Egyptian Poultry Science Journal

http://www.epsaegypt.com

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

COMPARATIVE STUDY OF EGG QUALITY, HATCHING PERFORMANCE AND CARCASS TRAITS FOR RHODE ISLAND RED, BAHIJ AND MATROUH CHICKEN STRAINS

G.N. Rayan*, A.I. El-Faham*, S.A. Ibrahim* and N.A.Hattaba**

**Dept. of Poult. Produ., Fac. of Agric., Ain Shams Univ., Cairo, Egypt.*

*** Anim. Prod. Rese. Insti., Mins. of Agric., Dokki, Cairo.*

Received: 18/08/2015 Accepted: 06/09/2015

ABSTRACT: The present experiment was designed to compare and evaluate some traits such as egg quality, hatching performance and carcass measurements of Rhode Island Red (RIR), Bahig and Matrouh chicken strains. A total number of 435 females (145 for each strain) and 47 males (15 RIR, 16 Bahig and 16 Matrouh) were used in the beginning of this experiment. Initial body weights at 20 wks of age, final body weight at 62 wks of age and body weight gain (20-62 wks of age) were significantly affected by strain. Matrouh and RIR strains had significantly heavier initial body weight compared to Bahig strain. On the other hand, RIR and Bahig strains had significantly heavier final body weight and body weight gain in comparision with Matrouh strain. Rhode Island Red hens produced significantly heavier egg weight compared to Bahig and Matrouh strains. No significant differences ($P \geq 0.05$) between strains for shell thickness, shell weight and yolk weight were observed. Conversely, shell (%), yolk (%), albumen weight and albumen (%) were significantly affected by strain. Fertility and hatchability percentages of Matrouh strain were significantly higher in comparison with other strains. Concerning age effect, the present results showed that maximum percentage of fertility is often observed during periods (29-37, 46-53 and 54-61) wks of hens' age. Inversely, percentage of fertility was lower at stage (38-45 wks). Significant difference between strains was detected for carcass, heart and abdominal fat percentages. It could be observed that Bahig strain had significantly higher carcass percentage (64.08 %) compared to RIR and Matrouh strains (59.19 and 58.94 %, respectively). Concerning abdominal fat percentage, Bahig strain had being significantly a lower abdominal fat percentage (1.43 %) compared to Matrouh and RIR strains (3.99 and 4.95 %, respectively). Finally, the mortality rate during the experimental period was lower for Matrouh females and males than those of other experimental strains.

Key Words: Egg quality, Hatching Performance, Carcass, RIR, Bahig and Matrouh chickens.

Corresponding author: gamal_rayan@agr.asu.edu.eg

INTRODUCTION

In Egypt, one of the important protein sources is poultry protein (meat and eggs). Most of the Egyptian consumers still prefer eggs from local strains. Poultry production is of great importance as a primary supplier of eggs and meat and as a source of income in Egypt. So, the knowledge of performance in chicken is important for the formulation of breeding plans for further improvement in production traits. The productivity of the local strains is genetically low. Hocking et al. (2003) clarify genetic variation in egg production between breeds, strains and lines. Growth and production traits of a bird indicate its genetic constitution and adaptation with respect to the specific environment (Ahmed and Singh, 2007).

Local developed stains in Egypt varied according to the purpose of production; one from these strains is Matrouh chickens that originated from crossing between White Leghorn males and Dokki-4 females for six successive generations (Mahmoud et al., 1974). While, Bahig strain resulting from crossing between Silver Montazah males and Alexandria females for five generations and they are considered as dual purpose for egg and meat production. Rhode Island Red, which is successfully maintained under rural as well as farming conditions in different parts of the country and have potentials of a higher economic return as layers and / or broilers (Javed et al., 2003).

Many investigators found significant differences between some local strains in body weight and rate of growth at different ages (Younis and Abd El- Ghany, 2003) in Salam, Mandara, Silver Montazah and Gimizah; (El Kaiaty and Hassan, 2004) in Fayoumi, Goldan Montazah and Matrouh; (Habeb, 2007) in Matrouh and Inshas.

Egg quality characters monitoring is important mainly in terms of production economy. External and internal egg quality traits of the breeds affect the future generations and their performance (Islam et al., 2001). Moreover, genotype significantly affects yolk and albumen quality and yolk index as reported Iraqi (2002) and Yousria Afifi et al. (2010) and affects egg weight and eggshell traits (Zita et al. 2009). Whereas, Basmacioglu and Ergul (2005) reported no significant effects of genotype on eggshell percentage and thickness. Egg weight is genetically linked to all three of the major components: shell, albumen, and yolk. Albumen quality is an important egg characteristic because the proportions of firm albumen are used as a criterion for egg quality and the quality of albumen declines with hen age (Burley and Vadehra, 1989).

Orban and Roland (1990) stated that shell quality measurements (shell weight, shell thickness, shell strength, shell percentage and specific gravity) were highly correlated with each other.

Ovary is the principal site for yolk formation, however yolk is comprised of approximately 50% water and 30% lipid, with the remainder largely protein. These constitute most of the nutrients required for embryonic development except for the portions derived from the albumen and eggshell. The blastoderm is positioned on the yolk within the nucleus of pander and beneath the perivitelline layer (Romanoff, 1960).

Fertility and hatchability are important economic traits of domestic poultry and represents a major component of reproductive fitness (Hassan and Nordskog, 1971). Fertility and hatchability

are major parameters of reproductive performance which are most sensitive to environmental and genetic influences (Stromberg, 1975). Heritability estimates for fertility and hatchability in chickens range from 0.06-0.13 (Sapp et al., 2004), this indicates that the non-genetic factors have a higher influence on these traits. Breeder factors that affect hatchability include strain, health, nutrition and age of the flock, egg size, weight and quality, egg storage duration and conditions (Tona et al., 2005). The efficiency of reproduction of broiler breeders decreases with age that is related to the internal egg composition or ratio, larger egg weight, poor shell quality, increased early and late embryo mortality (Elibol and Brake, 2003; Tona et al., 2004; Joseph and Moran, 2005) and albumen quality deterioration (Lapao et al., 1999; Tona et al., 2004). Significant differences between breeds and strains for carcass traits were detected by El-Labban (1999) and Habeb (2007).

The main objectives of this study were to compare and evaluate some traits such as egg quality, hatching performance and carcass traits of three chicken strains: Rhode Island Red, Bahig and Matrouh.

MATERIALS AND METHODS

This study was carried out on three chicken strains (Rhode Island Red, Bahig and Matrouh). A total number of 435 females (145 for each strain) and 47 males (15 RIR, 16 Bahig and 16 Matrouh) were used in the beginning of this experiment. Males used to insemination were representing almost 10 % of number of females. Birds were housed in floor pens under the same environmental, managerial and hygienic conditions. The feed and water were provided ad libitum. Vaccination under specific climatic conditions was carried out. Females and males were fed basal diet formulated to provide the nutrient requirements. Mortality rate (%) was calculated by (number of mortality birds throughout the experiment / number of live birds at the beginning of the experiment) x100. Composition of the experimental diet is summarized in Table (1).

Individual live body weight was recorded for each strain at the beginning (20 wks of age) and at the end of the experiment (62 wks of age). Body weight gain was calculated as the difference between initial body weight and final body weight.

Egg quality

Egg quality measurements at 40 wks of age were conducted using 90 eggs (30 eggs from each strain). Eggs were individually weighed to the nearest 0.01 g using an electronic digital balance. Shell thickness (mm) with membranes was measured using a dial gauge micrometer.

Subsequent to eggshell cracking, fractured egg was opened to isolate the entire eggshell after emptying the egg's contents, shell fragments or pieces were maintained. All eggshell pieces were cleaned from the albumen remaining, rinsed free of external debris or internal egg contents, washed under distilled water and air dried at room temperature. Also shell membranes were preserved. The weight (to the nearest 0.01 gram) for the eggshell humid was measured using second decimal scales.

The shell percentage was calculated according to following equation:

Shell percentage = Wet shell weight / Egg weight x 100.

Albumen weight was recorded by the equation:

Albumen weight = egg weight – (yolk weight + shell weight). While, albumen percentage was calculated by (albumen weight / egg weight) x100.

Yolk weight was determined by second decimal scale, while yolk percentage was estimated by (yolk weight / egg weight) x100.

Hatching performance

Thirty-two batch hatching eggs of three strains in this study were incubated under standard hatching conditions. At different age stages of hen strains (29-37, 38-45, 46-53 and 54-61) wks of hen age, hatching performance were conducted using 12000 hatching eggs for each age stage (500 hatching eggs for each strain per week). Fertility, un-hatched eggs and dead embryos were calculated as percentage of total egg set in the incubator. Fertility percentage was calculated using the following equation:

$$\% \text{ Fertility} = \frac{\text{Number of fertile eggs}}{\text{Number of settable eggs}} \times 100$$

Hatchability percentage was calculated using the following equation:

$$\% \text{ Hatchability} = \frac{\text{Number of hatched chicks}}{\text{Number of fertile eggs}} \times 100$$

Abnormalities of hatched chicks were calculated as percentage of unsalable chicks to total hatched chicks.

Carcass traits

At the end of the experimental period (62 wks of age), three hens from each strain were randomly taken and slaughtered for carcass evaluation. They were weighed, slaughtered and defeathered. The birds were eviscerated by removing the viscera. The giblets (gizzard, liver and heart) were dissected from the viscera and the gizzard was cut, opened and its contents cleaned.

The carcass, liver, gizzard, heart, abdominal fat and feather were individually weighed. All parts were expressed as a proportion of the live body weight.

Statistical analysis:

Data related to egg quality, carcass traits, body weight and body weight gain are analyzed using one-way analysis of variance with strain effect using the General Linear Model (GLM) procedure of SAS (2002) according to the following model (I);

$Y_{ij} = \mu + S_i + e_{ij}$

Where;

Y_{ij} = Trait measured,

μ = Overall means,

S_i = Strain effect (i= 1, 2 and 3),

e_{ij} = Experimental error.

While, data related to hatching performance were subjected to analysis using two-way analysis of variance with strain and hen age and their interaction using the General Linear Model (GLM) procedure of SAS (2002) as following model (II);

$Y_{ijk} = \mu + S_i + A_j + (S\ A)_{ij} + e_{ijk}$

Y_{ijk} = Trait measured,

μ= Overall means,

S_i = Strain effect (i= 1, 2 and 3),

A_j = hen age effect (four levels of age),

$(S\ A)_{ij}$ = Interaction between strain and age,

e_{ijk} = Experimental error.

When significant differences among means were found, means were separated using Duncan's multiple range tests.

RESULTS AND DISCUSSION

Live body weight and body weight gain

Data in Table (2) clarify body weight and body weight gain for females of RIR, Bahig and Matrouh strains. Initial body weight (at 20 wks of age), final body weight (at 62 wks of age) and body weight gain (20-62 wks of age) were significantly affected by strain. Matrouh and Rhode Island Red (RIR) strains had significantly heavier initial body weight (1389 and 1382 g, respectively) compared to Bahig strain (1324 g). On the other hand, RIR and Bahig strains had significantly heavier final body weight and body weight gain in comparision with Matrouh strain.

Strain differences in live body weight and body weight gain were reported by Younis and Abd El-Ghany (2003) in four local chicken strains, by Habeb (2007) in Inshas and Matrouh chicks during the growing period, and Kosba and Abd El- Halim (2008) in 14 local strains. Moreover, results of Ajayi and Ejiofor (2009); Zhao et al. (2009) and Morsy et al. (2012) are in accordance with the present results, where there were significant effects of strain on growth performances.

Egg quality

Egg quality traits of RIR, Bahig and Matrouh strains at 40 wks of age are shown in Table (3). Rhode Island Red hens produced significantly heavier egg weight (50.76 g) compared to Bahig (48.15 g) and Matrouh (47.23 g) strains. No significant differences ($P \geq 0.05$) were observed between strains for shell thickness, shell weight and yolk weight. Conversely, Shell percentage was significantly affected by strain. Eggs produced by Matrouh strain had significantly higher shell percentage (12.09 %) compared to Bahig and RIR strains (11.06 and 10.99%, respectively).

Regarding yolk percentage, yolk (%) of eggs produced by Matrouh strain was significantly higher than that of Bahig eggs, whereas RIR strain had the lowest one. Similar trend was observed by El-Bahy (1994) who reported that there was a significant effect of breed on yolk percentage. Also, Zaky (2006) reported that the yolk percentage was significantly higher in Fayoumi eggs compared to those of White Leghorn strain.

Significant difference between strains for albumin weight and percentage were detected. The highest values of albumen weights and percentage were detected for RIR strain followed by Bahig and finally by Matrouh strain. These findings are in agreement with those reported by Hanafi (1981) who pointed that small eggs had lower percentage of albumen.

Washburn (1990) concluded that breeds that differed in proportions of egg components also differed in egg weight, the group with the largest egg size having relatively less yolk than albumen as compared to group laying small eggs. Hanafi (1981) reported that small eggs had higher percentage of yolk. Ezzeldin and El-Labban (1989) stated that the eggs of local strains contain higher percentage of yolk as compared to eggs of standard breed.

Hatching performance

Data presented in Table (4) clarify hatching performance of Rhode Island Red, Bahig and Matrouh strains at different ages. The results showed significant differences between strains for both fertility and hatchability percentages.

Fertility and hatchability percentages of Matrouh strain were the highest (94.39

and 87.53 %, respectively) in comparison with other strains. Breslavets (1995) detected significant differences between strains (Leghorn and Rhode Island Red), where the hatchability was higher for the first than later strain. Moreover, Bakst et al. (2012) reported that differences among strains in hatchability might be due to various reasons such as: differences in the ranges of perivitelline layer sperm holes, blastoderm diameter, cell count or embryo weights which attributed to different egg weights.

Concerning age effect, the present results showed that maximum percentage of fertility is often observed during periods (29-37, 46-53 and 54-61) wks of hens' age. Inversely, percentage of fertility was lower at stage (38-45 wks).

Regarding percentages of dead embryos, chick abnormality and un-hatched eggs, no significant difference between strains for these traits. Inversely, percentages of dead embryos and un-hatched eggs were significantly affected by hens' age. It could be noticed that dead embryos (%) increased gradually as hens' age increased. The mean values were 3.77, 4.25, 4.54 and 4.60 at 29-37, 38-45, 46-53 and 54-61 wks of age respectively. Results indicated that maximum percentage of un-hatched eggs (2.81 %) is observed during period 29-37 wks of age.

Carcass traits

Data presented in Table (5) show carcass traits of RIR, Bahig and Matrouh strains at the end of the experimental period (62 wks of age). Significant difference between strains was detected for carcass, heart and abdominal fat percentages. It could be observed that Bahig strain had significantly higher carcass percentage (64.08 %) compared to RIR and Matrouh strains (59.19 and 58.94 %, respectively). While, Matrouh chickens had significantly higher heart percentage (0.42 %) in comparison with RIR chickens (0.35 %), however Bahig strain was intermediate value (0.38 %). Ojedapo, et al. (2008) pointed that the strain and sex had a significant effect on the carcass characteristics.

Concerning abdominal fat percentage, Bahig strain had a lower abdominal fat percentage (1.43 %) compared to Matrouh and RIR strains (3.99 and 4.95 %, respectively). Chambers (1990) reported that abdominal and subcutaneous fat are being regarded as the main source of waste in the slaughterhouse. Therefore, the success of poultry meat production has been strongly related to the improvements of growth and carcass yield, mainly by increasing breast percentage and reducing abdominal fat. On the other hand, there were no significant differences between strains in the overall means of live body weight, carcass weight, liver (%), gizzard (%), total giblets and feather (%) which is confirmed by El-Labban (1999) and Enaiat et al. (2010). they found that the percentages of carcass traits were nearly equal in males of Matrouh and Silver Montazah strain chicks.

Mortality rate

Data presented in Figure (1) showed mortality rate of RIR, Bahig and Matrouh strains for each females and males during experimental period (20-62 wks of age). The mortality rates for both sexes of Matrouh were the lowest than those of other strains. The corresponding values were 14.5, 16.6 and 19.3 % of Matrouh, Bahig and RIR females, respectively. While,

the values were 12.5, 18.8 and 13.3 % of Matrouh, Bahig and Rhode Island Red males, respectively.

Conclusion:

It could be concluded that each strain in the present study had some advantages compared to other strains. Rhode Island Red and Matrouh strains had significantly heavier initial body weight compared to Bahig strain. On the other hand, RIR and Bahig strains had significantly heavier final body weight and body weight gain in comparision with Matrouh strain. RIR hens produced significantly heavier egg weight compared to other strains.

Matrouh strain had significantly higher percentages of shell, yolk, fertility and hatchability of in comparison with other strains. Concerning, the mortality rate, it was lower than those of other strains.

Bahig strain had significantly higher carcass percentage and lower abdominal fat (%) compared to RIR and Matrouh strains.

Table (1): Composition and calculated analysis of basal diet:

Ingredients (kg)	**%**
Yellow Corn	66.00
Soybean Meal (48%)	20.20
Wheat bran	4.93
Bone meal	2.20
Limestone	6.00
NaCl	0.30
Premix*	0.30
Methionine	0.07
Total	**100**
ME Kcal/ Kg diet	2765
Crude Protein, %	15.64
Ca, %	2.95
NPP, %	0.39
Methionine & Cystein	0.62
Lysine	0.83

ME: metabolizable energy, NPP: non-phytate phosphorus.

*Each 1 Kg of premix contains:

Vitamins: A (retinyle acetate): 3.60 mg; D3 (cholecalciferol): 0.07 mg; E (tocopherol acetate): 20 mg; K_3 (menadione sodium bisulphite): 3 mg; B_1 (thiamine mononitrate): 1 mg; B_2 (riboflavin): 2 mg; B_6 (pyridoxine HCl): 3 mg; B_{12} (cyanocobalamin): 0.015 mg; Biotin: 0.05 mg; Coline chloride: 255 mg; Folic acid: 1.5 mg; Niacin: 30 mg.

Minerals: Mn (manganese sulphate): 100 mg; Zn (zinc sulphate): 80 mg; Fe (ferrous carbonate): 30 mg; Cu (copper sulphate): 8 mg; I (calcium iodate): 0.5 mg; Se (sodium selenite): 0.3 mg and CaCO3 was used as a carrier.

Table (2): Body weight and body weight gain for females of Rhode Island Red (RIR), Bahig and Matrouh strains (Means ± SE).

Trait	Strain			Prob.
	RIR	Bahig	Matrouh	
Initial body weight, (g) at 20 wks of age	1382.90[a]±15.27	1324.03[b]±14.10	1389.24[a] ±15.22	0.003
Final body weight, (g) at 62 wks of age	1873.33[a]±26.06	1851.07[a] 26.75	1747.66[b]±23.27	0.001
Body weight gain (20-62 wks of age)	483.68[a]±29.12	531.87[a]±32.50	352.02[b]±28.38	0.0001

[a and b] Means within the same main effects with different letters are significantly differed.

Table (3): Egg quality traits of Rhode Island Red (RIR), Bahig and Matrouh strains at 40 wks of age (Means ± SE).

Trait	Strain			Prob.
	RIR	Bahig	Matrouh	
Egg weight, (g)	50.76[a] ±0.90	48.15[b]±0.76	47.23[b]±0.84	0.01
Shell thickness with membranes, (mm)	0.38±0.01	0.37±0.01	0.38±0.01	NS
Shell weight, (g)	5.60±0.15	5.31±0.11	5.72±0.15	NS
Shell, (%)	10.99[b]±0.17	11.06[b]±0.20	12.09[a]±0.19	0.0001
Yolk weight, (g)	16.19±0.38	16.32±0.41	16.86±0.37	NS
Yolk, (%)	31.89[c]±0.49	33.65[b]±0.66	35.75[a]±0.15	0.0001
Albumen weight, (g)	28.97[a]±0.55	26.88[b]±0.53	24.64[c]±0.52	0.0001
Albumen, (%)	57.12[a]±0.53	55.41[b]±0.68	52.17[c]±0.55	0.0001

[a, b and c] Means within the same main effects with different letters are significantly differed, NS= Non-significant.

Table (4): Hatching performance of Rhode Island Red (RIR), Bahig and Matrouh strains at different ages (Means ± SE).

Trait	Age (A), wk	Strain (S)			Overall
		RIR	Bahig	Matrouh	
Fertility, %	29-37	92.00 ± 0.91	93.63 ± 0.65	94.63 ± 0.91	**93.42^{a}**
	38-45	91.75 ±0.56	91.50 ±0.60	92.63 ±0.32	**91.96^{b}**
	46-53	93.50 ±0.71	92.43 ±0.37	94.94 ±0.64	**93.67^{a}**
	54-61	92.63 ±0.75	91.43 ±1.02	95.38 ±0.73	**93.22^{a}**
	Overall	**92.47^{b}**	**92.27^{b}**	**94.39^{a}**	
Hatchability, %	29-37	83.90 ± 1.47	86.33 ± 0.66	87.21 ± 1.25	**85.81**
	38-45	84.14 ±1.23	84.54 ±1.70	85.50 ±0.74	**84.73**
	46-53	85.49 ±0.95	82.76 ±0.66	89.10 ±0.82	**85.78**
	54-61	85.59 ±1.28	83.21 ±1.53	88.31 ±1.01	**85.81**
	Overall	**84.78^{b}**	**84.24^{b}**	**87.53^{a}**	
Dead embryos, %	29-37	3.50 ± 0.35	3.89 ± 0.27	3.88 ± 0.25	**3.77^{b}**
	38-45	4.38 ±0.57	4.09 ±0.61	4.29 ±0.43	**4.25^{ab}**
	46-53	4.60 ±0.56	5.54 ±0.40	3.48 ±0.39	**4.54^{a}**
	54-61	4.14 ±0.40	5.19 ±0.30	4.56 ±0.42	**4.60^{a}**
	Overall	**4.17**	**4.66**	**4.05**	
Chick abnormality, %	29-37	1.49 ± 0.19	1.18 ± 0.12	1.48 ± 0.18	**1.39**
	38-45	1.56 ±0.26	1.95 ±0.38	1.73 ±0.43	**1.73**
	46-53	1.60 ±0.33	1.42 ±0.26	1.00 ±0.30	**1.41**
	54-61	1.50 ±0.13	1.30 ±0.38	1.00 ±0.30	**1.32**
	Overall	**1.53**	**1.45**	**1.37**	
Un-hatched eggs, %	29-37	3.07 ± 0.51	2.63 ± 0.36	2.76 ± 0.22	**2.81^{a}**
	38-45	2.20 ±0.28	2.00 ±0.31	2.14 ±0.23	**2.11^{b}**
	46-53	2.53 ±0.26	3.04 ±0.20	1.86 ±0.26	**2.48^{ab}**
	54-61	2.03 ±0.21	2.61 ±0.15	2.25 ±0.20	**2.28^{b}**
	Overall	**2.44**	**2.57**	**2.25**	

	Prob.		
	S	**A**	**S*A**
Fertility, %	0.0001	0.02	NS
Hatchability, %	0.0002	NS	NS
Dead embryos, %	NS	0.05	NS
Abnormality, %	NS	NS	NS
Un-hatched eggs, %	NS	0.01	NS

a and b Means within the same main effects with different letters are significantly differed, NS= Non-significant.

Table (5): Carcass traits of Rhode Island Red (RIR), Bahig and Matrouh strains at the end of the experimental period (62 wks of age) (Means ± SE).

Trait	Strain			Prob.
	RIR	Bahig	Matrouh	
Carrcass, (%)	59.19^{b}±1.31	64.08^{a}±0.87	58.94^{b}±1.02	0.03
Liver, (%)	2.38±0.12	1.98±0.22	2.30±0.06	NS
Heart, (%)	0.35^{b}±0.03	0.38^{ab}±0.01	0.42^{a}±0.01	0.05
Gizzard, (%)	1.46±0.10	1.63±0.13	1.62±0.15	NS
Giblets, (%)	4.18±0.20	3.99±0.31	4.34±0.20	NS
Abdominal Fat, (%)	4.95^{a}±0.75	1.43^{b}±0.52	3.99^{a}±0.59	0.02
Feather, (%)	9.94±0.10	8.65±0.32	3.32±0.27	NS

a and b Means within the same main effects with different letters are significantly differed, NS= Non-significant.

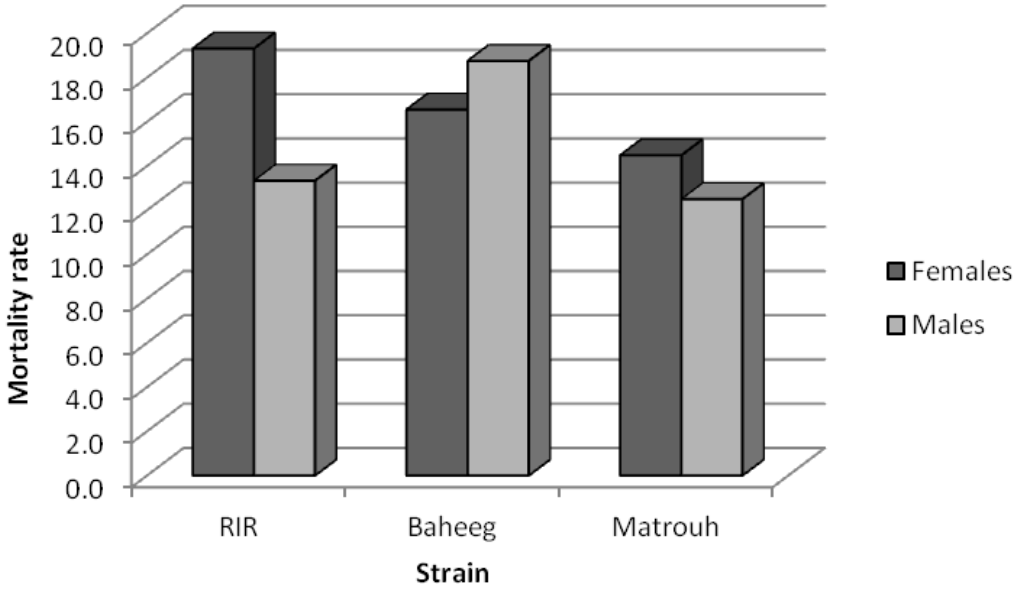

Fig. (1): Mortality rate of Rhode Island Red (RIR), Bahig and Matrouh strains for each females and males during experimental period (20-62 wks of age).

REFERENCES

Ahmad, M. and P.K. Singh (2007). Estimates of genetic parameter for some economic traits in White Leghorn. Indian J. Poult. Sci., 42: 311-312

Ajayi, F. O. and O. Ejiofor (2009). Effects of genotype X sex interaction on growth and some development characteristics of Ross and Anak broiler strains in the high rainforest zone of Nigeria.Asian J. Poult. Sci., 3: 51-56.

Bakst, M.R., V. Akuffo, D. Nicholson and N. French (2012). Comparison of blastoderm traits from 2 lines of broilers before and after egg storage and incubation. Poult. Sci., 91: 2645-2648.

Basmacioglu, H. and M. Ergul (2005). Research on the factors affecting cholesterol content and some other characteristics of eggs in laying hens – the effect of genotype and rearing system. Turk. J. Vet. Anim. Sci., (29): 157–164.

Breslavets, V.A., (1995). Egg quality depending on age, genotype and keeping of chickens. European Symposium on the quality of poultry meat. 195-201.

Burley, R. W., and D. V. Vadehra (1989). The Avian Egg: Chemistry and Biology. John Wiley and Sons, New York, NY. Pages 68–71, 372.

Chambers, J. R. (1990). Genetics of growth and meat production in chickens. Pages 599–643 in Quantitative Genetics and Selection. R. D. Crawford, ed.

Poultry Breeding and Genetics. Elsevier, Amsterdam.

El-Bahy, N. A. (1994). Productivity of two local domestic fowl breeds under semi-tropical conditions. M.Sc. Thesis, Fac. of Agric., Fayoum, Cairo Univ., Egypt.

Elibol, O. and J. Brake (2003). Effect of frequency of turning from three to eleven days of incubation on hatchability of broiler hatching eggs. Poult. Sci., 82: 357-359.

El-Kaiaty, A.M. and Hassan, M.S.H. (2004). Some physiological and immunological parameters in the female of local chicken strains. Egypt. Poult. Sci., 24: 901- 916.

El-Labban, A.F.M. (1999). Comparative studies on phenotypic performance of body measurements and carcass characteristics in males of some local strains of chickens. Egypt .Poult . Sci., 19: 419 - 434.

Enaiat, M. M. El-Anwer, Amina, A. Salem and Eman, M. Abou-Eitta (2010). A comparative study of productive and physiological performance between two local strains of chicks. Egypt. Poult. Sci. Vol (30) (I): 297-316.

Ezzeldin, Z. A. and A. F. El-Labban (1989). Egg weight and egg characteristics of purebred and crossbred chickens. 3th Egypt. Br. Conf. on Anim., Fish and Poult. Prod., Alexandria, 7-10 October: 983-992.

Habeb, A.R.H. (2007). A comparative study of meat and egg production and some physiological aspects in some local strains of chickens. M. Sc. Thesis, Fac. Agric., Cairo. Univ., Egypt.

Hanafi, M. S. (1981). Egg characteristics as affected by egg weight in New Hampshire and White Leghorn chickens. Egypt. J. Anim. Prod., 21: 135.

Hassan EM, A.W. Nordskog (1971). Effect of egg size and heterosis on embryonic growth and hatching speed. Genetics, 67: 279-285.

Hocking, P.M., M. Bain, C.E. Channing, R. Fleming, and S. Wilson (2003). Genetic variation for egg production, egg quality and bone strength in selected and traditional breeds of laying fowl. Brit. Poult. Sci., 44: 365-373.

Iraqi, M. M. (2002). Genetic evaluation for egg quality traits in crossbreeding experiment involving Mandarah and Matrouh chickens using animal model. Egypt. Poult. Sci., (22): 711-726.

Islam, M. A., S. M. Bulbuli, G. Seeland and A. B. Islam (2001). Egg quality of different chicken genotypes in summer and winter. Pak. J. Bid. Sci., (4): 1411-1414.

Javed, K., M. Farooq, , M.A. Mian, , F.R. Durrani, , S. Mussawar (2003). Flock size and egg production performance of backyard chickens reared by rural woman in Peshawar, Pakistan. Available from:http://www.lrrd.org/lrrd15/11/jave1511.htm.

Joseph, N.S. and E.T. Moran Jr. (2005). Effect of age and post emergent holding in the on broiler performance and further processing yield. J. Appl. Poult. Res., 14: 512-520.

Kosba, M.A. and H.A.H. Abd El – Halim (2008). Evaluation of the Egyptian local strains of chicks. Egypt. Poult. Sci., 28:1239-1251.

Lapao,C., L.T. Gama and M.C. Soares (1999). Effect of broiler breeder age and length of egg storage on albumen characteristics and hatchability. Poult. Sci., 78: 640-645.

Mahmoud, T.H., Madkour, Y.H., Sayed, I.F. and Harirah, K.M. (1974). "Matrouh" a new breed of chickens. Agric. Res. Rev., 52: 87-96.

Morsy, A. S., Amal, M. Hassan and K. R. S Emam (2012). Productive performance and physiological responses of three strains of chickens drinking saline water under north sinai conditions. Egypt. Poult. Sci. 32: 791-808.

Ojedapo, L.O., O. Akinokun, T.A. Adedeji, T.B. Olayeni, S.A. Ameen and S.R. Amao (2008). Effect of Strain and Sex on Carcass Characteristics of Three Commercial Broilers Reared in Deep Litter System in the Derived Savannah Area of Nigeria. World J. of Agric. Sci., 4: 487-491.

Orban, J. I. and D. A. Roland (1990). Correlation of eggshell quality with tibia status and other production parameters in commercial Leghorns at oviposition and 10 hour post oviposition. Poult. Sci., 69: 2068-2073.

Romanoff, A. L. (1960). The Avian Embryo. Structural and Functional Development. MacMillan Co., New York, NY.

Sapp, R.L., R. Rekaya, I. Misztal and T. Wing (2004). Male and female fertility and hatchability in chickens: A longitudinal mixed model approach. Poult. Sci., 83: 1253-1259.

SAS institute (2002). SAS/STAT User's Guide statistics Ver. 9.1; SAS institute Inc., Cary, NC.

Stromberg, J. (1975). A Guide to Better Hatching. Stromberg Publ. Co. Iowa, USA, pp: 8-25.

Tona, K., O. Onagbesan, B. De Ketelaere, E. Decupere and V. Bruggeman (2004). Effect of age of broiler breeders and egg storage on egg quality, hatchability, chick quality, chick weight and chick post hatch growth to forty-two days. J. Appl. Poult. Res., 13: 10-18.

Tona, K., V. Bruggeman, O. Onagbesana, F. Bamelis, M. Gbeasor, K. Mertens and E. Decuypere (2005). Day old chick quality: Relationship to hatching egg quality, adequate incubation practice and prediction of broiler performance. Avian Poult. Biol. Rev., 16: 109-119.

Washburn, K. W. (1990). Genetic variation in egg composition. P. 781-804, Poultry Breeding and Genetics, Edited by R. D. Crawford, Elsevier Science Pub., B. V. Amsterdam, Netherlands.

Younis, H.H. and F. A. Abd El–Ghany (2003). Productive and reproductive performance of four local chicken strains during winter and summer seasons. Egypt. Poult. Sci., 23: 893 – 910.

Yousria Afifi, K. M., O. M. Aly and Nazla Y. Abou El-Ella (2010).

Effect of crossing on the performance of local chicken strain. 4- Effect of strain and laying age on egg quality characteristics. Egypt. Poult. Sci., (30): 1171-1188.

Zaky, H. I. (2006). The effect of heterosis between Fayoumi and White Leghorn chickens on egg quality traits under desert conditions. Egypt. Poult. Sci., 26 (I): 39-52.

Zhao, J. P., Chen, J. L., Zhao, G. P.,Zheng, M. Q., Jiang, R. R., and Wen, J. (2009). Live performance, carcass composition, and blood metabolite responses to dietary nutrient density in two distinct broiler breeds of male chickens. Poult. Sci., 88: 2575-2584.

Zita, L., E. Tumova and L. Stolc (2009). Effect of genotype, age and their interaction on egg quality in Brown-egg laying hens. Actavet Brno, (78): 85-91.

الملخص العربى

دراسة مقارنة لجودة البيض، أداء التفريخ، وصفات الذبيحة لسلالات دجاج الرود إيلاند الأحمر وبهيج ومطروح

جمال ناصر ريان*، أحمد إبراهيم الفحام*، سيد عبد الرحمن إبراهيم*، نبيل على حطبة**

قسم إنتاج الدواجن، كلية الزراعة – جامعة عين شمس، القاهرة – مصر

****معهد بحوث الإنتاج الحيوانى – الدقى – الجيزة – مصر***

صممت هذه التجربة بهدف مقارنة وتقييم بعض الصفات مثل: جودة البيض، أداء التفريخ، ومقاييس الذبيحة لسلالات الرود ايلاند الأحمر – بهيج – مطروح. أستخدم فى بداية هذه التجربة عدد ٤٣٥ دجاجة (١٤٥ دجاجة لكل سلالة)، ٤٧ ديك (١٥ رود ايلاند أحمر، ١٦ بهيج، ١٦ مطروح). وأظهرت النتائج تأثر كل من وزن الجسم فى بداية التجربة (عند عمر ٢٠ أسبوع)، وزن الجسم فى نهاية التجربة (٦٢ عند عمر أسبوع)، والزيادة فى وزن الجسم (٢٠- ٦٢ أسبوع) تأثرا معنويا بالسلالة. حيث كانت كل من سلالتى مطروح والرود ايلاند الأحمر أثقل معنويا بالنسبة لوزن الجسم فى بداية التجربة مقارنة بسلالة بهيج. ومن ناحية أخرى، وجد أن كل من سلالتى الرود ايلاند الأحمر وبهيج كانت أثقل معنويا بالنسبة لوزن الجسم فى نهاية التجربة مقارنة بسلالة مطروح. أنتجت سلالة الرود ايلاند الأحمر بيضا أثقل وزنا وبشكل معنوى مقارنة بسلالتى بهيج ومطروح. لم يلاحظ وجود فرق معنوى بين السلالات لكل من سُمك القشرة، وزن القشرة، وزن الصفار. وعلى العكس من ذلك، وجد أن كل من القشرة (%)، الصفار (%)، وزن البياض، النسبة المئوية للبياض تأثروا معنويا بالسلالة. وجد أن النسب المئوية للخصوبة والفقس لسلالة مطروح كانت أعلى مقارنة بالسلالات الاخرى. وفيما يتعلق بتأثير العمر، أظهرت النتائج الحالية أن أعلى نسبة خصوبة لوحظت خلال الفترات (٢٩-٣٧ ، ٤٦-٥٣ ، ٥٤-٦١) أسبوع من عمر الدجاج. وعلى العكس، وجد أن نسبة الخصوبة كانت منخفضة فى الفترة (٣٨-٤٥) أسبوع من العمر. لوحظ وجود فرق معنوى بين السلالات لكل من النسب المئوية للذبيحة، القلب، دهن البطن. سجلت سلالة بهيج نسبة مئوية للذبيحة أعلى معنويا (٦٤,٠٨ %) مقارنة بسلالتى الرود ايلاند الأحمر ، مطروح (٥٩,١٩ ، ٥٨,٩٤ % على التوالى). وفيما يتعلق بالنسبة المئوية لدهن البطن، سجلت سلالة بهيج نسبة دهن بطن أقل معنويا (١,٤٣ %) مقارنة بسلالتى مطروح، الرود ايلاند الأحمر (٣,٩٩ ، ٤,٩٥ % على التوالى). وأخيرا، وجد أن معدل النفوق خلال فترة التجربة لكل من إناث وذكور سلالة مطروح كان أقل من مثيلتها فى السلالات الأخرى.