Egypt. Poult. Sci. Vol (36) (III): (767 -778) (2016) **(1656)**

Egyptian Poultry Science Journal

http://www.epsaegypt.com

ISSN: 1110-5623 (Print) – 2090-0570 (On line)

COMPARATIVE STUDY OF SOME PRODUCTIVE AND EGG QUALITY TRAITS OF TWO COMMERCIAL LINES OF LAYING HENS

M.Y. Mahrous and Lamiaa M. Radwan

Poult. Prod. Dep., Fac.of Agric., Ain Shams Univ. Cairo, Egypt.

Corresponding author:Lamiaa M.Radwan ;Email:Lamia_radwan@agr.asu.edu.eg.

Received: 18/07/2016 Accepted: 15/08/2016

ABSTRACT: The present research has proceeded on examining the effect of strains in two commercial laying hens (Lohmann LSL and Hi-sex) for Body weight, feed consumption, feed intake and mortality were measured at 28 to 35 wk and egg production traits (egg number, egg weight, Egg mass) which recorded daily from the onset of lay till 65 weeks of age. The egg mass and egg production percentage were significant increased for Lohmann strain than Hi-sex ones. Hi-sex strain was significant more efficient feed conversion (gm egg / gm feed). To assess mechanical eggshell quality a randomly collected ٩0 eggs for each strain at 35 wk of age, and take twenty samples eggshell randomly from these eggs to examine the ultrastructure of eggshell. The inspection ultrastructure of eggshell for Hi-sex and Lohman strains were appeared insignificant difference ultrastructure variants of eggshell mammillae; the only differences between two stain for length of palisade layer only. The length palisade layer play main role increase eggshell strength for Lohman eggs compared to Hi-sex ones.

Key word*:* Laying Hens- Productive Traits-SEM- Eggshell Quality.

INTRODUCTION

The egg production is an important poultry industry and major source protein for humans.

Egg poultry production is affected by several factors as genetic (breed or strain of chickens used), management practices (system house, source and program feed, program light, source water,…. etc) and environment (air, humidity, season…. etc) Weeks and Nicol (2006). The advantages of the commercial layer strains are generally regarded as being greater feed efficiency, higher egg production, heavier eggs weight and good egg quality than local breeds Yakubu et al., 2007 and Radwan 2015.

The commercial strain produced by crossing breeds (crosses in cross-lines and pure-lines) and selected improvement production traits and egg quality (Soller et al., 2006; Dunn et al., 2005). The primary objective of breeding programs is to increase output and maximize the reverting on investment of production parameters from different strains. So, the different breeding programs or crossing a layer geneticist have to consider the following selection objectives: age sexual maturity, body weight, egg number, feed consumption, feed conservation, egg mass, external and internal egg quality Blackburn (2006). The commercial laying hens is different strains vary in their genetic makeup. The different strains vary in the different criteria of egg production and quality (Gowe et al., 1993; Albers and Van Sambeek 2002a; Albers et al 2002b; Zhang et al., 2005; Blackburn 2006; Hillel et al., 2007; Aygun and Yetisir, 2010; Tixier-Boichard et al., 2012; Bell 2012a and Damme et al., 2012).

The different commercial lay strains both lay brown or white eggs have been developed from the Leghorn breed such as strains Lohmann (white or brown), Hy-Line Brown, Hy-Line-W-36 and W-98. The brown strains eggs were distinguished oneself high strength of eggshell so the brown strains eggs apparent more demand and economic compared to white strains eggs because cracked eggshell presents higher losses from market-egg producers. Therefore, there was interest in selected better parameter eggshell quality of white strains eggs (Arango, et al., 2006; Bell 2011 and 2012b). The productive traits and eggshell quality is important for consumers, and the economic success of a product depends on percentage egg production. Eggshell quality includes several aspects related to mechanical properties and ultrastructure eggshell (Dunn et al., 2012 and Radwan et al., 2015).

Eggshell quality has a genetic basis and the parameters of eggshell quality vary between breeds or strains of hens (Silversides et al., 2006; Tixier-Boichard et al., 2012 and Radwan et al., 2015). In comparing strains used for production and eggshell quality of different commercial strains, Silversides and Scott (2001) recorded that eggs from ISA-Brown hens had a greater percentage of eggshell than those from ISA-White hens. Moreover, Grobas et al. (2001) compared production performance and egg quality of ISA-Brown hens with Dekalb Delta, a White Leghorn egg layer; they found increased egg weight, egg mass and feed efficiency from ISA-Brown than other strains. Tůmova et al. (2009) reported that Haugh units and eggshell strength lower for ISA Brown in comparison with Hisex Brown. Leyendecker et al. (2001a,b) recorded that the effect of housing system not significant effect egg quality when compared between white and brown Lohmann eggs. In addition Tůmova et al. (2007) Zita et al. (2009) and Ledvinka et al. (2011) genotype has a major effect on productivity and egg quality characteristics.

It is important to emphasize that any improvement in egg production of laying hens would be translated into economic benefits to the company. Current per capita egg consumption increase, especially countries in Africa; in these countries are Consumer habits and producer use strain preferences for the increase egg number, high egg percentage and good egg quality. The commercial strains were selected to these parameters. So This study examines the effect of strains on egg performance, eggshell quality and eggshell ultrastructure in two commercial white strains eggs (Lohmann LSL and Hi- sex).

MATERIAL AND METHODS

The field work was done at Commercial company farm of poultry. However, the lab work was fulfilled at the Dept. of Poultry Production, Faculty of Agriculture, Ain Shams University.

This study was used to compare between Two commercial Strains (L.S.L& Hi- Sex strains) in rearing chicks were obtained at 1 day old and reared on the floor under 13.30 h light/day (housed in open house system). At 17 weeks all pallets were housed in the cage close system (5 birds / cage) up to the end of the experiment at 65 weeks of age; and day length was increased to 14.3 h to stimulate and synchronize the onset of egg production. The laying hens were provided with water and feed ad-labium and kept under similar conditions of management. The feed rations included grower (CP = 18.6% and ME = 2870 Kcal/Kg), developer (CP = 14.9% and ME = 2750 cal/Kg), and pre-lay (CP = 18.0% and ME = 2755 Kcal/Kg). The grower diet was provided to pullets from day one to eight weeks, the developer from eight to sixteen weeks, and the pre-lay from seventeen to twenty four weeks. All laying hens use this experiment were bred under similar conditions.

Productive parameters:

Body weight, feed consumption and feed intake were measured at 28 to 35 wk intervals. In addition, mortality was recorded daily and percent mortality was calculated weekly.

Egg number, egg weight and Egg mass were recorded daily from the onset of lay till 65 weeks of age. Egg mass was calculated by multiplying the egg number by the egg weight.

Egg quality: Egg dimensions (length and width, mm), weight (g) and shell weight (g) were measured on all individual eggs (randomly collected ٩0 eggs for each strain) at ٣٥ weeks of age. The specific gravity of the egg was determined by using the saline flotation method of Hempe et al. (1988). The force required breaking eggs (kg/cm2) were determined according to Fathi and El-Sahar (1996). The degree of yolk color was measured by fan Haughmen Larosh. The eggshell, after the removal of the egg content, was dried, measured thickness of eggshell with membranes (mm) by a dial gauge micrometer.

Preparation of samples for ultrastructural analysis using SEM:

At 35 weeks of age, twenty samples of eggshell were randomly taken Lohmann LSL and Hi- sex. The specimens were prepared by Radwan et al., 2010. These samples were examined using JEOL JSM-T330A scanning electron microscopy (JeoL, Tokyo, Japan) at 15 Kv. The incidence of ultrastructure variants at the level of the mammillary layer was assessed according to the methodology and terminology by Bain, 1990 and Radwan, 2015.

Statistical analysis:

Data were analyzed a one-way ANOVA using GLM of SAS (2005) with strain as fixed effect according to the following model:

$Y_{ijk} = \mu + B_i + e_{ij}$

Where; μ= overall mean, B_i = strain effect and e_{ij} = experimental error.

RESULTS AND DISCUSSION

Performance parameters for Hi-sex and Lohman strains are presented in Table 1. There was an insignificant difference among strains in feed consumption. Nevertheless, Feed conversion gm egg /gm feed was a significant increase for Hi-sex strain when compared to Lohman. Moreover, mortality percentage was high significant increase for Hi-sex compared to Lohman strain. Ledvinka et al (2010) and

Englmaierová et al (2010) found an interaction effect between genotypes (strain or breed) and management condition (feed type, housing system, light, water… etc) for feed efficiency and mortality percentage.Inasumuch the Hi- sex and Lohman hens were breeding as to similar conditions, so can be concluded that a different mortality rate between two strains reflected the genotype effect.

Egg production parameters for Hi- sex and Lohman strains are shown in table 2. Lohman strain was significant increased egg numbers, egg mass and percentage egg production compared to Hi-sex ones.

Moreover, egg weight was an insignificant difference between Lohman and Hi-sex eggs. These results agreed with Ketta and Tůmová (2014) found that housing system significant effected heavier egg weight for white Lohman than other strain but insignificant effect strain for these trait. Singh et al. (2009), Tůmová et al. (2011), and Ledvinka et al. (2012) recorded that interaction between effect strain or genotypes and housing system for egg weight. Abdou and Kolstad (1979) recorded that high genetic and phenotypic correlations between body weight and egg weight. The results showed that insignificant differences body weight among Lohman and Hi-sex hens so insignificantly different egg weight between them.

These results reflect that improvement of line Lohman strain on more efficient egg production than Hi-sex, also, the Lohman strain more adaptation under Egyptian environment and genetic productive traits can be completely expressed under Egyptian condition compared to Hi-sex strain.

Egg quality measurements at 35 weeks of age (table 3) explained that the Lohmann strain were significant increased shell strength, specific gravity, shell thickness and color index compared to Hi- sex ones in table 3. Butcher and Miles (2003) recorder that Smaller eggs size has more stronger eggshell strength than larger ones, due to the calcium eggshell is deposited in less space for small size egg compared to large-sized eggs. Clunies et al. (1992) found that the genes carried in the breeds or strains had effect eggshell strength; they reported that hens laying thick eggshell retained more dietary calcium than those laying thin-eggshell. On the other hand, there was no difference in egg production between thick and thin eggshell layers, both eggs and eggshell weight were greater for the thicker shelled eggs. Mohamed et al. (2016) studied the improvement of qualitative and quantitative production of eggs for Hi-sex strain by feeding mustard seeds, they recorded that not affect the qualitative (egg size, yolk weight and shell thickness) parameter were significant effect quantitative (egg mass and feed efficiency) parameters.

The content pigments carotenoid present in the hens feed was a major effect of yolk color (Hernandez et al. 2005).

The last results can be conducted that the genotypes (strains or breeds) play an important role in parameter eggshell quality.

The effective eggshell thickness was measured by using scanning electron microscope recorded different length of eggshell layers. Table 4 showed that Cross-sectional length (µm) of individual eggshell layers (absolute or %) in Hi- sex and Lohmann LSL strains at 35 weeks of age. Lohman eggshell were significantly longer total length, Palisade and Palisade percentage compared to Hi- sex ones. Bain et al. (2006); Galal et al. (2012) and Radwan 2015 reported that several different layer contribute to mechanical properties of eggshell.

Ultrastructure variation of eggshell mammillae for Lohmann LSL and Hi- sex had inspected by SEM and recorded data in table 5. Appears that insignificant differences ultrastructure variants of eggshell mammillae for Hi- sex and Lohmann strain at 35 weeks of age.

The last result accentuates the Lohman eggs stronger broken compared to Hi- sex eggs due to longer Palisade layer for Lohmen eggshell than Hi- sex ones.

Fig 2. Showed Extensive cubics in Hi-sex, the cubics refer to shaped crystals on the sides of the mammillary cone. cubics cause weakness eggshell strength due to the formation of normal palisade columns is impaired.

Fig.3. Showed that Pitting type 1: depression represented areas which display concave distorting of normal mammillary appearance in Hi- six strain. Pitted area described appear the presence of pits or cavities in the mammillary layer. Pitting type 1 refer to wipe in the mammillary layer and rub confluence. It is thought that pitting crates areas of weakness within the eggshell (Bain et al, 2009).

CONCLUSION

The all last results conducted that the Lohman LSL strain was more efficiency productive traits compared to Hi-sex ones. The Lohman hens decrease mortality percentage than Hi-sex due to genotype effect. Not substantially differ Ultrastructure variation of eggshell mammillae for Lohmann LSL and Hi- sex had inspected by SEM. The length palisade layer played main role increase eggshell strength compared to Hi-sex.

Table (1): Performance parameters for Hi- sex and Lohman strains (Means ± SE).

Trait	**Strains**		**Prop.**
	Lohman	**Hi- sex**	
Body weight (gm)	1682±14.57	1625±12	Ns
Feed con. (gm)	121.97± 3.43	123±3.23	NS
Feed conversion (gm egg / gm feed)	0.49± 0.0017 [b]	0.51± 0.0009 [a]	٠.01
Mortality, %	0.15 ±0.007 [b]	0.35 ± 0.002 [a]	0.0001

a,b Means within the same raw with different letters are significantly differed parameters (P < 0.05). NS, not significant.

Table (2): Egg production parameters for Hi- sex and Lohman strains (Means ± SE).

Trait	**Strains**		**Prop.**
	Lohman	**Hi- sex**	
Egg number, No	643342±17449^{a}	589773±15367^{b}	0.001
Egg weight, gm	62.24±0.91	61.82±0.59	NS
Egg mass, gm	40556197±1248400^{a}	36635002± 941997^{b}	0.001
Egg production %	89.36±2.49^{a}	85± 2.31^{b}	0.0١

a,b Means within the same raw with different letters are significantly differed parameters (P < 0.05). NS, not significant.

Table (3): Means ± SE of egg quality measurements for Lohmann and Hi- sex strains.

Trait	**Strains**		**Prop.**
	Lohmann	**Hi- sex**	
Egg weight, gm	63.05±0.91^{a}	61.95±0.59^{b}	0.05
Egg shape index	77.63±0.32	76.63±0.29	NS
Shell strength, kg/cm^2	3.35±0.05^{a}	2.88±0.06^{b}	0.001
Specific gravity	1.085±0.001^{b}	1.079±0.001^{a}	0.0001
Shell thickness, mm	0.34±0.014^{a}	0.32±0.005^{b}	0.04
Color Ind.	10.86±0.22^{b}	11.79±0.31^{a}	NS

a,b Means within the same raw with different letters are significantly differed parameters (P < 0.05). NS, not significant.

Table (4): Cross-sectional length (µm) of individual eggshell layers (absolute or %) in Hi-sex and Lohmann LSL strains at 35 weeks of age.

Trait	**Strains**		**Prop.**
	Lohmann LSL	**Hi- sex**	
Total (µm)	301.55±4.06[a]	269.13±5.21[b]	0.001
Palisade (µm)	233.32±4.34[a]	200.06±5.49[b]	0.03
Cap (µm)	68.23±1.13	69.09±2.59	NS
Palisade %	77.62±0.05 [a]	74.53± 0.54 [b]	0.05
Cap %	22.45±0.89 [b]	25.41±0.14 [a]	0.03

a,b Means within the same raw with different letters are significantly differed parameters (P < 0.05). NS, not significant.

Table (5): ultrastructural variants of eggshell mammillae for Hi- sex and Lohmann strain at 35 weeks of age.

	Strains		
Variant	**Lohmann LSL**	**Hi- sex**	**Prob.**
Confluence	1.٩4±0.10	1.61 ±0.15	NS
Fusion	2.10±0.53	٢.٥0±0.37	NS
Cuffing	1.٥±0.001	1.٨±0.02	NS
Alignment	٢.21±0.05	٢.٦5±0.03	NS
Type Bs	1.20±0.25	1.30±0.33	NS
Depression	1.37±0.30	1.46±0.16	N S
Erosion	1.٤2±0.37	1.٥5±0.25	NS
Cubics	1.٢5±0.09	1.٤2±0.11	NS
Aragonite	1.٦5±0.03	1.٣9±0.02	NS
Caps	3.1±0.50	2.9±0.50	NS
Type As	2.0±0.11	1.9±0.16	NS
Changed membrane	1.٢±0.00	1.٤±0.00	NS
Total score	٢٠.٩4±0.98	٢١.88±1.35	NS

a,b Means within the same raw with different letters are significantly differed parameters (P < 0.05). NS, not significant.

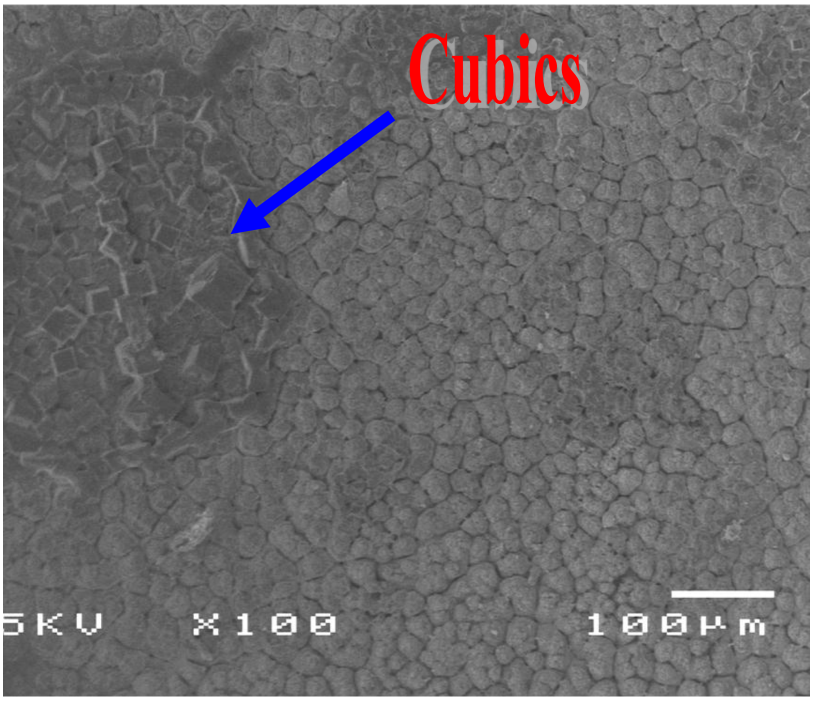

Fig3. Extensive cubics appear in Hi-sex.

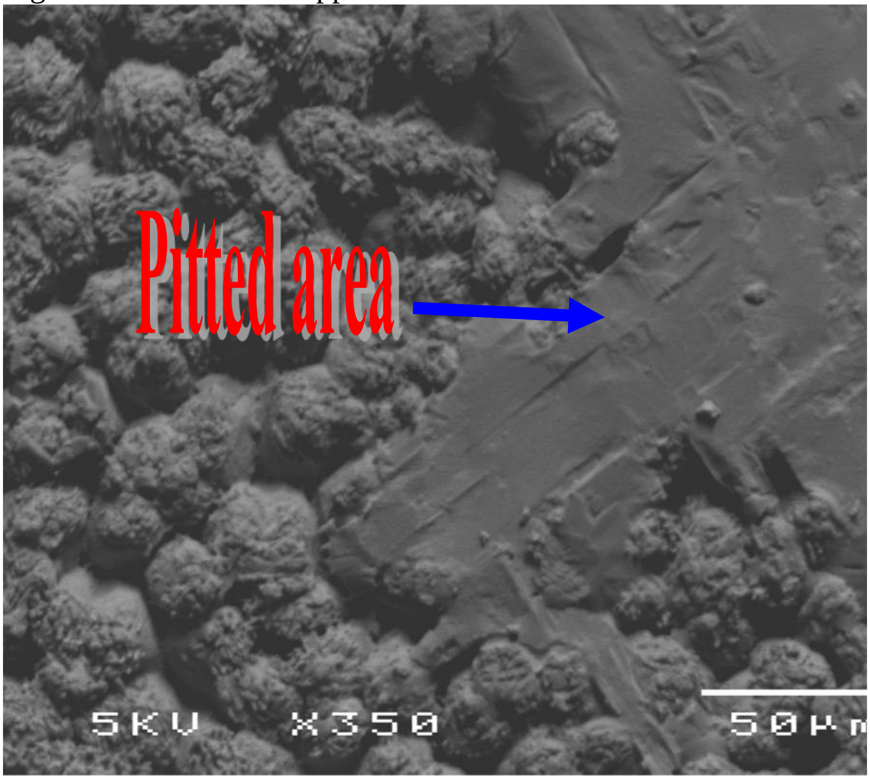

Fig3. Pitting type 1: depression represent areas which display concave distorting of normal mammillary appearance in Hi six strain.

REFERENCES

Abdou, F.H. and Kolsted, N. 1979. Genetic analysis of a control population of white Leghorn hens. Agric. University of Norway, Depertment Of Poultry and for Animal Science Report, No. 63.

Albers, G.A.A. and Van Sambeek, F.M.J.P. 2002a. Breeding strategies for layers in view of new technologies. Paper presented at the 11th European Poultry Conference, Bremen, Germany.

Albers, G.A.A.; Broekman, K.; Vissher, J.; Buddiger, N. and Maatman, R. 2002b Role of genotype x environment interaction in applied breeding programmes.In Proceeding of the 7th World Congress of Genetics Applied to Livestock Production, 19–23 August, 2002, Montpellier, France. Communication No. 18–09.

Arango, J.A.; Settar, P.; Arthur, J.A. and O'Sullivan,N.P.2006. Relationship between shell color and incidence of speckles in brown egg lines. Proc. XIIth European Poultry Conference, Verona, Italy.

Aygun, A. and Yetisir, R. 2010. The relationships among egg quality characteristic of different hybrid layers to forced molting programs with and without feed withdrawal. J. Anim. Vet.y Adv., 9:710-715.

Bain, M.M. 1990. Eggshell strength: a mechanical/ultrastructural evaluation. PhD Thesis, University of Glasgow, UK.

Bain, M.M.; Mcdade, K.; Schmutz, M.; Preisinger, R.; Waddington, D. and Dunn, I.C. 2009. The deposition of the cuticle on laying hens eggs is a moderately heritable trait. Br. Poult. Abstracts, 5, 17.

Bain, M.M.; Macleod Thomson, N. and Hancock, J.W.2006. Microcracks in eggs. Poult. Sci,85:2001-2008.

Bell, D.D. 2011. The challenges of management for today's high performing laying hens – Part 1: Egg production and egg size. Lohmann Information 46 : 8-15.

Bell, D.D. 2012a. Experiences with Lohmann Selected Leghorn (LSL-Lite) layers – Part 2: Feed consumption and conversion. Lohmann Information 47 (1), 14-20.

Bell, D.D. 2012b. Experiences with Lohmann Selected Leghorn (LSL-Lite) layers – Part 3: Mortality and livability. Lohmann Information 47 (2), 22-33.

Blackburn, H.D. 2006. The national animal germplasm program: challenges and opportunities for poultry genetic resources. Poult. Sci., 85: 210–215.

Butcher, G. D. and Miles, R. D. 2003. Concepts of Eggshell Quality. University of Florida. http://edis.ifas.ufl.edu/pdffiles/VM/VM01300.pdf

Clunies, M.; Parks, D. and Leeson, S. 1992. Calcium and phosphorus metabolism and eggshell thickness in laying hens producing thick or thin shells. Poult. Sci., 75: 656- 663.

Damme, K.; Simon, I. and Flock, D.K. 2012. Adaptability of Laying Hens to Different Environments: Analysis of German Random Sample Tests 2010/11 with floor management and enriched cages. Lohmann Information 47 (2).

DSM, 2004: Yolk color fan. www.dsmnutritionalproducts.com

Dunn, I.C.; Rodríguez-Navarro, A.B.; Mcdade, K.; Schmutz; M., Preisinger; Waddington, D.; Wilson, P.W.; Bain, M.M. 2012. Genetic variation in eggshell crystal size and orientation is large and these traits are correlated with shell thickness and are associated with eggshell matrix protein markers. Anim. Genet., 43: 410–418.

Dunn, I.C.; Bain, M.M.; Edmond, A.; Wilson, P.W.; Joseph, N.; Solomon, S.; De Ketelaere, B.; De Baerdemaeker, J.; Schmutz, M.; Preisinger, R. and Waddington, D. 2005. Heritability and genetic correlation of measurements derived from acoustic resonance frequency analysis; a novel method of determining eggshell quality in domestic hens. Br. Poult. Sci., 46:280-6.

Englmaierová, M.; Tůmová, E.; Charvátová, V. and Skřivan, M. 2010. Effects of laying hens housing system on laying performance, egg quality characteristics, and egg microbial contamination. Czech J. Anim. Sci., 59: 345–352.

Fathi, M.M. and El-Sahar, E.A. 1996. Determining the strength of eggshell by using an appropriate apparatus and an equation to calculate egg surface depending on its dimensions. Egypt. Poult. Sci., 16: 285-303.

Galal, A.; Mahrous, M.Y.; Radwan, L.M. 2012. Eggshell ultrastructural and organic matrix in two genetic groups of chicken. In 'The 3rd Mediterranean poultry summit of WPSA (3rd MPS) and the 6th international poultry conference (6th IPC). Alexandria, 26–29 March 2012, Egypt'. pp. 1068–1077.

Gowe, R.S.; Mc Millan, I. and Fairfull, R.W. 1993. Should all traits in a multiple trait selection program for egg stocks be included in an index? Aviagen, 93: 33–39.

Grobas, S.; Mendez, J.; Lazaro, R.; Delbas, C. and Mateos, G.G. 2001. Influence of source and percentage of fat added to diet on performance and fatty acids composition of egg yolks of two strains of laying hens, Poult. Sci. 80: 1171-1179.

Hempe, J.M.; Lauxen, R.C. and Savage, J.E. 1988. Rapid determination of egg weight and specific gravity using a computerized data collection system. Poult. Sci., 67: 902-907.

Hernandes, J.-M.; Beardswort, P.M. and Weber, G. 2005. Egg quality – meeting consumer expectations. Inter. Poult. Prod., 13: 20–23.

Hillel, J.; Granevitze, Z.; Twito, T.; Ben-Avraham, D., Blum, S.; Lavi, U.; David, L.; Feldman, M.W.; Cheng, H. and Weigend, S. 2007. Molecular markers for the assessment of chicken biodiversity. World Poult. Sci. J. 63: 33–45.

Ketta, M.and Tůmová, E. 2014. Differences in the eggshell quality and tibia strength in Lohmann White and Czech Hen housed in cages and on litter. Acta fytotechn. zootechn., 17: 75–78.

Ledvinka Z. ; Tůmová, E. ; Englmaierová, M. and Podsedníček, M. 2010. Egg quality of three laying hen genotypes kept in conventional cages and on litter. Arch.Geflügelk., 76. S. 38–43, 2012,

Ledvinka, Z.; Zita, L.; Hubeny, M.; Tumova, E.; Tyller, M.; Dobrovolny, P.; Hrusca, M. 2011. Effect of genotype, age of hens and K/k allele on egg shell quality. Czech. J.Anim. Sci., 56: 242-249.

Ledvinka, Z.; Tůmová, E.; Englmaierová, M.; Podsedníček, M. 2012. Egg quality of three laying hen genotypes kept in conventional cages and on litter. Archiv für Geflügelkunde, 76, 38–43.

Leyendecker, M.; Hamann, H.; Hartung, J. ; Kamphues, J. ; Ring, C. ; Glunder, G.; Ahlers, C.; Sander, I.; Neumann, U.; Distl, O. 2001a. Analysis of genotype environment interactions between layer lines and housing systems for performance trails, egg quality and bone strength. 1st Communication: Performance traits. Zuchtungskunde, 73: 290 -307.

Leyendecker, M.; Hamann, H.; Hartung, J.; Kamphues, J.; Ring, C.; Glunder, G.; Ahlers, C.; Sander, I.; Neumann, U.; Distl, O. 2001b. Analysis of genotype-environment interactions between layer lines and housing systems for performance trails, egg quality and bone strength. 2nd Communication: Egg quality traits. Zuchtungskunde, 73: 308–323.

Mohamed, S. A.; El sheikh Barrib, M. ; Abdel Rahmana, S. H. ; El bashiera, S. M.; El sheikh.El sammanib, F. ; Ibrahima, I. G. 2016. Mustard seeds supplementation Improves egg production, egg yolk nutritional quality and plasma lipids profile of layers. Journal for Nutrition. Photon 109 : 152-158. https://sites.google.com/site/photonfoundationorganization/home/journal-for-nutrition.

Radwan, L. M. 2015. Eggshell quality: a comparison between Fayoumi, Gimieizah and Brown Hy-Line strains for mechanical properties and ultrastructure of their eggshells. . Anim. Production Sci. http://dx.doi.org/10.1071/AN14755.

Radwan, L. M.; Galal, A. and Shemeis, A.R. 2015. Prediction of eggshell Ultrastructure via some non-destructive and destructive measurements in Fayoumi breed. Asian-Australasian J. Anim. Sci., 28: 993-998.

Radwan, L.M.; Fathi, M.M.; Galal, A. ; Zein El-Dein, A. 2010. Mechanical and ultra structural properties of egg shell in two Egyptian native breeds of chicken. Int. J. Poult. Sci. 9: 77–81.

SAS Institute 2005. SAS/STAT User's Guide: Statistics. SAS Institute Inc., Cary, NC, USA.

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

Silversides, F.G.; Scott, T.A.; Korver, D.R.; Afsharmanesh, M. and Hruby, M. 2006. A study on the interaction of xylanase and phytase enzymes in wheatbased diets fed to commercial white and brown egg laying hens. Poult. Sci., 85: 297-305.

Singh, R..; Cheng, K.M. and Silversides, F.G. 2009. Production performance and egg quality of four strains of laying hens kept in conventional cages and floor pens. Poult. Scie., 88: 256–264. http://dx.doi.org/10.3382/ps.2008-00237.

Soller, M.; Weigend, S.; Romanov, M. N.; Dekkers, J. C. and Lamont, S.J. 2006. Strategies to assess structural variation in the chicken genome and its associations with biodiversity and biological performance. Poult. Sci., 85:2061–2078.

Tixier-Boichard, M.; Leenstra, F. ; Flock, D.K.; Hocking, P.M. and Weigend, S. 2012. A century of poultry genetics. World Poult. Sci.J., 68: 307-321.

Tůmová, E.; Zita, L.; Hubený, M.; Skřivan, 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.

Tůmová, E.; Englmaierová, M.; Ledvinka, Z. and Charvátová, V. 2011. Interaction between housing system and genotype in relation to internal and external egg quality parameters. Czech J. Anim. Sci., 56, 490–498.

Tůmova, E.; Skřivan, M., Englmaierova, M. and Zita, L. 2009. The effect of genotype, housing system and egg collection time on egg quality in egg type hens. Czech J. Anim. Sci., 54: 17–23.

Weeks, C.A. and Nicol, C.J. 2006. Behavioural needs, priorities and preferences of laying hens. World's Poult. Sci. J., 62: 296-307.

Yakubu, A.; Salako, A.E. and Ige, A.O. 2007. Effects of genotype and housing system on the laying performance of chickens in different seasons in the Semi Humid Tropics. Int. J. Poult. Sci., 6:434-439.

Zhang, L.-C.; Ning, Z.-H.; XU, G.-Y.; Hou, Z.-C. and Yang, N. 2005. Heritabilities and genetic and phenotypic correlations of egg quality traits in brown-egg dwarf layers. Poult. Sci., 84: 1209-1213.

Zita, L.; Tůmová, E. and Štolc, L. 2009. Effects of genotype, age and their interaction on egg quality in brown-egg laying hens. Acta Vet. Brno, 78: 85–91.

الملخص العربى

دراسة مقارنة لبعض الصفات الإنتاجية و جودة البيض لخطين تجاريين من الدجاج البياض

محمود يوسف محروس ، لمياء مصطفى رضوان
قسم إنتاج الدواجن، كلية الزراعة، جامعة عين شمس

قد اجرى هذا البحث لدراسة تأثير السلاله باستخدام سلالتين تجاريتين لانتاج البيض الأبيض هما (سلالة اللهومنLSL وسلالة الهاى سيكس Hi- sex) لصفات الأداء الانتاجى (وزن الجسم، واستهلاك العلف، تم قياس كمية الغذاء المستهلك ومعدل الوفيات عند عمر ٢٨-٣٥ أسبوع)، وكذلك صفات إنتاج البيض (تم تسجيل عدد البيض، وزن البيض، كتلة البيض وإنتاج البيض يوميا من بداية انتاج البيض حتى ٦٥ أسبوعا من العمر)،واظهرت النتائج زياده معنويه لكتلة البيض ونسبة انتاج البيض لسلالة اللوهمان مقارنة بسلالة الهاى سيكس. لتقييم معايير الجودة لقشر البيض تم جمع ٩٠ بيضة عشوائيا لكل سلالة عند ٣٥ أسبوع من العمر، كما تم أخذ عشرين عينه من قشر البيض بشكل عشوائي من هذا البيض لدراسة التركيب البنائى لقشر البيض، كذلك فان الفحص الالكترونى للتركيب البنائى لقشر البيض لسلالتى اللوهمن والهاى سيكس اظهر النتائج عدم وجود اختلافات معنوية فى طبقة mammillae بين السلالتين بينما كانت الاختلافات لطول طبقة Palisade. طبقة palisade تلعب دور رئيسى وهام لزيادة متانة قشرة البيض لسلالة اللوهمن مقانة لسلالة الهاى سيكس.