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STRAIN AND SEX EFFECTS ON PRODUCTIVE AND SLAUGHTER PERFORMANCE OF DEVELOPED LOCAL EGYPTIAN AND CANADIAN CHICKEN'S STRAINS.

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ABSTRACT

This experiment was conducted to evaluate the effect of strain and sex on productive performance, slaughter traits of chickens and the effect of strain on some productive as well as some reproductive traits of local improved dual purpose. A total of 1951 one day old chicks of three Canadian strains (Shaver A,B and C) and two Egyptian chicken strain (El-Salam and Mandarah). Productive performance measured from one day to 65 weeks of age and slaughter traits were recorded for cocks at 12 weeks of age. Results revealed that strain effect was clear for Shaver C strain for body weight, weight gain, feed consumption. In addition Shaver C had better feed conversion, dressing, fleshing, liver, glycogen, tenderness percentages but recorded the highest percentages for abdominal and total fat content as well as lowest testicular weight of cocks . Shaver B showed higher percentages for blood loss, feather, bones and spleen percentages, but Shaver A showed the highest percentages for PH content, ashes and water holding capacity. Sex effect showed superiority of males over females for body weight allover study periods, weight gain and feed consumption, while viability in growing period were recorded for Egyptian chickens. Strain effect was evident for shaver C strain for body weight, feed consumption and egg weight (at sexual maturity, at first 90 days of egg production, 42 and 65 weeks of age). While strain effect for fertility, hatchability and scientific hatchability, age at sexual maturity, Egg number at first 90 days of egg production, egg number at 42 and 65 weeks of age, egg quality were recorded for Egyptian chickens. Moreover, negative correlation estimates were observed between age at sexual maturity and egg number at different periods as well as positive correlation between body weight at all period ages, and most of productive traits that of high great benefits to select for economic traits in chickens at earlier age.

From the above results we can conclude that Canadian Shaver C strain recorded the best results for most productive traits, while Egyptian strains (EL-Salam and Mandarah) recorded the best results for reproductive traits as well as egg numbers at first 90 days of egg production, 42, and 65 weeks of age. egg mass at first 90 days of egg production, fertility and hatchability percentages , viability, egg quality. And local developed Egyptian environs mental conditions from other foreign breeds.

INTRODUCTION

In Egypt, as in most countries, poultry production plays an important role in providing customers with animal protein. Egyptian poultry industry depends mainly on importing commercial parent stocks for both meat and egg production. However, local chicken breeds are greatly participating in poultry market. Although, local breeds have lower rate, produce fewer eggs and less feed efficient compared with commercial strain, small holders prefer to raise local breeds for the following reasons:

Production of commercial egg-type or broiler chicken strains involves mainly two parts, development and improvement. There is no clear cut between development and improvement programs. In Egypt, there are pure and hybrid lines of chickens. Among these hybrid El-Salam and Mandarah strains which they were improved genetically for both eggs and meat production. Some dual purpose foreign chickens were domesticated in Egypt as Shaver Canadian strains.

There is evidence that there are genetic differences in growth rate between strains Deeb and Lamont,(2002).Younis and Abd El-Ghany (2004). Strain of chicken affect mean of body weight and weight gain at different ages El-Wardany (1994), Saleh et al., (1994) Leeson et al.,(1997), Amin (2008 a) and Saleh et al., (2008 a, b). Also significantly altered feed intake, feed coversion Rondell et al., (2003) and Hassan (2006 b). Moreover, sex has effect on some performance traits of chickens include body weight, growth rate, feed intak and feed conversion ratio, Balogun et al.,(1997), Abd El., Halim (1999), El-Amawy (2004) and Ajayi and Ejiofor,(2009)

Effect of strain and sex on carcass parameters were also evaluated by many authors (Ahn et al.,1995; Cherian et al., 1996; Musa et al., 2006; Jaturasasitha et al., 2008; Ojedapo et al., 2008 and Zhao et al., 2009)

In a developing counteries like Egypt, poultry production is of great importance as a primary supplier of eggs and meat and as a source of income. So, the knowledge of performance of economic traits in chicken is important for the formulation of breeding plans for further improvement in production traits. 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 purpose of production; from these strains is Mandarah chickens that resulting from crossing between Alexandria male and Dokki-4 female (Abdel-Gawad,E.M., 1981). While EL-Salam strain is across between Nicolas male and Mamourah females (Abdel-Gawad,E.M., 1983) and they are considered as dual purpose for egg and meat production.

It was found that body weights, age at sexual maturity, egg weights and egg production were significantly varied in four chicken varieties (Niranjan et al., 2008). Moreover, Sola-Ojo and Ayorinde (2011) reported that line and strain effect were evident for fertility, hatchability, body weight, total egg number, hen day egg production, body weight at first egg, and total egg number.

A number of researches have been done earlier on the relationship between body weights, age at sexual maturity, egg weight and egg production in the domestic chickens. Moreover, Relationships between the age at sexual maturity and some economic traits were reviewed by Omeje and Nwosu, (1984) singh and singh (1985), Ayorinde et al., 1988; Oni et al., 1991; Shebl (1991), Adenowo et al., (1995); Chineke Ghanem (1995), Kosba et al. (1997) Abd El-Halim (1999), El-Tahawy (2000) and Younis and Abd El-Ghany (2004).:, 2001; Abd El-Ghany (2005), Nwagu et al., 2007, El-Dlebshany 2008). Udeh, (2010) and Younis et al., (2011). The objectives of this study were to assess the differences between local Egyptian and

Canadian shaver chicken strains for reproductive and productive traits as well as estimation of correlation between studied parameters.

MATERIALS AND METHODS

A total number of 1951 one day old chicks obtained from three Canadian dual purpose strains received from Shaver poultry breeders and two Egyptian strains (El-`Salam and Mandarah). Chicks individually weighted, sexed, wing banded and Mark's vaccinated with spectam® at one day old, then randomly distributed and put 25 females/ pen and 24 males/ pen from each strain. Chicks were floor brooded for the first five weeks of age in a clean well ventilated room. The room was provided with heaters to adjust the environmental temperature according to age of the chicks.

Light was provided 24 hours at the first day then decreased to 21 hours daily till the fourth week of age then reduced to 10 hours of light and 14 hours of darkness during the growing period. At the 18th weeks of age the lighting period increased gradually to 14 hours with 10 hours darkness daily. During laying period the lighting was 16 hours with darkness 8 hours daily (Chao and Lee, 2001).

During laying period males and females were subjected to optimum environments as possible to keep their high performance in cage system.

Females fed with starter ration (19% CP and 3050 K-cal/kg) ad libitum from zero to 5 weeks of age and then grower ration (14% CP- / and 3100 K-cal/kg from 6-12 weeks). Males fed with broiler starter ration (22% CP and 3150 k-cal/kg) from 0-5weeks of age, then roaster grower (20% CP and 3200 k-cal/kg) from 6- 10 weeks of age, and roaster with finisher (18% CP and 3250 K-cal/kg) from 10-12 weeks of age, finally breeder ration till the end of experiment (16% CP and 3000 k-cal /kg).

Studied traits:

1-Body weight: (weight at hatch, 4 week, 8 week,12 week) and viability.

2- Body weight gain at (hatch – 4 week), (5- 8 week) and (9-12 week).

3-Feed consumption and feed conversion were calculated every 4 weeks from hatch till 12 weeks of age.

4- Four males were slaughtered from each strain at 12 weeks of age to estimate their carcass quality parameters including percentages of blood loss, feather, fleshing, bones, liver, gizzard, spleen, color, dressing weight, fat, protein, pH, ashes, glycogen according to (Dalrymple and Hamm, 1973), and tenderness, water holding capacity, thyroid and testicular weight.

5- Body weight at sexual maturity, first 90 days of laying, 42 and 65 weeks of age) -- Age at sexual maturity: age at the first egg.

6- Fertility percentage: ((No. of fertile eggs/ Total number of eggs set)*100).

7- Hatchability percentages: Scientific hatchability percentage (No.of hatched eggs/Total number of fertile eggs)*100. Commercial hatchability percentage (No. of hatched eggs/Total number of eggs set)*100

8- Feed consumption: was calculated at sexual maturity, first 90 days of egg production, 42 weeks of age and 65 weeks of age).

9- Feed conversion: was calculated at first 90 days of egg production, 42 weeks of age and 65 weeks of age).

10- Egg parameters: Egg Number (at first 90 days of egg production, 42 weeks of age and 65 weeks of age); Egg Weight (at first 90 days of egg production, 42 weeks of age and 65 weeks of age); Egg Mass (at first 90 days of egg production, 42 weeks of age and 65 weeks of age)

11- Estimation of correlations.

Statistical analysis:

The analysis of variance (GLM) for the obtained data was performed using Statistical Analysis System (SAS, 2004) software to assess significant differences according to the following model.

$$Y_{ijk}= \mu + G_i + L_j + e_{ijk}$$

Where:

Y_{ijk} = the Y th on observations,

μ = overall mean,

G_i = effect of strain (i = Shaver A, B, C, El-Salam and Mandarah)

L_j=effect of sex (j=Male and female)

e_{ijk}= random error.

Spearman's rank correlations were computed using SAS procedure Guide, (SAS, 2004).

$$Y_{ijk}= \mu + G_i + e_{ijk}$$

Where:

Y_{ijk} = the X th on observations,

μ = overall mean,

G_i = effect of strain (i = Shaver A, B, C, El-Salam and Mandarah)

e_{ijk}= random error.

RESULTS AND DISCUSSION

Reproductive performance:

Fitness traits are presented in (Table 1). It was observed that there were higher non-significant percentages for fertility of local Egyptian strains (Mandarah and El-Salam) over Canadian shaver strains C and B (94.25 and 92.77% versus 91.32 and 84.29 %; respectively), while the lowest fertility percentage was recorded for Shaver A strain 67.99 %. The same trend of fertility was recorded for scientific hatchability where Mandarah and El-Salam strains recorded higher percentages than Shaver C, B and A (95.44, 93.81% versus 88.60, 83.33 and 82.97 %; respectively), Moreover, commercial hatchability percentages were higher for Mandarah and El-Salam strains than those of Shaver C, B and A (89.25, 87.03% versus 80.92, 70.24 and 56.07 %; respectively). Nawar et al., (1995) , Nawar et al., (1997), Younis and Abd El-Ghany (2004), Amin (2008 a), (Sola-Ojo and Ayorinde, 2011) who found significant ($P<0.05$) effect of genotype on fertility and hatchability of eggs. Higher fertility and hatchability percentages for local breeds over exotic ones also were reported by (Horst, 1991 and Dessie and Ogle, 2001). Moreover, breed differences for fertility percentage were reported by (Kamble et al., 1996), while breed differences for hatchability percentage were recorded by (Alaba, 1990; Atteh, 1990 and Fayeye et al., 2005). These results inticete that local Egyptian chicken strains (EL-Salam and Mandarah) had superiority for fitness traits than Canadian Shaver strain A, B and C. This superiority may be due to adaptation to the Egyptian environmental conditions.

Table (1): Hatching eggs arrive from Canda (Shaver) and two strains Egypt (El-Salam and Mandarah).

Strain	Fertility %	Hatchability %	
		Fertility	Total of eggs
Shaver A	67.99^{c} ±5.32	82.47^{d} ±0.87	56.07^{d} ±0.13
Shaver B	84.29^{b} ±1.95	83.33^{d} ±0.77	70.24^{c} ±0.28
Shaver C	91.32^{a} ±1.65	88.60^{c} ±0.63	80.92^{b} ±0.33
El-Salam D	92.77^{a} ±1.68	93.81^{b} ±0.87	87.03^{a} ±0.37
Mandarah E	94.25^{a} ±1.77	95.44^{a} ±0.43	89.25^{a} ±0.49
Total	86.93 ±.98	89.37 ±0.23	77.69 ±0.19
Significance strain	**	**	**

1- Performance during growing period:

Body weight:

Results of body weight for different local Egyptian and Canadian chicken strains are presented in (Table, 2). Results in (Table 2) represented least square means ±standard errors of the effect of different strains on body weight of male from (hatch– 12 weeks of age). Hatch weight of males showed significant differences between different strains; Shaver C presented the highest significant values, while the lowest weight recorded for Mandarah strain (45.16 vs. 34.97 gm). Shaver C recorded the highest significant weight throughout 4, 8, and 12 week of age while the lowest weight throughout the same periods were recorded by Shaver B cocks (497.34, 1482.41 and 2629.12 gm) versus (271.87, 746.94 and 1335.36 gm).

Females of different strains followed the same trend for males. Shaver C females showed the highest hatch weight while the lowest hatch weight recorded by Mandarah strain 44.18 vs. 34.58 gm (Table 2). Shaver C recorded the highest significant weight throughout 4, 8, and 12 week of age while the lowest weight throughout the same periods were recorded by Shaver B (430.81, 1113.60 and 2051.80 gm) versus (295.97, 708.48 and 1227.87 gm).

These results showed that there was significant effect of strain on body weight and these agreed with those obtained by Abdel-Ghany,(1992), Saleh et al., (1994) reported that body weight at weight at hatch in twelve local strains of chickens were ranged from 28 to 34 gm, Abd El-Ghany (1992), El-Wardany et al., (1994), Lesson et al., 1997), Nadia et al.,(2001), Younis and abd El-Ghany (2004), Nawar Et al., (2004) (Ajayi and Ejiofor, 2009) and (Enaiat et al., 2010). Who reported marked strain and breed differences for body weight. Results showed also significant differences for sex effect on body weight at different ages where males were higher than females in body weight.

These results closely related to those obtained by Mahmoud et al.,(1980), Abdel-Ghany,(1992, Gueye et al., (1998), El-Soudany (2000) showed significant differences between different sex (Golden Montazah and Matrouh), Rondell et al.,(2003) Saleh et al.,(2008 a and b), Amin (2008 a), and Ajayi and Ejiofor, (2009).

Viability

Viability for different local Egyptian and Canadian chicken strains are summarized in (Table, 2). Egyptian Mandarah and El- Salam strain the highest significant values for Viability % (98.55, 97.97)**,** while the lowest Viability % recorded for Shaver A, C and B strain (94.93,95.16 and 95.96), respectively).

These results showed that there was significant effect of strain on viability and these agreed with those obtained by El-Soudany, (2000), Nawar et al., (2003), Younis and Abd El-Ghany (2003) and Amin (2008 a). This is due to the fact that locally development rived breeds bear Egyptian environmental conditions which reduces the proportion of dead in the first period of growth.

Weight gain

Strain effect were evident on weight gain (Table, 3) where Shaver C strain expressed higher significant weight gain than other strains during week 4, 8 and 12. On the other hand Shaver B strain recorded the lowest values of weight gain during week 4, 8 and 12.While Mandarah recorded the lowest weight gain at week 12 of age. These results agreed with those obtained by (Deeb and Lamont, 2002), (Rondelli et al., 2003), (Zhao et al., 2009) and (Enaiat et al., 2010). They found significant differences between different strain in growth rate and weight gain at different stages of life.

Males of all strains recorded higher significant weight gain than females during weeks 4, 8 and 12 of age parallel to overall . The same trend of results was recoded by (Balogun et al., 1997), (Rondelli et al., 2003) and (Enaiat et al., 2010) who found that males had higher weight gain than females.

Feed consumption:

Shaver C strain showed the highest significant different among strain (Table, 4) for feed consumption (gm/ day / bird) during week 4, 8 and 12 of age. Differences between strains in feed consumption were confirmed by the results obtained by Saleh et al., (1994), Leeson et al., (1997), Rondelli et al., (2003), Nawar et al., (2004) and Amin (2008 a). Males consumed more feed than females during weeks 4, 8 and 12 of age. These results agreed with those obtained by Balogun et al., 1997 who found that cockerels consumed more feed than pullets of the same strain and age. Moreover, it was noticed that males consume more feed than females for all strains throughout week 6, 8 10 and 12. These results were the same obtained by (Enaiat et al., 2010) who concluded that Matrouh chicks strain consumed significantly lower amounts of feed than that of Silver Montazah chicken during all studied periods and the males of each strain consumed significantly more feed than their females. El-Salam strain recorded the lowest feed consumption during weeks 4, 8 and 12 of age

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Feed conversion:

Table (5) showed that there significant differences among different strains for feed conversion (gm feed/ gm gain) where the best feed conversion recorded by Shaver C during week 4and 12 of age. While El-Salam strain showed the best eed conversion during week 8 (3.70 gm feed/gm gain). On the other hand, the lowest feed conversion recorded by Shaver B during week 4, 8 and 12 of age. Line and strain effect on feed conversion was closely related to the results recorded by Saleh et al.,(1994) Farran et al., (2000), Rondelli et al.,(2003), Nawar et al., (2004) and Hassan (2006b). Sex effect had no specific trend during early weeks and late period of rearing as recorded for week 4 and 12. Non significant differences for sex between Silver Montazah strains on feed conversion ratio at early stages of growth were recorded by Enaiat et al.,2010. But males of different strains showed the best feed conversion than females during week 8 for all strains. Significant differences in feed conversion between sexes were recorded by (Washburn et al., 1975).

Carcass and meat quality:

Table (6) represented effect of strain on carcass parameters. Shaver C recorded the highest significant percentages for dressing, fleshing, liver, abdominal fat, total fat and glycogen (72.75,58.75, 2.10, 3.65, 3.72 and 1.27%, respectively). Strain effect on abdominal fat percentage were recorded also by Ahn et al., (1995), Cherian et al., (1996), Farran et al., (2000) and Zhao et al.,(2009), and on carcass percentage Ojedapo et al., (2008).

Heart and proten percentages were significantly higher for Mandarah strain (0.57 and 21.25 %). On the other hand Shaver A showed the higher pH content, ashes, color, water holding capacity (6.30, 1.11, 0.36 and 3.08 %), as well as thyroid weight (9.33mg/100gm live weight).These results agreed with Ojedapo et al.,(2008) who found that chickens Anka and Rugao breeds differed significantly in color density, pH and tenderness Musa et al., (2006) who reported non significant differences between breeds in water holding capacity. Tenderness percentage was the highest for Shaver A and Mandarah while the lowest for Shaver C (2.82, 2.82 and 2.55 %, respectively)). On the other hand cocks of El-Salam strain recorded the highest significant testicular percentage 0.44% while the lowest was for cocks of Shaver C strain 0.16% (Chatterjee et al.,2007) recorded significant differences in testicular weight between Brown Nicobari and White Leghorn males and their crosses. These results showed that there was significant effect of strain on body weight and these agreed with those obtained by Hassan (2006 b) and Shemeis et al., (2007).

2- Performance during egg production:

Body weight:

Table (7) represented effect of strain on body weight at sexual maturity; it was observed that shaver C strain reached sexual maturity with the heaviest weight (2661.34 g) followed by shaver A (1873.38 g) while the lowest body weight at sexual maturity was recorded for Shaver B strain (1615.63 g).

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Strain and line effects for body weight at sexual maturity were also recorded by (Udeh, 2010 and Sola-Ojo and Ayorinde, 2011 and El-labban et al., 2011).

Table (7) represented effect of strain on body weight, Shaver C strain recoded superiority in body weight at 90 days egg production over other studied strains (2832.66 g) followed by Shaver A strain (2100.51 g), but the lowest body weight recorded for Mandarah strain (1960.70 g). The same trend was recorded for body weight at 42 weeks of age where the highest body weight was recorded for Shaver C strain (3157.21 g) followed by El-Salam strain (2172.21 g), while the lowest body weight recorded for Mandarah strain (2100.90 g). These results confirmed by those obtained byEl-Khaiat (2008), Niranjan et al., (2008) and Yahaya et al., (2009) who found strain differences for body weight at 40 weeks of age. In addition, Shaver C strain also recorded, the highest body weight at 65 weeks at age (3388.76 g) followed by Shaver A (2309.88 g). Similar results obtained by (Niranjan et al., 2008) who found significant differences between different layer strains at 64 weeks of age. On the other hand, Mandarah strain had the same trend of body weight at 90 days of egg production and 42 weeks of age and recorded the lowest body weight (2127.60 g). Strain effect for body weight were also recorded by Abd El-Ghany (2005) , Amin (2008 a), Ojedapo et al., (2008) and Singh et al., (2009) who found that there were line and strain effect for body weight at 30, 40 and 50 weeks of age for four strains of laying hens.

Age at sexual maturity

Age at sexual maturity for different local Egyptian and Canadian chicken strains are summarized in (Table, 7). Egyptian Mandarah strain reached sexual maturity earlier than other strains (151.60 days) followed by El-Salam strain (163.66 days), while Canadian Shaver B strain reached sexual maturity at older age (181.87 days). It was noticed that Egyptian strains reached sexual maturity at earlier age than Canadian Shaver strains. Differences in age at sexual maturity between different lines of poultry were also recorded by (Udeh, 2007; Niranjan et al., 2008; Yahaya et al., 2009; Udeh, 2010; El-labban et al., 2011; Udeh and Omeje, 2011), but disagree with AL-Nasser et al., 2008 who found that there were no differences for age at sexual maturity for Lohmann LSL-Classic white and brown strains.

Feed consumption

Feed consumption at different periods in local Egyptian and Canadian chicken strains are listed in (Table, 7). Higher significant differences for feed consumption at sexual maturity for Shaver C strain (146.59 g), followed by Mandarah strain (127.00 g), while the lowest feed consumption recorded for Shaver A (103.20 g). The same trend for feed consumption at 90 days of egg production was recorded for Shaver C (140.36 g) followed by Shaver A (133.47 g), on the other hand Mandarah strain recorded the lowest feed consumption (128.48 g). Shaver C strain also, recorded the highest significant for feed consumption at 42 weeks and 65 weeks of age (142.64 and 145.12 g; respectively) while El-Salam strain recorded the lowest feed consumption at the same periods (130.77 and 131.24 g; respectively).

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The results agreed with those obtained by Lacin et al., 2008 who found Strain effect for feed consumption among different layer strains.

Egg number

Egg number at first 90 days of production (Table, 8). Local strains (Mandarah and El- Salam) the highest significant values for egg production (65.92 and 61.75 eggs), while the lowest egg number recorded for Shaver B strain (35.83). Also, egg number at 42 weeks of age was of highest significant for Mandarah strain followed by El-Salam strain (123.14 and 118.57; respectively), while Shaver B recorded the lowest egg number (71.83). Significant strain differences for egg number at first 90 days and 42 weeks of age were also recorded by Enab (1982), Youis and Abd el-Ghany (2003), Abd el-Ghany (2005), Ghanam et al., (2007), Amin (2008 a) Ghanam et al., (2008), Saleh et al., (2008 a and b) and El-labban et al., (2011).

Mandarah strain continues recoding the highest significant egg number at 65 weeks of age followed also by El-Salam strain (199.94 and 191.01; respectively). On the other hand the worst egg number recorded for Shaver B strain (130.63). It was clear that there were superiority for number at different periods of production for Egyptian Local strains (El-Salam and Mandarah) over Canadian shaver Strains. Strain differences for egg production at 65 weeks of age where reported by El-Hossare et al., (1992), Abd El-Ghany (20005), Udeh, (2007); Lacin et al., (2008); Niranjan et al., 2008; Yahaya et al., 2009; Sola-Ojo and Ayorinde, (2011); Udeh and Omeje, (2011).

Egg weight

It was noticed that Shaver C recorded the highest significant differences for egg weight (Table, 8) at 90 days of egg production, 42 and 65 weeks of age (66.83, 71.33 and 70.45 g; respectively), while the lowest egg weights for the periods were recorded for Mandarah strain (50.46, 53.94 and 55.14 g; respectively). Results agreed with those obtained by Udeh, 2007 who reported that the comparative performance between the two strains of chicken showed significant differences in weight of first egg, egg weight at 30 and 40 weeks. Also, strain differences for egg weight were recorded by Goher et al., (1990 , 1994), El-Wardany et al., (1994), Younis and Abd El-Ghany (2003), Abd El-Ghany (2005), Ghanam et al., (2007 , 2008), Saleh et al., (2008 a, b), Lacin et al., 2008; Niranjan et al., 2008; Yahaya et al., 2009; Udeh and Omeje, 2011). It was clear that egg weights were negatively correlated with egg number as observed in El-Salam strain.

Egg mass

El-Salam strain was of highest significant values for egg mass (Table, 8) at 90 days of egg production (3327.40 g), while shaver B recorded the lowest egg mass (2294.67 g), but egg mass at 42 weeks of age was of highest significant values for Shaver C (7154.11 g) and the lowest egg mass also recorded for Shaver B (4482.15 g). On the other hand egg mass at 65 weeks of age was significant for Shaver A (12046.56 g) and Shaver B was still of the lowest egg mass (8439.30 g). The results in agreement with those obtained by Attia and Hakim (1972) found that Fayoumi breed had the lightest egg mass was (19.9 g/h/d), while Younis and Abd El-Ghany (2003) recorded that the highest egg mass was in Mandarah strain which was

2937.3g (32.63 g/h/d) till 90 days of production, El-labban et al., (2011) who found strain differences for egg mass at first 90-days, egg mass for 210-days, egg mass for first ten eggs, egg mass for one week per month and egg mass for two days per week. Strain effect for egg mass also recorded by Goher et al., (1990 , 1994), El-Wardany et al., (1994), Younis and Abd El-Ghany (2004), Abd El-Ghany (2005), Ghanam et al., (2007 , 2008), Saleh et al., (2008 a, b). and (Udeh, 2007).

Feed conversion

From the data presented in (Table, 8) El-Salam and Mandarah strains represented the best feed conversion rate at first 90 days of production 3.52 and 3.65 kg, while Shaver A strain recorded the best feed conversion at 42 weeks of age (3.50 kg) followed by El-Salam and Mandarah strains (3.55 and 3.57 Kg), more over the same trend was recorded for feed conversion at 65 weeks of age; Shaver A strain showed the highest feed conversion ratio (4.47kg) followed by El-Salam and Mandarah strains (4.29 and 4.16 Kg). From the mentioned results Egyptian El-Salam and Mandarah strains represented best feed conversion over Shaver B and C Strains. The same results reported by **Saleh et al.,(1994), Nawar et al., (1995) , Nawar et** al., (1997), Younis and Abd El-Ghany (2004), Abd El-Ghany (2005), Ghanam et al., (2007), Amin (2008 a), Udeh, 2007 who found significant strain effect for feed conversion into eggs between two strains of brown Nick and Black Olympia layer type chickens. Strain effect for feed conversion in different layer strains was also recorded by Lacin et al., 2008.

Egg quality

From the data presented in (Table, 9). Egg quality characteristics were affected by strains in three age periods at first 90 days of production, 42 and 65 weeks of age. El-Salam and Mandarah strains represented the best egg quality (Haugh unit and shell thickness) in three age periods followed by Shaver A, B and C strains. Also, Haugh unit increased with the hens age in all genotypes, shell thickness and strength improved with age, The same results reported by (Lukas et al., 2008), and Yousria, et al., (2010) showed that Haugh units were not significantly different between pure strains and their crosses, but hen age affected significantly ($p<0.01$) this trait. age had a highly significant effect on egg shell thickness as it decreased with hen age increase, It is generally agreed that all characteristics of egg quality have a genetic basis. Egg quality has been defined by Stadelman (1977) as the characteristics of an egg that affect its acceptability to the consumer's. Egg quality is the more important price contributing factor in table and hatching eggs. Therefore, the economic success of a laying flock solely depends on the total number of quality eggs produced.

From this study, we find that local breeds characterized by high quality of the eggs produced from homogeneity and shell thickness and therefore a positive affect on egg production and hatching improves recipes

Correlations among some productive traits

Correlation coefficients among some production traits were presented in table (Table 10). It was observed that there were highly positive correlations between body weights at 8 weeks, body weight at sexual maturity and body weight at 65 weeks of age.

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While negative correlation values were recorded between BW1, BW2, BW3 and Sexual maturity (-0.13, -0.02 and -0.05) on the other hand mild positive correlations were recorded between and Sexual Maturity (0.06 and 0.07). These results agreed with those obtained by Abd El-Ghany (2005) and (Udeh, 2010). Negative correlation estimates were observed for egg weight and egg number at three periods of production. These results agreed with those obtained by Shebl (1991), El-Tahawy (2000), El-Khaiat (2008) Veeramani et al., (2008) and El-labban et al.,(2011). But not agreed with those obtained by Nwagu et al., (2007) who reported that correlation between egg number and egg weight was small non-significant. On the other hand, Positive correlation estimates were recorded between egg number and egg mass.

Highly negative correlation estimates were observed between age at sexual maturity and EN1, (-0.70), EN2 (-0.87) and EN3 (-0.83). The same results were obtained by Abd El-Ghany (2005), Younis et al., (2001) who found that the early age of sexual maturity in chickens Inshas to increase the rate of egg production, and Veeramani et al. (2008) who found negative correlation between ASM and Egg production on both genetic and phenotypic scale

CONCLUSION

From the above results we can conclude that Canadian Shaver C strain recorded the best results for most productive traits, while Egyptian strains (EL-Salam and Mandarah) recorded the best results for reproductive traits as well as egg numbers at first 90 days of egg production, 42, and 65 weeks of age. egg mass at first 90 days of egg production, fertility and hatchability percentages , viability, egg quality. Also, we can select for body weight at eight weeks of age for improving most of productive traits as egg number, egg weight and egg mass instead of selection in older ages of birds that will be economically more benefit**.**

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تـأثير السـلالة و الجـنس علـى الأداء الإنتـاجي وصـفات الذبيحـة فـى سـلالات الـدجاج المحلية المصرية والكندية

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أجريت الدراسة بهدف تقييم تـأثير السـلالة والجنس علـى الأداء الإنتـاجي وصـفات الـذبح للكتاكيت وتـأثير السلالة على بعض الصفات الإنتاجية والتناسلية للدجاج حيث استخدم ١٩٥١ كتكوت عمر يوم واحد من ثلاث سـلالات كنديـة ثنائيـة الغرض (شيفر أ , ب , ج) وأثنين من السلالات المصـرية (السلام والمندرة). درست الصفات الإنتاجية من عمر يوم حتى نهاية التجربة عمر ٦٥ أسبوع, وكذلك صـفات الذبيحـة سجلت للديوك عمر ١٢ أسبوع. وأوضحت النتائج إن تأثير السلالة كان واضحاً لسلالة (شيفر ج) لـوزن الجسم فـى جميـع الأعمـار , زيادة الـوزن اليومي, استهلاك العلـف , بالإضـافة إلـى ذلك كانت هذه السـلالة الأفضـل فـي التحويل الغذائي , ونسبة التصــافي للذبيحـة ووزن الكبـد والجليكـوجين. ألا أنهـا سـجلت أعلـى النسـب المئويـة لمحتـوى الـدهون فـى منطقة البطن والجسم عامـة واقل وزن للخصـية فـى الـديوك . وأظهـرت سـلالة (شيفر ب) أعلـى النسب المئويـة للدم المفقود بعد الذبح , الريش , والعظام والنسبة المئوية لـوزن الطحـال. ولكن سـلالة (شيفر أ) قد سـجلت أعلـى النسب المئوية للمحتوى الرقم الهيدروجيني , والرماد , والقدرة علـى الاحتفـاظ بالمـاء . وبالنسبة لتـأثير الجنس , أظهـرت النتـائج تفوق الـذكور علـى الإنـاث فـى وزن الجسم أثنـاء فتـرة الدراسـة وزيـادة الـوزن اليـومي واستهلاك العلف. والسلالات المحلية سجلت أعلـى النسب فـى الحيويـة فـى فتـرة النمـو .وأوضـحت النتـائج ان تـأثير السـلالة كان واضحاً لسلالة (شيفر ج) لوزن الجسم واستهلاك العلف (عمـر النضـج الجنسـي – وال ٩٠ يـوم الأولـى مـن الإنتـاج – عمـر ٤٢ , ٦٥ أسبوع) ووزن البيضـة , بينمـا كانـت السـلالات المحليـة لهـا تـأثير واضـح فـى نسبة الخصـوبة ونسـبة الفقـس للمخصـب ونسـبة الفقـس الكليـة وعمـر النضـج الجنسـي المبكـر وعـدد البـيض وجـودة البيض فى الثلاث فترات إنتـاج . وأوضـحت النتـائج بأنـه يوجـد ارتبـاط سـالب بين عمـر النضـج الجنسي وإنتـاج البيض فى فترات الإنتاج المختلفة وارتباط موجب بين عمر النضج الجنسي ووزن الجسم ووزن البيضة .

والخلاصـة : السـلالة الأجنبيـة (شيفر ج) تتميز بـوزن جسم عـالى (سرعة النمـو) فـى فتـرة النمـو والإنتـاج وحجـم البـيض الكبيـر والتحسـن فـى معـدل التحويـل الغـذائي . والسـلالات المحليـة المحسـنة (السـلام والمندرة) تمتاز بتحمل الظروف البيئية - ومقاومة الإمراض - وقلة النفوق فى فترة النمو- وتتنـافس علـى وزن الجسم فـى فتـرة النمـو - وفـى فتـرة الإنتـاج تمتـاز بكثـرة إنتـاج البـيض - والتبكيـر فـى عمـر البلـوغ الجنسـي - وصفات الخصوبة والفقس. ولذلك يجب العمل علـى التحسين المستمر بالسـلالات المستنبطة محليـاً حفاظـاً علـى تلك التراكيب الوراثية الجيدة والإكثار منها.

ام بتحكيم البحث

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Table 4: Last square means ± standard errors of the effect of different strains on feed consumption (g/day/bird) of male and female at different ages .

Age in weeks	Sex	Strains					Significance
		Chaver A	Chaver B	Chaver C	El-Salam	Mandarah	
Hatch- 4 week	Male	48.88±0.06	46.67±0.20	61.61±0.41	43.78±0.23	43.78±0.42	**
	Female	44.06±0.18	47.85±0.20	64.70±0.08	41.72±0.03	44.23±0.40	**
	Overall	43.52±0.10 b	47.27±0.15 c	63.22±0.23 d	42.49±0.13 a	44.01±0.29 b	**
4-8 week	Male	79.68±0.04	72.72±0.37	109.59±0.76	66.16±0.07	75.92±0.94	**
	Female	69.34±0.10	69.10±0.18	104.47±0.58	59.72±0.06	73.27±0.45	**
	Overall	74.48±0.37 c	70.86±0.24 b	106.91±0.50 d	63.05±0.41 a	74.58±0.52 c	**
8-12 week	Male	113.92±0.04	115.54±0.26	143.32±0. 81	92.08±0.21	100.79±0.04	**
	Female	103.70±0.23	101.37±0.19	125.57±0.29	92.83±0.25	91.93±0.14	**
	Overall	108.78±0.38 c	108.27±0.53 c	1 34. 0 3±0.76 d	92.47±0.16 a	96.32±0.39 b	**

a,b and c = means on the same raw (between strains) significantly ((p<0.01)

Table 5 : Last square means ± standard errors of the effect of different strains on feed conversion (gm feed / gm gain) of male and female at different ages .

Age in weeks	Sex	Strains					Significance
		Chaver A	Chaver B	Chaver C	El-Salam	Mandarah	
Hatch- 4 week	Male	3.08±0.04	4.27±0.12	2.66±0.05	3.47±0.08	3.27±0.06	**
	Female	3.60±0.06	4.47±0.10	3.49±0.06	3.58±0.09	4.01±0.07	**
	Overall	3.34±0.04 a	4.52±0.08 c	3.10±0.05 a	3.35±0.06 b	3.65±0.05 b	**
4-8 week	Male	3.83±0.09	4.38±0.14	3.15±0.07	4.05±0.09	3.91±0.09	**
	Female	5.11±0.02	6.76±0.59	4.50±0.37	3.99±0.23	3.53±0.23	**
	Overall	4.48±0.12 b c	5.53±0.33 c	3.87±0.20 a	3.70±0.13 c	3.77±0.40 b	**
8-12 week	Male	3.59±0.08	5.69±0.36	3.94±0.42	4.60±0.68	4.13±0.14	**
	Female	4.08±0.17	3.65±0.07	3.18±0.16	4.50±0.16	4.26±0.21	**
	Overall	3.84±0.09 b	4.64±0. 19 c	3.54±0.22 a	4.13±0.34 c	4.04±0.12 c	**

a,b and c = means on the same raw (between strains) significantly ((p<0.01).

Table 6 : Last square means ± standard errors of the effect of different strains on parameters of Slaughter test relative to live body weight of males at 12 weeks of age.

Parameter*	Strains					Significance
	Chaver A	Chaver B	Chaver C	El-Salam	Mandarah	
Blood loss*	3.22±0.17 [a]	3.30±0.14 [a]	2.50±0.04 [b]	3.02±0.06 [a]	2.57±0.12 [b]	**
Feather*	9.67±0.07 [bc]	11.40±0.12 [a]	9.55±0.19[d]	10.07±0.17 [c]	10.22±0.14 [bc]	**
Dressing*	65.50±0.28 [bc]	63.75±0.47 [c]	72.75±0.62 [a]	64.75±0.62 [c]	66.75±0.75 [b]	**
Fleshing*	49.00±0.70 [b]	45.25±1.25 [c]	58.75±1.03 [a]	48.25±0.75 [c]	49.75±0.85[b]	**
Bones*	16.50±0.50 [a]	18.50±0.04 [a]	14.00±070[b]	16.50±0.85 [a]	17.50±0.28 [a]	**
Liver*	1.77±0.07 [b]	1.85±0.02 [b]	2.10±0.09 [a]	1.82±0.04 [b]	1.85±0.06[b]	**
Gizzard*	2.37±0.18 [a]	2.40±0.07 [a]	2.07±0.04[b]	1.95±0.02[b]	1.97±0.04 [b]	**
Spleen*	0.27±0.07 [ab]	0.42±0.02 [a]	0.22±0.02[b]	0.30±0.00 [ab]	0.20±0.00 [b]	**
Heart*	0.50±0.00 [b]	0.50±0.00 [b]	0.51±0.00 [b]	0.52±0.02 [b]	0.57±0.02 [a]	**
Abdominal fat*	1.50±0.17 [b]	0.47±0.04 [c]	3.65±2.48 [a]	1.47±0.11[b]	1.30±0.12 [b]	**
Total fat*	2.92±0.07 [b]	2.25±0.06 [d]	3.72±0.06 [a]	2.92±0.02[b]	2.55±0.06 [c]	**
Protein	20.70±0.07 [b]	20.55±0.11[b]	20.38±0.03 [b]	20.46.±0.16 [b]	21.25±0.09 [a]	**
pH	6.30±0.03 [a]	6.11±0.06 [ab]	6.03±0.04 [b]	5.95±0.01[c]	6.01±0.02[b]	**
Ashes	1.11±0.01 [a]	1.06±0.01[b]	1.08±0.00 [b]	1.03±0.00[c]	1.08±0.00 [b]	**
Glycogen	0.74±0.01 [c]	0.90±0.01 [b]	1.27±0.08 [a]	0.94±0.03[b]	0.69±0.01 [c]	**
Color	0.36±0.01 [a]	0.25±0.01 [d]	0.28±0.00[bc]	0.29±0.00[b]	0.27±0.00 [cd]	**
Tenderness	2.82±0.04 [a]	2.75±0.05 [a]	2.55±0.02[b]	2.57±0.04 [b]	2.82±0.04 [a]	**
w-holding capacity	3.08±0.50 [a]	2.59±0.05[c]	2.86±0.04.b	2.95±0.03[ab]	2.67±0.05 [c]	**
Thyroid**	9.35±0.17 [a]	9.72±0.08 [a]	8.02±0.08 [b]	7.07.±0.08 [c]	8.25±0.18 [b]	**
Testis*	0.42±0.01 [a]	0.27±0.00 [c]	0.16±0.01 [d]	0.44±0.02 [a]	0.34±0.01 [b]	**

a,b,c and d = means on the same raw (between strains) significantly (($p<0.01$).
*** Percentage from live body weight ** thyroid weight mg/100g live weight.**

Table 7: Least square means ± standard errors of the effect of different strains on body weight, age at sexual maturity and feed consumption.

Parameter*	Strains					Significance
	Shaver A	Shaver B	Shaver C	El-Salam	Mandarah	
BW 1	1873.38±19.10b	1615.63±22.45d	2661.34±32.37a	1728.73±27.35c	1649.60±18.49 d	**
BW2	2100.51±17.67 b	1977.97±16.64 c	2892.66±23.25 a	1998.63±23.36 c	1960.70±13.87 c	**
BW3	2159.05±13.17 b	2119.79±15.18bc	3157.21±26.25 a	2172.21±22.69 b	2100.90±15.80 c	**
BW4	2309.88±27.34b	2229.39±24.30b	3388.76±40.25a	2279.57±26.82b	2127.10± 22.71c	**
ASM	160.14±0.54 b	181.87±0.33 e	166.73±0.24 d	163.66±0.62 c	151.60 ± 0.54 a	**
Feed 1	133.20±5.10 c	120.87±0.65 b	146.59±0.27 d	122.00±0.16 a	122.73±0.13 a	**
Feed 2	133.47±0.18 c	131.01±0.16 b	140.36±0.15 d	123.48±0.08 a	124.50±0.05 a	**
Feed 3	135.65±0.12 c	133.88±0.14 b	142.64±0.13 d	125.98±0.10 a	125.77±0.08 a	**
Feed	137.81±0.06 c	135.41±0.12 b	145.12±0.15 d	126.49±0.11 a	126.24±0.08 a	**

a, b, c, d and e means on the same raw (for the average of strains) significantly ($P \leq 0.01$).

BW1 = body weight at sexual maturity, BW2 = body weight at first 90 days of production, BW3 = body weight at 42 weeks of age, BW4= body weight at 65 weeks of age feed 1 = feed consumption at sexual maturity, feed 2= feed consumption at 90 days of laying , feed 3 = feed consumption at 42 weeks of age and feed 4= feed consumption at 65 weeks of age

Table 8: Least square means ± standard errors of the effect of different strains on egg production (egg number, egg weight and egg mass)and feed conversion.

Parameter*	Strains					Significance
	Shaver A	Shaver B	Shaver C	El-Salam	Mandarah	
EN1	46.42±0.76 d	35.83±0.40 e	44.48±0.40 c	61.75±0.30 b	65.92±0.54 a	**
EN2	101.76±0.49	71.83±0.72	100.36±0.34	118.57±0.16 b	123.14±0.55 a	**
EN3	179.65±0.72	130.63±1.21	160.51±0.48	191.01±0.49 b	199.94±0.68 a	**
EW1	63.24±0.24 c	64.16±0.14 b	66.83±0.19 a	51.28±0.08 d	50.46±0.03 e	**
EW2	68.64±0.14 b	62.72±0.13 c	71.33±0.25 a	55.62±0.06 d	53.94±0.08 e	**
EW3	67.05±0.07 b	64.45±0.22 c	70.45±0.25 a	56.16±0.03 d	55.14±0.08 e	**
EM1	2937.36±49.55 c	2294.67±21.88 d	2967.88±34.07 c	3165.30±12.74 b	3327.40±28.19 a	**
EM2	6977.72±24.42 b	4482.15±50.93 c	7154.11±22.31 a	6595.60±9.76 c	6645.17±36.49 c	**
EM3	12046.56±50.70 a	8439.30±102.35 c	11391.59±60.05 d	10728.14±30.26 c	11023.69±32.70 b	**
F.1	4.20±0.07 d	5.18±0.04e	4.31±0.05 c	3.52±0.01 b	3.39±0.03 a	**
F.2	3.50±0.01 c	5.43±0.05 e	3.59±0.01 d	3.44±0.04 b	3.42±0.02 a	**
F.3	4.01±0.02 a	5.69±0.07 e	4.47±0.02 c	4.13±0.01 b	4.01±0.01 a	**

a, b, c, d and e means on the same raw (for the average of strains) significantly (P≤0.01).
EN1=egg number at first 90 days of production, EN2= egg number at 42 weeks of age, EN3 = egg number at 65 weeks of age
EW1=egg weight at 90 days of laying, EW2= egg weight at 42 weeks of age, EW3 = egg weight at 65 weeks of age
EM1=egg mass at 90 days of laying, EM2= egg mass at 42 weeks of age, EM3 = egg mass at 65 weeks of age
F.1=feed conversion at 90 days of laying, F. 2= feed conversion at 42 weeks of age. 3=feed conversion at 65 weeks of age.

Table 9: Least square means ± standard errors of the effect of different strains on egg quality

Parameter*	Strains					Significance
	Shaver A	Shaver B	Shaver C	El-Salam	Mandarah	
HU1	74.88±0.15 c	67.58±0.11 a	73.02±0.14 b	75.99±0.13 c	76.70±0.14 c	**
ST1	0.336±0.02 b	0.336±0.01 b	0.335±0.02 b	0.350±0.08 a	0.358±0.06 a	**
HU2	74.43±0.11 c	71.61±0.17 c	75.70±0.11 b	79.43±0.19 a	78.40±0.13 a	**
ST2	0.318±0.05 c	0.319±0.06 c	0.334±0.01 b	0.345±0.03 b	0.341±0.01 a	**
HU3	71.73±0.22 c	73.18±0.19 c	78.14±0.17 b	80.03±0.34 a	81.88±0.33 a	**
ST3	0.316±0.07 d	0.326±0.06 c	0.336±0.01 b	0.333±0.05 b	0.340±0.07 a	**

a, b, c and D means on the same raw (for the average of strains) significantly (P≤0.01).
HU1= Haugh unit at first 90 days of production, HU2 = Haugh unit at 42 weeks of age, HU3= Haugh unit at 42 weeks of age
ST1=Shell thickness at first 90 days of production, ST2= Shell thickness at 42 weeks of age, ST3= Shell thickness at 65 weeks of age.

Table 10: Correlation coefficient among some production traits.

Parameter	BW2	BW3	SM	EN1	EW	EM1	EN2	EW2	EM2	EN3	EW3	EM3
BW1	0.68**	0.70**	-0.13**	0.01	0.26**	0.22**	0.20**	0.43**	0.53**	0.05	0.40**	0.57**
BW2		0.78**	-0.02	-0.22**	0.50**	0.06	-0.02	0.63**	0.43**	-0.14**	0.60**	0.22**
BW3			0.07	-0.28**	0.51**	-0.03	-0.08	0.60**	0.35**	-0.22**	0.58**	0.21**
SM				-0.70**	0.54**	-0.65**	-0.87**	0.33**	-0.67**	-0.83**	0.41**	-0.64**
EN1					-0.84**	0.89**	0.86**	-0.65**	0.48**	0.85**	-0.71**	0.40**
EW						-0.50**	-0.74**	0.89**	-0.16**	-0.73**	0.93**-	0.07
EM1							0.77**	-0.27**	0.65**	0.76**	-0.33**	0.16**
EN2								-0.49**	0.76**	0.93**	-0.56**	0.62**
EW2									0.19**	-0.49**	0.97**	0.23**
EM2										0.68**	0.09	0.88**
EN3											-0.55**	0.72**
EW3												0.19**
EM3												

BW1, BW2, BW3, , SM, EN1, EW1, EM1, EW2, EM2, EN2, EN3, EW3, EM3, = body weight at 8 weeks of age, body weight at sexual maturity, body weight at 65 weeks of age, age at sexual maturity, egg number at 42 weeks, egg weight at 42 weeks, egg mass at 42 weeks, egg number at first 90 days of production, egg weight at first 90 days of production, egg mass at first 90 days of production, egg number at 65 weeks, egg weight at 65 weeks,

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Table 2: Last square means ± standard errors of the effect of different strains on body weight and viability of male and female

Age in weeks	Sex	Strains					Significance
		Chaver A	**Chaver B**	**Chaver C**	**El-Salam**	**Mandarah**	
Hatch weight	Male	43.31±0.26	42.45±0.30	45.16±0.33	35.19±0.41	34.97±0.31	**
	Female	43.12±0.27	41.72.±0.28	44.18±0.30	34.78±0.32	34.58±0.05	**
	Overall	43.22±0.10^{b}	42.01±0.19^{b}	44.56±0.76^{a}	34.86±0.62^{c}	34.68±0.34^{c}	**
Week-4	Male	319.56±3.48	271.87±4.18	497.34±5.59	321.12±5.04	314.25±4.35	**
	Female	298.06±3.81	257.56±3.88	430.81±5.29	295.42±4.40	295.97±3.81	**
	Overall	308.71±4.22^{b}	264.60±3.21^{c}	463.96±5.71^{a}	308.16±4.99^{b}	305.01±3.66^{b}	**
Week-8	Male	912.42±9.28	746.94±10.34	1482.41±17.78	945.05±13.13	913.50±11.90	**
	Female	696.04±7.87	572.13±8.60	1113.60±13.20	738.08±10.04	708.48±9.36	**
	Overall	804.14±8.76^{c}	659.36±19.34^{d}	1297.96±19.11^{a}	840.99±12.07^{b}	821.06±10.46^{c}	**
Week-12	Male	1686.31±16.99	1335.36±17.35	2629.12±27.19	1598.84±20.80	1594.84±18.72	**
	Female	1326.25±14.02	1158.80±12.98	2051.80±23.10	1379.63±13.32	1227.87±14.44	**
	Overall	1505.96±13.16^{b}	1246.86±14.11^{bc}	2341.21±19.20^{a}	1489.11±14.39^{b}	1410.76±16.26^{c}	**
Viability Hatch – 12 weeks	Male	93.00±0.04	94.00±0.14	94.50±0.08	97.00±0.12	98.00±0.21	**
	Female	96.87±0.17	97.92±0.11	95.83±0.07	98.95±0.14	99.11±0.16	**
	Overall	94.93±0.09^{d}	95.96±0.11^{b}	95.16±0.08^{c}	97.97±0.09^{a}	98.55±0.07^{a}	**

a,b,c and d = means on the same raw (between strains) significantly ((p<0.01).

Table 3: Last Square means ± standard errors of the effect of different strains on weight gain (g/day)of male and female at different ages.

Age in weeks	Sex	Strains					Significance
		Chaver A	**Chaver B**	**Chaver C**	**El-Salam**	**Mandarah**	
Hatch- 4week	Male	14.16±0.18	11.50±0.24	23.78±.35	13.93±0.32	13.34±0.24	**
	Female	12.55±0.15	10.42±0.20	19.03±0.32	11.64±0.25	11.56±0.20	**
	Overall	13.35±0.15^{b}	10.95±0.16^{d}	21.29±0.29^{a}	12.76±0.50^{c}	12.44±0.17^{c}	**
4 – 8 week	Male	21.49±0.49	17.81±0.44	36..04±0.77	23.42±0.62	22.00±0.63	**
	Female	17.72±0.36	10.91±0.36	26.53±0.67	15.84±0.44	16.13±0.61	**
	Overall	18.27±0.39^{c}	14.27±0.37^{d}	31.06±0.61^{a}	19.45±0.47^{b}	19.19±0.52^{b}	**
8 – 12 week	Male	33.08±0.66	32.29±0.56	41.64±1.58	27.42±1.05	25.85±0.67	**
	Female	27.64±0.61	28.77±0.52	38.99±1.30	20.94±0.64	22.67±0.72	**
	Overall	30.35±0.50^{b}	29.10±045^{c}	40.25±1.02^{a}	25.76±0.62^{c}	24.25±0.50^{d}	**

a,b,c and d = means on the same raw (between strains) significantly ((p<0.01).