EGG TRAITS UNIFORMITY COMPARISON BETWEEN KURDISH LOCAL CHICKEN AND TWO COMMERCIAL STRAIN USING COEFFICIENT OF VARIATION

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Abstract - The eggs were collected between February 2018 until June 2018, and their characteristics were done in the laboratories of the animal production department in the directorate of agricultural research in Sulaimani province. Collected eggs from each of ROSS 308, ISA brown, Localblack, Local black with brown neck, and White non-feathering shank were 150, 65, 26, 39 and 52 respectively. Egg weight, length and breadth,andthe internal egg traits including yolk, albumin and shell weights, and their ratiosto the whole egg weight, as well the egg shape index were measured. Means, standard errors, and coefficients of variation of studied traits were calculated using the descriptive statistic of SPSS /PASW. One-way analysis of variance was used to test the effect of genetic line on the traits and the differences between the means of genetic lines for each trait were tested.The results indicate a significant effect of genetic lines on all studied traits with a superiority of white non-feathering shank in both internal and external traits including egg weight (59.96 g), yolk weight (20.71 g), shell weight (6.33 g), egg length (59.55 mm), egg breadth (43.64 mm), and the ratio of yolk weight to the egg weight (34.55). While the highest albumin weight (34.69 g), shape index (77.74%), and the ratio of albumin weight to the egg weight (61.49 %) were noticed in ROSS, and the higher eggshell thickness (0.42 mm), and the ratio of egg shell weight to the egg weight (10.80 %) were noticed in Isa brown.Most of the coefficients of variation were less than 10 %, which indicate that these traits are near to the uniformity. It can be concluded that the three genetic lines of Kurdish local chicken differ significantly in most of the egg traits, as well most of the traits have coefficient of variation less than 10% which mean it was selected for many years for egg production.

Keywords - Local Chicken, Uniformity, Egg, Coefficient of Variation

I. INTRODUCTION

Over the last ten decades, the science of poultry breeding has made great progress (Haunshi et al., 2010). The development was through improving commercial lines to cover the needs of the market of animal protein, consisting of meat and egg production lines (Das et al., 2014). Therefore, some genetic traits have been neglected or deteriorated several generations (Yuan, et al., 2015), because they are not genetically associated with the aforementioned productive traits.

Since 2005 many researchers were studied the characteristics of Kurdish local chicken eggs regarding external egg traits (Shaker et al., 2016; Aziz et al., 2017; Shaker et al., 2017), internal egg traits (Hermiz, et al., 2012; Shaker and Aziz, 2017; Abdullah & Shaker, 2018), and the productivity of the genetic groups (Abas et al., 2014; Omer et al., 2016). All these studies refer to the significant differences in these characteristics. Also other studies reported that strain and genotype significantly affect the egg shape index, yolk and albumen quality and yolk index (Tumova et al., 2007), as well affect egg weight (Zita et al., 2009). In addition, Hermiz et al., (2012) shown significant correlation between egg weight and egg quality parameters including yolk percentage, yolk weight and albumin weight.

Coefficient of variation (CV) is the ratio between standard deviation and mean. It is used to study the uniformity in several agricultural fields, such as the carcass uniformity of the Kurdish local chicken (Hermiz et al., 2018), and the eggshell color in laying hens (Mulder et al., 2016).

The aim of this experiment is to determine the extent of the deviation or alteration of external and internal characteristics of eggs as well as their percentages in the three genetic groups of Kurdish local chicken and two commercial strains ROSS 308 and ISA brown.

II. MATERIALS AND METHODS

The eggs were collected between February 2018 until June 2018, and their characteristics were done in the laboratories of the animal production department in the directorate of agricultural research in Sulaimani province. Collected eggs from each of ROSS 308, ISA brown, Localblack, Local black with brown neck, and White non-feathering shank were 150, 65,

26, 39 and 52 respectively. After recording the egg weight by using sensitive electronic balance (0.01 g), the length and breadth of egg were measured by using electronic calliper vernier. The internal egg traits including yolk, albumin and shell weights, and their ratiosto the whole egg weight, as well the egg shape index were measured using the formulasof Singh and Panda (1987) which used also earlier by Hermiz and Ali (2012); Shaker and Aziz (2017) and Shakeret al. (2019). Means, standard errors, and coefficients of variation of egg weight and egg components were calculated using the descriptive statistic of SPSS /PASW statistics for Windows version 19 (SPSS, 2011). One-way analysis of variance was used to test the effect of genetic line on the traits. The differences between the means of genetic lines for each trait were tested by using multiple range test (Duncan, 1955).

III. RESULTS

The mean, standard error, and the coefficient of variation for the egg weight (g) and internal traits including albumin, yolk, and shell weight in (g) are shown in table 1. The egg weight in White non-feathering shank (59.96 g) and black brown neck (58.86 g) were significantly higher than those recorded in local black, Isa brown, and ROSS, which were (56.98, 56.73, and 56.37 g) respectively. The coefficient of variation of the egg weight was lower value among the lines in white non-feathering shank (4.95). Albumin weight was significantly higher in ROSS and lower in Isa (34.69, 31.37 g) respectively, while the differences observed between the three local chickens (Black, Black with brown neck, and white non-feathering shank) were not significant and their values were (32.94, 33.59, and 32.93 g) respectively. Lower value of coefficient of variation was in Isa brown (7.61). Yolk weight was higher in white non-feathering shank and lower in ROSS (20.71, 16.07 g) respectively. The coefficient of variation was lower in ROSS (8.00). Shell weight was higher in both white non-feathering shank and Isa brown, and lower in local black (6.33, 6.13, and 5.47 g) respectively. The coefficient of variation was lower in ROSS (9.46).

Overall mean, standard error, and coefficient of variation for the external egg traits including the egg length, breadth and shell thickness in (mm) are given in table 2. Egg length was significantly higher in white non-feathering shank (59.55 mm), black brown neck (58.61mm), and local black (58.57 mm) comparing with those in Isa (57.21 mm) and ROSS (52.85 mm). The lowest coefficient of variation was noticed in local black (3.16). Egg breadth was higher in white non-feathering shank (43.64 mm), medium in local black (42.65 mm), and lower in ROSS (41.06 mm), and the inter-mediate was in black brown neck (43.49 mm) and Isa (43.08 mm). The coefficient of variation was lower in local black (1.93). Eggshell thickness in each of Isa (0.42 mm), local black (0.40 mm), black brown neck (0.41 mm) and white non-feathering shank, (0.40 mm) were significantly higher than that in ROSS, which was 0.38 mm. The coefficient of variation was lower in black brown neck (10 %).

The mean, standard error, and coefficient of variation for the ratios of the components including egg shape index (ESI), yolk weight to egg weight, albumin weight to egg weight, and shell weight to egg weight in (%) are shown in table 3. Shape index was higher in ROSS (77.74%) and lower in both white non-feathering shank and local black (73.49, 72. 86 %) respectively. The coefficient of variation was lower in local black (2.87). The ratio of yolk weight to the egg weight was higher in white non-feathering shank (34.55 %) and lower in ROSS (28.54 %) and the differences were significant. The coefficient of variation was lower in black with brown neck (6.90). The ratio of albumin weight to the egg weight was higher in ROSS (61.49 %) and lower in both of Isa (55.32 %), and white non-feathering shank (54.88 %) respectively. The coefficient of variation was lower in ROSS (3.42). The ratio of egg shell weight to the egg weight was higher in both of Isa brown and white non-feathering shank (10.80 %, 10.56 %) respectively, and lower in each of ROSS, black brown neck, and local black (9.97 %, 9.82 %, and 9.58 %) respectively. The coefficient of variation was lower in ROSS (7.67).

IV. DISCUSSION

Egg weights as well their external, internal, and ratio of the components traits were investigated earlier. The differences in egg weight due to their genetic lines, breeds and strains were reported earlier by Monira et al. (2003), Zita et al. (2009) and Hermiz and Ali (2012). Monira et al. (2003) found that egg external and internal traits were differ significantly ($p<0.001$) between the four breeds that used. Also each of Anderson (2004), Khan (2004), Baishya et al. (2008)and Zita et al., (2009) found that egg traits and their components differ between the breeds and comericial strain by using different strains. Also Hermiz and Ali (2012) found that Isa brown surpassed significantly ($P<0.01$) in their egg weight as well their quality than Lohman white. Al-Shawi (2003) noticed significant differences in yolk weight using four lines of Iraqi local chicken at age of 23 weeks. But Khan (2004) did not found significant differences in yolk weight trait. Abanikannda et al. (2007) who study the external egg traits for five breeds that these traits significantly differnces between the breeds. Earlier studies found significant differences in the percentages in different breeds and strains (Silversides and Scott, 2001; Akyurek, and Okur, 2009;Zita et al., 2009 and Hermiz and Ali, 2012). Shaker and Aziz (2017) found that the egg

traits also depend on the morphological characteristics of chicken by using white shank feathering and white non-feathering shank chicken. the coefficient of variation was less then 10 % for all the traits and for all the lines. Hermiz et al.,(2018) used the cofficient of variation to evaluate the carcass traits for three local Kurdish lines and the values were more then 10%, which mean these lines slected many years for egg production.

V. CONCLUSION

It can be conclude from the result that the three genetic lines of Kurdish local chicken differ significantly in most of the egg traits. And most of traits have coefficient of variation less then 10% that mean it's selected for many years for egg production.

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REFERENCES

[1] Abanikannda, O., Olutogun, O., Leigh, A., and Ajayi, L. (2007). Statistical modeling of egg weight and egg dimensions in commercial layers. International journal of poultry science, 6 (1): 59-63.

[2] Abas, K.A., Hermiz, H.N., Al-Khatib, T.R., Amin, S.M., Ahmed, A.M., and Hamad, D.A. (2014). Comparative productive performance of local hens in Erbil-Kurdistan region. Journal of zankoy Sulaimani, 16 (Special Issue): 203-206.

[3] Abdullah, S.M. and Shaker, A.S. (2018). Principal component analysis of internal egg traits for four genetic groups of local chicken. Egypt. Poult. Sci., 38 (2): 699-708.

[4] Akyurek, H. and Okur, A.A. (2009). Effect of storage time, temperatureand hen age on egg quality in free-range layer hens. J. of Animal andVeterinary Advances, 8 (10): 1953-1958.

[5] Al-Shawi, A.M.S. (2003). Effect of age on some quality characteristicsand chemical composition of egg from four lines of Iraqi chickens.M.Sc. Thesis, College of Agriculture, Baghdad University, Iraq. (InArabic).

[6] Anderson, K.E., Tharrington, J.B., Curtis, P.A. and Jones, F.T. (2004). Shell characteristics of egg from histonic strains of single comb white leghorn chickens and the relationship of egg shape to shell strength. International journal of poultry science, 3 (1): 17-19.

[7] Aziz, S.R., Shaker, A.S.and Kirkuki, S.M. (2017). Changes in external egg traits of chickens during pre-and post molting periods. poultry science journal, 5 (2): 9-13.

[8] Baishya, D., Dutta, K., Mahanta, J.and Borpujan, R. (2008). Studies on certain qualities of different sources of chicken eggs. Tamil Nadu J. veterinary and animal sciences, 4 (4): 139-141.

[9] Das, P.K., Goswami, A. and Mazumdar, D. (2014). Study on marketing of poultry meat and egg. international journal of development research, 4 (5): 1043-1047.

[10] Duncan, D.B. (1955). Multiple range and multiple test. Biometrics, 11: 1-42.

[11] Haunshi, S., Doley, S. and Kadirvel, G. (2010). Comparative studies on egg, meat, and semen qualities of native and improved chicken varieties developed for backyard poultry production. Tropical animal health and production, 42(5): 1013-1019.

[12] Hermiz, H.N., Abas, K.A., Al-Khatib, T.R., Amin, S.M., Ahmed, A.M., Hamad, D.A. (2012). Effect of strain and storage period on egg quality characteristics of local Iraqi laying hens. Res. Opin. Anim. Vet. Sci., 2 (1): 98-101.

[13] Hermiz, H.N. and Ali, S.H.(2012). Effect of strain and storage period on some qualitative and quantitative traits of table eggs. World Academy of Science, Engineering and Technology. 22-23, Aug. 2012. Paris, France, 6: 1344-1348.

[14] Hermiz, H.N., Shaker, A.S., Ameen, Q.A., Sardary, S.Y. and Al-Khatib, T.R. (2018). Predicting the carcass uniformity in Kurdish local chicken by using coefficient of variation. Proceedings of academicsera 32th international conference (pp. 46-49). Vienna: Academicsera.

[15] Khan, M., Khatun, M. and Kibria, A. (2004). Study the quality of eggs of different genotypes of chickens under semi-scavenging system at Bangladesh. Pakistan journal of biological science, 7 (12): 2163-2166.

[16] Monira, K.N., Salahuddin, M. and Miah, G. (2003). Effect of breed and holding period on egg quality characteristics of chicken. International journal of poultry science, 2 (4): 261-263.

[17] Mulder, H.A., Visscher, J. and Julien, F. (2016). Estimating the purebred–crossbred genetic correlation for uniformity of eggshell color in laying hens. Genet Sel Evol, 48: 1-13.

[18] Omer, A.A., Kirkuki, S.M.and Abdulla, H.K. (2016). Comparative analysis for production traits of local chicken and ISA in KGR-Iraq. Assiut Vet. Med. J., 62 (149): 25-31.

[19] Shaker, A.S., Amin, Q. A., Akram, S. A., Kirkuki, S. M., Talabani, R. B., Mustafa, N. A., et al. (2019). Using principal component analysis to identify components predictive of shape index in chicken, quail, and guinea fowl. Int.J.Poult.Sci., 18: 76-79.

[20] Shaker, A.S. and Aziz, S.R. (2017). Internal traits of egg and their relationship to shank feathering in chicken using principal component analysis. Poultry science journal, 5 (1): 1-5.

[21] Shaker, A.S., Hermiz, H.N., Al-Khatib, T.R. and Mohammed, R.M. (2016). Egg shape characterization for four genetic groups of Kurdish local chickens. Food and nutrition science-an international journal, 1: 20-25.

[22] Shaker, A.S., Kirkuki, S.M., Aziz, S.R.and Jalal, B.J. (2017). Influence of genotype and hen age on the egg shape index. International journal of biochemistry, biophysics & molecular biology, 2 (6): 68-70.

[23] Singh, R.P. and Panda, B. (1987). Effect of seasons on physical quality and component yields of eggs. Indian Journal of Animal Science, 57: 50-55.

[24] Silversides, F.G. and Scott, T.A. (2001). Effect of storage and layer age on quality of eggs from two lines of hens. Poultry Sci., 80: 1240-1245.

[25] SPSS (2011). Statistics for windows version 20.0. Armonk, NY: IBM corp.

[26] Tumova, E., Zita, L., Hubeny, M., Skrivan, M. and Ledvinka, Z. (2007). The effect of oviposition time and genotype on egg quality characteristics in egg type hens. Czech. J. Anim. Sci., 52: 26-30.

[27] Yuan, J., Sun, C., Dou, T., Yi, G. and Qu, L. (2015). Identification of promising mutants associated with egg production traits revealed by genome-wide association study. PLOS one, 10 (10): 1-20.

[28] Zita, L., Tumova, E., & Stolc, L. (2009). Effect of genotype, age and their intraction on egg quality in egg laying hens. ACTA VET.BRNO, 78: 85-91.

Line	N	Egg weight		Albumin weight		Yolk weight		Shell weight	
		Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
ROSS	150	56.37±0.31^{b}	6.71	34.69±0.24^{d}	8.54	16.07±0.10^{d}	8.00	5.61±0.04^{bc}	9.46
ISA	65	56.73±0.46^{b}	6.57	31.37±0.31^{bc}	7.94	19.23±0.28^{bc}	11.77	6.13±0.11^{a}	14.41
LB	26	56.98±0.65^{b}	5.80	32.94±0.50^{c}	7.81	18.57±0.37^{c}	10.03	5.47±0.19^{c}	17.57
BBN	39	58.86±0.68^{a}	7.23	33.59±0.50^{b}	9.23	19.47±0.27^{b}	8.79	5.79±0.18^{b}	18.89
WNFS	52	59.96±0.41^{a}	4.95	32.93±0.35^{a}	7.61	20.71±0.23^{a}	7.98	6.33±0.10^{a}	11.36
Sig.		0.000		0.000		0.000		0.000	

Table 1: Internal egg traits of the two commercial strains and the three Kurdish local chickens

Means not having a common letter within each row differ significantly (P<0.05). LB= local black; BBN=black brown neck; WNFS= white non feathering shank.

Line	N	Egg length		Egg breadth		Shell thickness	
		Mean	C.V	Mean	C.V	Mean	C.V
ROSS	150	52.85±0.27^{c}	6.16	41.06±0.23^{c}	6.71	0.38±0.00^{b}	13.16
ISA	65	57.21±0.23^{b}	3.20	43.08±0.14^{ab}	2.60	0.42±0.00^{a}	14.29
LB	26	58.57±0.36^{a}	3.16	42.65±0.16^{b}	1.93	0.40±0.00^{a}	15.37
BBN	39	58.61±0.32^{a}	3.38	43.49±0.17^{ab}	2.48	0.41±0.00^{a}	10.00
WNFS	52	59.55±0.40^{a}	4.85	43.64±0.20^{a}	3.26	0.40±0.00^{a}	14.63
Sig.		0.000		0.000		0.000	

Table 2:External egg traits of the two commercial strains and the three Kurdish local chickens

Means not having a common letter within each row differ significantly (P<0.05). LB= local black; BBN=black brown neck; WNFS= white non feathering shank

Line	N	Egg Shape index		Y/EW		A/EW		Sh/EW	
		Mean	C.V	Mean	C.V	Mean	C.V	Mean	C.V
ROSS	150	77.74±0.27^{a}	4.23	28.54±0.17^{d}	7.21	61.49±0.17^{a}	3.42	9.97±0.06^{b}	7.67
ISA	65	75.36±0.30^{b}	3.22	33.87±0.37^{ab}	8.80	55.32±0.37^{c}	5.45	10.80±0.18^{a}	13.07
LB	26	72.86±0.41^{c}	2.87	32.59±0.53^{c}	8.28	57.83±0.66^{b}	5.85	9.58±0.30^{b}	15.85
BBN	39	74.26±0.40^{bc}	3.34	33.11±0.37^{b}	6.90	57.07±0.52^{b}	5.66	9.82±0.25^{b}	15.99
WNFS	52	73.49±0.68^{c}	6.66	34.55±0.35^{a}	7.24	54.88±0.37^{c}	4.82	10.56±0.16^{a}	10.83
Sig.		0.000		0.000		0.000		0.000	

Table 3: ratio of the components of the two commercial strains and the three Kurdish local chickens

Means not having a common letter within each row differ significantly (P<0.05). LB= local black; BBN=black brown neck; WNFS= white non-feathering shank. Y/EW= yolk weight to the whole egg weight; A/EW= albumin weight to the whole egg weight; Sh/EW= shell weight to the whole egg weight.

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