yolk index, hD is the height of the yolk, and dD is the diameter of the yolk.

White Index: The white index is defined as the ratio between the average height and the diameter of the solid white, which can be calculated using the formula: $\text{Whites Index (IE)} = \frac{hE}{dE/2}$. Where: IE is the white index, hE is the white high. dE = mean white diameter.

Eggshell thickness (mm): Eggshell thickness has important technical and economic significance. It has a close relationship with the breaking rate during packaging, incubation, transportation and also affects effect on hatching rate and chick quality. Eggshell thickness depends on many factors, especially the most important is the content of calcium, phosphorus and vitamin D in the diet as well as the season of chicken raising in the year. The thickness was determined by a micrometer with an accuracy of 0.01 mm, in which the eggshell was separated into in 3 parts including obtuse, equatorial and pointed end, then the membrane under shell was pelled off and measured.

The percentage of eggs with embryos and hatching rate: The percentage of eggs with embryos is determined through screening and testing after 7 days of incubation. After 21 days, the percentage of chickens hatched per total number of incubated eggs was identified.

$$\text{Percentage of eggs with embryos (\%)} = \frac{\text{Total number of eggs with embryos (eggs) X 100}}{\text{Total number of eggs incubated (eggs)}}$$

$$\text{Chicken hatching rate / total hatching eggs (\%)} = \frac{\text{Total number of babies hatched X 100}}{\text{Total number of eggs put into the incubator(eggs)}}$$

Possibility of meat production

At the end of the rearing period at 24 weeks of age, 3 hens in plot 1 and 3 hens in plot 2 were slaughtered to assess the meat-producing ability. The surveyed

individuals had a weight that fluctuated around the average value of the experimental chicken flock. Chickens were kept separately one day before which were not given food but provided with water. The criteria for evaluating carcass are live weight, carcass weight, carcass percentage, thigh meat weight, thigh meat percentage, breast meat weight and breast meat percentage.

Carcass Ratio: $\text{Carcass Ratio} = \frac{\text{Carcass weight}}{\text{live mass}}\ x\ 100$

Ratio of thigh meat: $\text{Weight of left thigh meat} = \frac{\text{Weight of left thigh meat x 2}}{\text{Carcass weight}}\ x\ 100$

Breast meat ratio: $\text{Breast meat ratio} = \frac{\text{Weight of left breast meat x 2}}{\text{Carcass weight}}\ x\ 100$

Belly fat percentage: $\text{Belly fat percentage} = \frac{\text{Belly fat mass}}{\text{Carcass weight}}\ x\ 100$

Determination of blood physiological parameters

Blood biochemical parameters such as red blood cell count, white blood cell count, hemoglobin content and white blood cell formula were taken and determined at 3, 4, 5, and 6 months of age. Blood was collected from the wing veins of the chickens in early morning before feeding. After collecting, blood was quickly put into a plastic tube containing sodium citrate anticoagulant. It was gently shaken then stored in the refrigerator compartment before being transferred to the laboratory for research.

Data processing: The data were processed using MS Excel 2013.

Result and Discussion

Growth performance of Egyptian chicken

Survival rate of Egyptian chicken

The survival rate of Egyptian chicken in the first 5 weeks of age is quite high which reaching 84%. At this stage, the survival rate of chick depends a lot on factors such as feed, weather, climate conditions every each year as well as environmental conditions of each breeding facility. Between 5^{th} to 8^{th} week of age, the survival rate of Egyptian chickens gradually decreased to 67 - 65%. The number of chickens that died was mainly due to inadequate care and rearing techniques. From 8 to 24 weeks of age, the survival rate of chickens started to and remained at 65% (Table 1). At this age, the structure and function of chicken organs have been completed, so the chicken is healthy and highly resistant to external changes.

Table1
The survival rate of Egyptian chicken by week of age

Age (week)	Quantity (chicken)	Ratio (%)
0	100	100
4	84	84
8	65	65

24	65	65

According to Dat et al. (2006), the survival rate of Egyptian chickens at the first week of age reached 99.04% and at the 19th week reached 92.12% (Dat et al., 2006; Tien et al., 2004), reported that Egyptian chicken had good vitality and high survival rate specifically in chick stage (0-9 weeks old), gilt stage (10-21 years old) week old) and the adult stage were 98.06%, 97.03% and 90.91%, respectively (Tien et al., 2004). In the current study, the reported data were lower than those recorded above because in this study, the veterinary care regimen for chickens had not really been focused. Therefore, in order to increase the survival rate, besides improving the rearing environment, it is necessary to focus on veterinary care.

Cumulative growth of Egyptian chicken through week of age

Cumulative growth performance of Egyptian chicken was assessed based on their increase in body mass over week of age. The body weight of chicken increases gradually with age, which is consistent with the general growth and development of poultry. Their average birth weights and at 5 weeks of age were 17.20g/head and 323.00g/head, respectively

The body weight of Egyptian chickens increased gradually in both experimental groups from the 7th to the 24th week of age, especially, there was no remarkable difference between them. In plot 1, the average weight of Egyptian chicken at 9 weeks, 12 weeks and 24 weeks of age was 499.25g/head, 582.50g/head and 1400g/head, respectively. while in the other experimental group those data were recorded as 507.50g/head, 630.95g/head and 1444.50g/head, respectively (Table 2).

Table 2
Cumulative growth of Egyptian chicken from birth to 24 weeks of age

Age	Mean ± SE		CV (%)	
(week)	Plot 1	Plot 2	Plot 1	Plot 2
0	17.20±0.63		16.40	
3	141.00±6.02		19.10	
6	323.00±5.95		8.24	
9	499.25±7.56	507.50±27.38	6.77	24.12
12	582.50±12.77	630.95±10.63	9.80	7.53
15	718.50±16.45	814.00±15.77	10.24	8.66
18	1050.00±23.22	1210.00±30.16	9.89	11.15
21	1230.00±20.44	1374.00±17.34	7.43	5.64
24	1400.00±10.66	1444.50±10.01	3.41	3.10

During the study period, the average weight of experimental batch 1 was always lower than the other batch. This difference at 9 weeks,12 weeks and 18 weeks of age was 8.25g/head, 48.45g/head, and 160g/head, respectively. When Egyptian chicken are 20 weeks of age, the body weight obtained in the plot 2 of this study

was higher than the result of Nguyen Viet Thai in 2012 (1336.00g/head vs 1303g/head).

Jana Pauwels and his colleguaes studied on Selection for efficient growth in broiler chickens associated with a flexible diet. The results showed the ability of four broiler breeds to perform on a commercial diet compared with the scavenger diet tested. The four broiler breeds differ genetically in terms of growth. There was a significant negative effect ($P < 0.01$) of the scavenger diet on the body weight of rapidly growing chicken breeds. However, this effect decreased as the growth rate of the breed increased. other chickens decrease. These differences could not be explained by differences in nutrient digestibility but rather because fast growing breeds lack the ability to increase their adequate feed intake (Pauwels et al., 2015).

In another study on South African chickens, confirmed that Indigenous chicken weight at maturity ranged from 2.5 to 3.5 kg depending on breed. In addition, these chicken breeds are capable of expressing different prodcutive traits. In recent years, indigenous chicken breeds have been gradually shifted from backyard to commercial scale (Idowu et al., 2021).

Absolute growth of Egyptian chicken through week of age

The absolute growth of Egyptian chicken increased on average over the unequal week of age. In the period from birth to 6 weeks of age, the absolute growth tended to decrease gradually before suddenly increased and reached the hihest value at week 4 (15.50±1.24 g/head/day). Thereafter, it was relatively stable during the period of 5 to 6 weeks of age, ranging from 5.00 to 5.50 g/head/day (Table 3).

Table3
Absolute growth of Egyptian chicken from birth to 24 weeks of age

Age (week)	Mean ± SE		CV (%)	
	Plot 1	Plot 2		
1	8.97±0.24		12.18	
4	15.50±1.24		35.67	
8	9.79±2.15	13.96±1.78	98.36	57.07
12	0.64±2.23	7.56±2.12	1552.17	125.29
16	16.86±2.26	16.14± 2.49	59.90	69.03
20	10.14±4.62	6.07±3.39	203.64	249.93
24	2.93±1.98	4.50±0.80	302.15	79.30

In plot 1, the absolute growth performance of Egyptian chicken at 12 weeks of age reduced to the lowest value about 0.64±2.23 g/head/day associated with changing the main food source from rice to banana which may not be suitable for the diet of Egyptian chickens. However, after that, the absolute growth increased rapidly at the stage of 15 to 17 weeks of age and peaked at the 17th week with 19.21±2.49 g/head/day. In plot 2, the absolute growth performance of Egyptian chickens was more stable than in plot 1. At the stage of 7 to 10 weeks of age, the absolute growth decreased sharply and got the lowest value at 10th week of age

with 1.43±1.93 g/head/day. After 10 weeks of age, the absolute growth continued to increase and reaches its maximum value at 17 weeks (21.29±3.36 g/head/day). Therefore, the above data shows that the absolute growth of Egyptian chickens in plot 1 was lower than in plot 2 with a difference of 0.35 g/head/day.

Fertility of Egyptian chicken

Egg yield

Egyptian hen start laying egg at 26 weeks of age. Egg production of the flock showed that a hen between 26 and 45 weeks of age can produce 56,56 eggs. In this study, the total number of eggs obtained when hens were 38 weeks old was 27.26 eggs/hen (table 4), which was lower than that reported by Tien et al. (2004), with 68-70 eggs/hen.

Table 4
Egg yield of Egyptian chicken by weeks of age

Week of age	Number of hens in the week (head)	Total number of egg (egg)	Egg yield (egg/hen/week)
26	12	23	1.92
27	11	21	1.91
28	11	26	2.36
29	11	25	2.27
30	10	0	0.00
31	10	0	0.00
32	10	0	0.00
33	10	27	2.70
34	10	28	2.80
35	10	30	3.00
36	10	32	3.20
37	10	36	3.60
38	10	35	3.50
39	10	35	3.50
40	10	40	4.00
41	10	40	4.00
42	10	45	4.50
43	10	43	4.30
44	10	43	4.30
45	10	47	4.70
	Total	576	56.56

The number of eggs produced each week tended to increase every week. However, due to the erratic weather, chicken got sick, so egg production was not high in this research, especially, when hens were 30 to 33 weeks of age, they expenrieced extreme weather conditions such as heavy rain and cold. During this period, the hens were infected, so they did not lay any egg.

When chicken was 45 weeks of age, the egg yield was 56.56 eggs/hen/45 weeks of age and this is lower than figure recorded by Thai (2012), on the same subject (94.57 eggs/hen/45 weeks) (Thai, 2012). Tien et al. (2004), when selectively studying some productive traits of Egyptian chicken through generation, the result indicated that egg yield/hen/61 weeks of age reached 163 to 175.48 eggs.

Egg laying rate

Laying rate is an important indicator. It is not only used to evaluate the egg production of chickens but also to identify the efficiency of used feed. Nowadays, in animal husbandry, finding solutions to improve the egg laying rate is very important because this ratio greatly affects the economic efficiency. The results in table 5 showed that the birth rate gradually increased from the 26th week to the 29th week before dropping sharply to zero at the 30th, 31st and 32nd weeks due to extreme weather conditions. After that period, it continued to increase and reached its maximum value at 45 weeks of age with 67.14%.

Table 5
Laying rate of Egyptian chicken through rearing stages

Week of age	Total number of hens per week (head)	Total number of egg for the week (egg)	Birth rate (%)
26	84	23	27.38
27	78	21	26.92
28	77	26	33.77
29	77	25	32.47
30	71	0	0.00
31	70	0	0.00
32	70	0	0.00
33	70	27	38.57
34	70	28	40.00
35	70	30	42.86
36	70	32	45.71
37	70	36	51.43
38	70	35	50.00
39	70	35	50.00
40	70	40	57.14
41	70	40	57.14
42	70	45	64.29
43	70	43	61.43
44	70	43	61.43
45	70	47	67.14
Medium	71.85	28.80	40.38

The results of monitoring the entire egg laying cycle of chicken flocks showed that Egyptian chickens had the highest laying rate (64.29% - 67.14%) between 42 weeks and 45 weeks of age. This was also observed in the average laying rate of Egyptian chicken where the highest data were recorded at 45th week (67.14%) and the lowest at 30 to 32 weeks of age (0%) related to inability to fertilize because of extreme weather conditions. The results of this study are consistent with the

results of Thai (2012), that the laying rate of Egyptian chicken in the period between 25th and 28th week and 41 weeks to 44 weeks of age were 50.00% and 65.50%, respectively (Thai, 2012).

Egg weight

Egg weight and egg quality are indicators closely related to hatching rate, which contributing to determining production productivity for breeding chickens. The results of the monitoring of egg weight indicated that according to the time of laying eggs, the average weight of egg increases gradually before peaking at 45th week. The average egg weight at 26 and 45 weeks of age was 36.87 g/egg and 45.00 g/egg, respectively (Table 6).

Table 6
Egg weight of Egyptian chicken by week of age (n=10)

Week of age	Mean±SE	SD	Cv (%)
26	36.87±0.66	2.08	5.63
30	38.74±0.49	1.54	3.8
34	41.25±0.67	2.12	5.15
38	43.40±1.38	4.37	10.06
42	44.79±1.50	4.76	10.62
45	45.00±0.74	2.34	5.21

At 38 weeks of age, the egg weight was recorded as 43.40 g/egg which is relatively lower than that of Hong et al. (2006), and Dat et al. (2007), (44 to 47 g/egg). There were no significant differences in egg weight during the study period. On the other hand, the gradual increase of egg weight studied by age is consistent with the laws of avian biology.

Egg quality

Fours parameters including shape index, yolk index, egg white index and eggshell thickness were investigated in oder to evaluate egg quality. In breeding poultry production, egg shape index is an indicator which used to consider the quality of hatching egg in which egg that are round or too long will has low hatching rate. Morphological index of egg is dirrectly related to the hatching rate. The experimental results obtained on the morphological index of Egyptian chickens at 38 and 45 weeks of age were 1.35 and 1.37, respectively (Table 7).

Table 7
Egg quality parameters by week of age

Week of age	Shape Index	The yolk index	Egg white index	Eggshell thickness
	Mean±SE	Mean±SE	Mean±SE	Mean±SE
38	1.35±0,85	0.41±1.87	0.095±0.3	0.40±0.01
45	1.37±0,95	0.42±1.00	0.1±0.2	0.42±0.00

The shape index of Egyptian chicken eggs in this study were 1.37 ± 0.95 which is higher than those reported by Dat et al. (2007), with 1.26 ± 0.04. An egg consists of three basic parts including the shell, the yolk, and the white. According to Perdrix et al. (1969); Card et al. (1970), indicated that the shell accounted for 10-11.6%, the white accounted for 57-60% and the yolk accounted for 30-32% in which the egg white index is an indicator of egg white quality. The egg white index of Egyptian chickens at 38 and 45 weeks of age was 0.095 and 0.01, respectively.

The yolk index is an indicator of the quality of the yolk. The results showed that the yolk ratio of Egyptian chickens at 38th and 45th week was 0.41 and 0.42, respectively. This was higher than that of Dat et al. (2007), stated that the yolk ratio of Egyptian chicken eggs reached 0.32 - 0.33. Thai (2012), also reported that the yolk index of H'mong and Egyptian chickens were 0.41 and 0.42, respectively.

Eggshell thickness is a genetic indicator. Determination of eggshell thickness is of economic importance which is related to the degree of damage to eggshells during packaging, incubation and transportation. The average eggshell thickness of Egyptian chickens at 38 and 45 weeks of age was 0.40 mm and 0.42 mm, respectively. Thus, the above criteria on egg quality surveyed on Egyptian broodstock flocks are within the limits of chicken eggs in general. Egyptian chicken egg have beautiful color, high yolk ratio, good egg quality and delicious meat quality that is suitable for consumer tastes.

Hatching rate of broodstock

Embryo egg rate and hatching rate are traits that determine the number of chicks which hatched by a hen in an egg laying cycle. Breed egg of experimental chicken was incubated in the same incubator at a farm in Danang city. The results showed that the later incubations had a higher hatching rate than the previous ones (Table-8).

Table 8
Incubation of Egyptian chicken broodstock by time

Number of incubation	First time (February 2nd, 2018)	2nd time (February 16th, 2018)	3rd time (March 4th, 2018)	4th time (March 20th, 2018)
Total number of incubated egg (egg)	18	38	20	22
Number of egg with embryos (egg)	18	37	20	22
Percentage of eggs with embryos (%)	100	97.36	100	100
Number of hatched chick (chicken)	10	28	16	20
Hatching/incubation rate (%)	55.55	73.68	80.00	90.99

In this study, the percentage of egg with embryo was higher than data was recorded by Muoi (2006), on the hybrid between Egyptian and Thai Hoa chicken

originating from China. The results showed that the embryo ratio in Egyptian chicken and Thai Hoa chicken were 96.73% and 96.44%, respectively. In addition, the hybrid between Thai Hoa cock with Egyptian hen and Egyptian cock with Thai Hoa hen had the corresponding embryo ratio of 97% and 96.79%, respectively (Muoi, 2006). Thus, the hatchability of the brood stock Egyptian chicken was confirmed through the percentage of embryos and newly hatched chicks.

Meat production capacity of Egyptian chicken

Meat production capicity is a very important parameter in chicken production. Meat performance was assessed by slaughtering chicken at 24 weeks of age basing on carcass, thigh meat, breast meat and belly fat weight. The survey results on carcass composition of Egyptian chicken are presented in Table 9.

Table 9
Survey on meat production ability of Egyptian chicken

	Targets	Lot 1	Plot 2
(%)	Carcass percentage	61.28±1.73	64.00±0.33
(%)	Breast meat ratio	12.24±0.33	14.07±0.50
(%)	Thigh meat ratio	19.31±0.43	17.26±0.10
	Belly fat ratio (%)	1.95±0.49	2.33±0.43

Carcass, breast meat and belly fat percentage of Egyptian chicken in plot 2 were higher than that in plot1. Specifically, the percentage of carcass, breast meat and belly fat in Plot 1 was 61.28%, 12.24% and 1.95%, respectively, which was lower than that of the remaing plot with 64%, 14.07% and 2.33%. Quyen (2008), reported that the carcass, thigh meat, breast meat and belly fat percentage of pure Egyptian chicken was 69.20%, 12.64%, 15.32% and 1.14%, respectively (Quyen, 2008). Compared with those data, in this study only carcass is higher and the other indicators are significantly lower.

Blood physiological parameters of Egyptian chicken

Red blood cell count of Egyptian chicken

The erythrocyte count of Egyptian chickens was different at each growth stage. At 6 months of age, the red blood cell count of Egyptian chickens gradually decreased and reached 2.50±0.97 million/mm^3. The variation in the erythrocyte count of Egyptian chicken from 3 months of age to 5 months of age is reasonable corresponding to the increasing demand for the capacity to transport nutrients and waste products of the metabolism.

Table 10
Red blood cell count of Egyptian chicken from 3 to 6 months of age (n=10)

Research target / Stage	Red blood cell (million/mm³)	
	Mean±SE	CV (%)
3 months old	1.92±0.47	0.80
4 months old	2.39±0.75	1.00
5 months old	2.79±0.39	0.4
6 months old	2.50±0.97	1.20

According to Nguyen Quang Mai & Cu Xuan Dan, the number of erythrocyte in adult chicken ranges from 2.5 to 3.2 million/mm³ of blood. Thao et al. (2014), indicated that the average number of red blood cell of normal chicken was 2.52 million/mm³ of blood (Thao et al., 2014). Vy (2015), also recorded that the red blood cell count of rooster and hen is 2.47 million/mm³ and 2.53 million/mm³, respectively, which was lower than curent data. Tho & Hang (2012), reported that the erythrocyte count of adult chickens was 2.83 million/mm³ of blood. Using dandelion extract, the number of red blood cell was higher than using powder containing 5% dandelion (3.11 million/mm³ vs 2.99.million/mm³ of blood) (Tho & Hang, 2012).

Hemoglobin (Hb) content of Egyptian chicken

The concentration of Hb in the blood of Egyptian chicken increased gradually from 3 months to 6 months of age. Specifically, the Hb content in the blood at 3 months old was 6.3g% then increased to 7.89g/% and 9.4g/% at 4 months and 5 months old, respectively then Hb concentration extended more slowly before peaking at 6 months of age with 10.19g%.

Table 11
Hb content of Egyptian chickens from 3 to 6 months of age (n=10)

Research target / Stage	Hemoglobin (g%)	
	Mean±SE	CV (%)
3 months old	6.30±0.33	16.82
4 months old	7.89±0.55	21.08
5 months old	9.40±0.54	18.05
6 months old	10.19±0.30	9.36

In the study of Thao et al. (2014), the Hb content of healthy Luong Phuong chicken was 9.6g% and this concentration be decreased to 7.05g% when chicken had coccidiosis (Thao et al., 2014). Thus, the Hb content of Egyptian chicken is higher than Luong Phuong chicken. According to Tho & Hang (2012), the Hb content of adult commercial broiler chicken was 9.93g%. When using 5% dandelion powder and dandelion extract, the Hb content increased to 10.35g% and 10.55g/%, respectively (Tho & Hang, 2012).

The white blood cell count of the Egyptian chicken

The number of white blood cell is one of the criteria which used to consider the resistance response of the animal body. Research result showed that the number of white blood cell-tends to increase gradually with age. The white blood cell count at 3 months was 21.9 thousand/mm^3, then it rapidly increased to 24.7 thousand/mm^3 at 4 months of age and peaked at 5 months of age (27.8 thousand/mm^3) before decreasing slightly to 26.7 thousand/mm^3 at 6 months old (Table 12). An increase in the number of white blood cells will increase the body's immunity. As a result, Egyptian chicken is increasingly adapting to the effects of the environment.

Table 12
White blood cell count of Egyptian chicken from 3 to 6 months of age (n=10)

Research target / Stage	WBC count (thousand/mm^3)	
	Mean±SE	CV (%)
3 months old	21.9±0.95	2.73
4 months old	24.7±0.99	2.53
5 months old	27.8±1.80	4.10
6 months old	26.7±0.94	2.23

According to Dao et al. (2013), the white blood cell count of healthy adult Isa Brown chicken was 28.67 thousand/mm^3 and it suddenly dropped to 20.41 thousand/mm^3 when chicken got Newcastle disease (Dao et al., 2013). Thus, the figures recorded in this study was higher.

Recipe of white blood cell of Egyptian chicken

Each type of white blood cell has its own function in the body. White blood cell will increase and decrease in case chicken has different diseases. The change in the ratio of each type of white blood cell reflects the health status of the body, so the diagnosis is often based on the white blood cell formula. The results showed that, during the growing period of Egyptian chicken, from the 3rd to 5th month of age, the proportion of neutrophil, lymphocyte, eosinophil, basophil and msonocyte increased. When chicken was 6 months old, while the neutrophil and msonocyte continued to increase, other cell types gradually decrease (Table 13). Lymphocyte accounts for the highest percentage of white blood cell because it plays an important role in the immune system in all animals. The percentage of lymphocyte of Egyptian chicken at 3 months of age was 52.6±1.75% then it gradually increased until the 5th month of age. The percentages of this white blood cell type at the 4th and 5th month of age were 54.2±3.50% and 56.8±6.70%, respectively. However, its percentage gradually decreases to a at 6 months of age with 55.4±2.34%.

The neutrophil of Egyptian chicken accounted for the second highest percentage of leukocytes. The results showed that it gradually increased from 3 months of age to 6 months of age. Specifically, the neutrophil rate of Egyptian chicken at 3, 4, 5, and 6 months old were 26.4±0.68%, 26.8±1.02%, 27.4±0.93% and 27.8±1.36%, respectively.

Table 13
White blood cell count of Egyptian chicken from 3 to 6 months of age (n=10)

Stage / Type of white blood cell	3 months Mean±SE	4 months Mean±SE	5 months Mean±SE	6 months Mean±SE
Neutrophil (%)	26.4±0.68	26.8±1.02	27.4±0.93	27.8±1.36
Eosinophil (%)	4.2±0.37	4.6±1.40	4.8±0.58	4.6±0.68
Basophil (%)	3.6±0.51	4.0±0.32	4.2±0.73	4.0±0,37
Msonocyte (%)	4.8±0.58	5.0±0.45	5.2±0.73	5.4±0.51
Lymphocyte (%)	52.6±1.75	54.2±3.50	56.8±6.70	55.4±2.34

Lien & Uyen (2004), reported that the neutrophil rate in Ri chicken, Te chicken, Tam Hoang chicken and H'Mong chicken were 18.39%, 21.42%, 24.65% and 12.35%, respectively (Lien & Uyen, 2004). Thus, Egyptian chicken had higher percentage of neutrophils compared to the chicken breeds mentioned above. With a high number of neutrophils, it will help Egyptian chicken has a high resistance and immunity.

The percentage of monocyte in Egyptian chicken at 3, 4, 5 and 6 months of age were was 4.8±0.58%, 5.0±0.45%, 5.2±0.73%, 5.4±0.51%, respectively. Tho & Hang (2012), recorded that the percentage of monocytes in adult chicken ranged from 5.4 to 5.5% (Tho & Hang 2012). Dao et al. (2013), reported that the monocytic white blood cell count of healthy Isa Brown chicken was 4.9% (Dao et al., 2013). Thus, compared with these results, the monocyte ratio in this study was slightly higher.

At 3 months of age, the rate of eosinophils in Egyptian chicken was 4.2±0.37%. This white blood cell increased slightly at 4 and 5 months of age with values of 4.6±1.40% and 4.8±0.58%, respectively. By 6 months of age, the rate of eosinophils in Egyptian chicken decreased to 4.6±0.68%. The percentage of eosinophil in the studied chicken was low which similar to that observed in other chicken breeds. According to Tho & Hang (2012), the rate of eosinophil in adult chicken ranged from 4.5 to 4.9% (Tho & Hang, 2012).

The percentage of basophil in Egyptian chicken was relatively low. This ratio in 3-month-old chicken was 3.6±0.51%. After that, it increased slightly to 4.2±0.73% before gradually decreasing to 4.0±0.37% at 6 months of age. Basophils are rare not only in Egyptian chicken but also in other animal because they have no immune function in common infections.

Conclusion

Egyptian chicken had good disease resistance. They were highly adaptable to environmental conditions in Danang city. The survival rate at 0-5 and 8-24 weeks age were 84% and 65%, respectively. The average weight at 24 weeks of age in plot 1 and plot 2 were 1400g/head and 1444.5g/head, respectively. The weight gain of Egyptian chicken over the weeks of age averaged 8.23 g/head/day in plot 1 and 8.49 g/head/day in plot 2.

Egg production: The parent of Egyptian chicken laid their first egg between 50 and 155 days old. The average egg yield of Egyptian chicken was 56.56 eggs/hen/45 weeks. The mean birth rate at 26 and 45 weeks of age were 27.38% and 67.14%, respectively. Egg weight of Egyptian chicken increased gradually by week of age. In detail, the average egg weight at 26 and 45 weeks of age 36.87 g/egg and 45.00 g/egg, respectively. The number of eggs which developed by cesarean section was 7. The number of recorded oocytes ranged from 150 to 200 eggs.

Egg quality: Egg was pinkish white in color. Egg of chicken which was 45 weeks of age had the shape index, yolk index and white index were 1.37, 0.42 and 0.01, respectively. The eggshell thickness at this time was 0.42 mm. The highest hatching rate observed was 90.99%. The red and white blood cell counts were highest at 5 months of age (2.79 million/mm^3 and 27.8 thousand/mm^3) and lowest at 3 months of age (1.92million/mm3 and 21.9 thousand/mm^3). The hemoglobin percentage in 5-month-old chicken was 9.4%. The observed white blood cell count was within the normal range of healthy chicken breeds.

References

Card, LE, Nesheim, M., Ducar Maluenda, P., & López Lorenzo, P. (1970). Poultry production.

Dao, BTA, Nam, NH, & Lan, NT, (2013). Some Hermological Characteristics Of Isa Brown Chicken With Newcastle Disease.

Dat, N. H., Hung, V. T., Tung, H. X., & Thien, V. C. (2006). Research on the production ability of the hybrid between Egyptian chicken and golden straw chicken in semi-grazing conditions. *Scientific report of the Institute*. Livestock. 1-8.

Dat, N. H., Tung, H. X., Hung, V. T., Dong, N. V., Lien, N. N., Thien, V.C., & Hien, T. T. (2007). Research on selection and breeding of a high-yielding RA (RA) line, *Report Science Institute of Livestock*.

Doan, BH, Dat, NH, & Mai, NT (2011). Nguyen Thanh Son (2011). *Some research indicators in poultry production. Agricultural Publishing House* .

Hong, L. T., Thieu, P.C., & Tieu, H. V. (2006). Research on the production ability of a hybrid between H'mong and Egyptian chickens. *Scientific report of the Institute of Livestock Production*.

Idowu, P. A., Zishiri, O., Nephawe, K. A., & Mtileni, B. (2021). Current status and intervention of South Africa chicken production–A review. *World's Poultry Science Journal*, *77*(1), 115-133.

Lien, L.V., & Uyen, P. N. (2004). Determination of some physiological indicators related to the natural resistance of Vietnamese chickens. Scientific report on animal husbandry-veterinary medicine. *Agriculture Publishing House*.

Maxine, M., & Benjamin, B. S. (1985). Outline of veterinary clinical pathology. *Colorado State University Rekha Printers, New Delhi OpenURL*.

Muoi, N. T. (2006). Research on the production ability of a hybrid between Egyptian chickens and Thai Hoa chickens – China. Master's Thesis in Agriculture, *University of Agriculture*, Hanoi. 84 - 85.

Pauwels, J., Coopman, F., Cools, A., Michiels, J., Fremaut, D., De Smet, S., & Janssens, G. P. (2015). Selection for growth performance in broiler chickens associates with less diet flexibility. *PLoS One, 10*(6), e0127819.

Perdrix, J. L., Foster, L. G., Coombs, A. E., Whitby, L. R., Bryant, R. L., Adcock, B., ... & Clark, B. A. J. (1969). Annual report 1968. *Journal of the Astronomical Society of Victoria Melbourne*, *22*, 2-14.

Quyen, N. T. (2008). Research on appearance characteristics and meat production ability of F1 chickens (Hmong rooster x Egyptian hen) and F1 chicken (Hong drum x Luong Phuong hen) raised semi-grazing in Thai Nguyen, Master thesis. *Agricultural Science*, Thai Nguyen University. 1-105.

Thai, N. V. (2012). Research on determining an economically efficient crossbreed between H'mong and Egyptian chickens to produce chicken with bones, skin, and black meat. *Scientific Report of the Institute of Livestock Production*. 76-82.

Thao, D. T., Hoan, T. D., Nam, N. H., & Son, N. V. (2014). Some hematological parameters in experimental coccidiosis chickens. *Journal of Science and Development*. 12(4): 567-573.

Tho, B. T., & Hang, N. T., (2012). Study on the effects of dandelion preparations on some blood physiological parameters of chickens. *Hanoi University of Agriculture*. 66-71.

Tien, P. D., Muoi, N. T., & Hien, L. T. T. (200)4. Results of selective breeding of some production traits of Egyptian chickens through 6 generations, Collection of scientific reports on animal husbandry. *Agriculture Publishing House*. 90-96.

Vy, NTT (2015). Study on some blood physiological parameters of two crossbred combinations (Daxga Tam Hoang chicken) and Kienxga Tam Hoang chicken in Quang Dien district, Thua Thien-Hue province. *Journal of Science* , (5 (70)), 149.