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RELATIONSHIP OF SHANK LENGTH WITH SOME PRODUCTIVE AND PHYSIOLOGICAL PARAMETERS OF MATROUH CHICKEN STRAIN.

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ABSTRACT

Twenty five males and 75 hens from Matrouh chicken strain at 32 weeks of age were kept as basic generation. Offspring produced from eggs of the base generation were termed as first generation (150 chicks represented each sex) . Upon reaching twelve weeks of age, male and female birds were weighed individually and classified into three groups according to their shank lengths (SL). The classification of male SL was 5.0 – 5.9 cm for short group, 6.0 - 8.4 cm for medium group and >8.4 cm for long SL one. Also, females were classified for SL as follows (4.5 – 5.5 cm as a short group, 5.6 – 7.4 cm as medium group and > 7.4 cm as a long one). The birds were weighed individually with 0.01 g precision at 12, 16, 20, 24, 28, 32,36 and 38 wks of age. A total of 30 Matrouh birds (males and females) representing 10 birds for each SL group were slaughtered at 16 wks of age for detection calcium and phosphorus concentrations in the blood and bone. Also carcass traits were determined for the same birds. The age of sexual maturity was determined. Egg weight, egg mass, and egg production percentage for each SL groups were determined through different laying periods (22-38 wks of age). At 38 wks of age, blood samples were collected from the wing veins for detection of total protein (TP), albumin (ALB), globulin (GLB), ALP/GLB ratio, calcium, phosphorus and cholesterol concentrations.

Obtained results are summarized as follows:

Birds of long SL for Matrouh males and females represented heavier ($P<0.05$) weights compared with that of short SL among all experimental ages.

Age at sexual maturity was significantly delayed for Matrouh hens with short SL compared with those for medium and long ones.

Hens with short SL produced ($P<0.05$) less percentage of egg production compared with those for other SL groups throughout all experimental periods.

Generally, egg weight and egg mass were not statistically influenced by SL through all experimental periods between 22 - 38 wks of age except that between 27 - 30 wks of age for egg weight and between 31 - 34 wks of age for egg mass.

Long SL group at 16 wks of age represented significant increase of plasma calcium concentration compared to medium and short one for both sexes except that there was no significant difference between long and medium ones for females.

Moreover, plasma phosphorus did not represent any significant difference between SL groups.

Bone calcium and phosphorus at 16 wks of age did not represent any significant differences between SL groups for males and females except that for phosphorus in females.

Long SL for males and females represented highest significant values of live body weight and empty carcass percentages compared with medium and short ones.

Keywords : Chickens, Shank length, Egg production, Blood and Carcass

INTRODUCTION

Shank length may be used as` indication of skeletal size and consequently body weight and related parameters. Nordskog (1976) mentioned that length of shank is a better measure for the genetics of size than body weight. Anonymous (1997) reported that there was relationship between shank length and skeletal development of layers. El-Wardany (1999b) showed that the values estimated of shank length heritability at 8 and 16 weeks of age were 0.40 and 0.90, respectively. Also, The same authors showed that selection by shank length at 43 weeks of age in parents appeared to improve body weight, skeletal measurements. Moreover, some researchers have asserted that there were relationships between shank length and live body weight (Missohou et al.,2003, Amao et al., 2010 and Ojo et al., 2014).

Regarding egg production, El-Wardany (1999b) mentioned that selection by shank length could improve egg number and egg mas:- progeny Mamoura breed. Yilmaz Dikmen and Ipek (2006a) showed that same production traits were affected by shank length of quails the number of eggs laid are low in short shank length group. In addition to, Yilmaz Dikmen and Ipek (2006b) reported that higher SL birds had higher egg weight than values for short SL birds.

Fathi (1997) mentioned that plasma calcium, phosphorus, total protein, albumin and cholesterol levels were higher in the normal sized hens when compared with dwarfed ones.

Tzudzuk et al. (2007) and Ramadan et al. (2014) concluded that there were significant relationships between shank and keel lengths with carcass characters.

This research was undertaken to determine the effect of shank length on body weight, egg production, blood parameters and carcass characters of Matrouh chicken strain.

MATERIALS AND METHODS

This work was carried out at Borg El-Arab Research Station, Animal Production Research Institute, Agricultural Research Center. Twenty five males and 75 hens for Matrouh chicken strain at 32 weeks of age were housed in cages under the same managerial procedures throughout the experimental periods and kept as basic generation. Artificial insemination was applied two times every week. Eggs that had been laid onto cages were collected twice a day (at 9 am and 4.0 PM). Following collection, the eggs were set in the incubator to produce pedigree progeny as first generation (150 chicks per each sex), the chicks were wing-banded at hatch day and brooded on pens brooders at a starting temperature of 34^{o}C for the first week after hatching, and then decreased 2-3 ^{0}C each week thereafter up to 21^{0}C. Feed and water were provided ad libitum. Diet contained 24.20% crude protein with 2900 ME kcal./kg was fed. Upon reaching twelve weeks of age, male and female birds were weighed individually and separated into three groups according to their shank lengths (SL). The male birds were classified according to the SL (5.0 – 5.9 cm as short, 6.0-8.4 cm as medium and >8.4

cm as long). Shank lengths for females were 4.5 – 5.5 cm for short group , 5.6-7.4 cm for medium and > 7.4 cm for long groups.

Diets were kept isocaloric and cover nutrient requirements, except crude protein and methionine, according to Feed Composition Tables for Animal and Poultry Feedstuffs in Egypt (2001).

The length of the shank (measured from the top of the hock joint to the footpad) was recorded as an assessment of frame size. The birds were weighed individually on a digital balance with 0.01 g precision at 12, 16, 20, 24, 28, 32,36 and 38 wks of age.

A total of 30 male and female Matrouh birds (males and females) representing 10 birds for each SL group were slaughtered to determine. blood and bone calcium and phosphorus concentrations at the 16 wks of age

Blood samples were collected from sacrificed birds in clean sterile tubes and then were immediately centrifuged at 3000 rpm for 15 min and stored at freezing temperature until use to determined calcium and phosphorus besides bone chicken calcium and phosphorus concentrations.

All slaughtered birds were feathered and manually eviscerated. The birds were weighed after removing heads, legs and viscera to determine the percentage of carcass empty weight. The heart, liver, bursa, spleen and fat cavity were weighed and their percentages to live body weight were calculated.

The age of sexual maturity was determined when the birds laid their first eggs in each group. Eggs were individually weighed daily to the nearest 0.1 g for each group. The percentages of egg production for each SL group were detected through different periods between 22 -38 wks of age. Egg mass was calculated by multiplying egg number by average egg weight throughout the excremental periods.

At 38 wks of age, blood samples were collected from wing veins in clean sterile tubes and immediately centrifuged at 3000 rpm for 15 min and stored at freezing temperature until use. Total protein (TP), albumin (ALB), globulin (GLB), ALB\GLB ratio, calcium, phosphorus, cholesterol concentrations were detected using kits supplied by Diamond Diagnostic (Giza, Egypt), at Animal Production Research Institute and Animal health Research Institute laboratories.

Data obtained were statistically analyzed using the General linear model of SAS (2004). Differences among treatment means were estimated by Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The mean values of shank length for female and male birds at 12 and 38 wks of age are given in Table 1. Data of this table reveal that the significant differences between the lengths of shank among the studied groups for the both males and females were continued with the increase of age. Highest SL for Matrouh males at 38 wks of age was 9.91 cm and the shortest one was 6.87 cm. While, SL for females at the same age was 8.81cm for long and 6.56 cm for short one. The results of increasing SL with

the age increase are in harmony with those previously reported by Abd El-Ghany et al.(2011) who mentioned that lengths of shank increased linearly with increasing age in Matrouh and EL-Salam cocks strains .Also, the obvious differences in SL between both experimental sexes are in line with those reported by Sharma et al.(1983).

Table 1: Shank length of male and female Matrouh birds at 12th and 38th wks of age

Shank length groups	Shank length (cm)	
	12th wk	38th wk
Male		
Short (5-5.9 cm)	5.21c	6.87c
Medium (6-8.4 cm)	7.02b	7.98b
Long (> 8.4 cm)	8.57a	9.91a
SEM	0.081	0.039
P value	0.031	0.03
Female		
Short (4.5-5.5cm)	4.66c	6.56c
Medium (5.6 -7.4 cm)	6.79b	7.88b
Long (> 7.4 cm)	7.66a	8.81a
SEM	0.072	0.045
P value	0.052	0.041

a,b,c Means in the same column with no common superscripts for each sex are significantly different at the P<0.01 level.

Productive Traits:

Body weight:

Long SL had a significant increase of live body weight compared with those for short SL at different weeks of age (16 , 24 ,28 , 32 and 36) while, there were no significant differences between body weights among all SL groups at 12 and 20 weeks of age (Table 2).

In females, group the significant effects of SL on live weight were at 28, 32 and 36 wks of age. Generally, the live weights increased as hens age increased. Moreover, hens of long SL represented significant (P<0.05) heavier weights compared with those of medium and short SL groups at 28,32 and 36 wks of the experimented ages. Whereas, hens of Matrouh for both long and medium SL have numerical heavier weight comparable to the short SL from 12 up to 24 weeks of age. The result implies that linear body measurements (SL) are good indicators of body weight as supported by Missohou et al. (2003) who mentioned that there were relationship between SL and live weight. Adeogun and Adeoye (2004) found that a positive phenotypic correlation between live weight and SL, indicating that an improvement in live weight will likely lead to improvement in SL. Also, Yilmazdikmen and Ipek (2006a) found that mean live body weight for females and males were significantly lower (P<0.05) in the short SL group. Additionally Ramadan et al. (2014) found that SL is correlated more strongly with body weight and provided the most accurate measure of growth potential. Contradicted results were reported by Mahmoud et al. (1980) who

did not observe significant differences in shank length among some local breeds of chickens, and concluded that relationship between shank length and body weight should be thought of within each breed or variety of chicken. Also, they did not observe any significant differences in shank length among some local breeds of chickens. These results were supported by Wolanski et al. (2006) and Nassar (2008). Ojo et al, (2014) mentioned that shank length was used to predict live body weight,

Table 2: Mean live body weights of male and female Matrouh birds at different ages wks

SL Groups	Live Weight, g						
	12th	16th	20th	24th	28th	32nd	36th
Male							
Short (5 -5.9 cm)	890.3	1072.3b	1209.2	1247.2b	1300b	1410b	1435b
Medium (6-8.4 cm)	909.4	1108.4ab	1214.3	1252.7ab	1324ab	1429ab	1495ab
Long (>8.4cm)	921.5	1117.6a	1215.4	1262.3a	1366a	1496a	1515a
SEM	4.9	9.15	5.37	3.34	8.81	9.15	17.63
P value	NS	0.009	NS	0.001	0.04	0.05	0.05
Female							
Short (4.5- 5.5 cm)	821.2	1066.7	1189	1240.3	1278b	1277c	1312c
Medium (5.6 -7.4 CM)	854.0	1092.9	1204.8	1254.0	1271b	1316b	1350b
Long (>7.4CM)	878.8	1097.3	1208.6	1255.0	1304a	1354a	1379a
SEM	8.73	7.29	6.63	5.78	8.16	11.01	18.10
P value	NS	NS	NS	NS	0.05	0.05	0.001

a,b,c Means within a column not sharing similar superscripts for each sex are significantly different (P<0.05), NS (P>0.05).

Sexual maturity:

Results in Table 3 reveal that age at sexual maturity was significantly delayed for hens with short SL group (153.1 days) compared with medium and long SL ones (142.6 and 142.3days), respectively. Whereas, SL had no significant influence on sexual maturity for hen`s age at 30 and 60 laying rates. The forementioned results of sexual maturity delay for hens with short SL could be due to that they reached the physiological maturity later than with longest and medium SL. Supporting to our results, Yilmazdikmen and Ipek (2006b) found that the age of first egg laying was earlier in long SL group than in short one. Moreover, Eissa et al. (2014) reported that the long SL line matured at earlier age than the control quail live by 5.9 days. Nearly to the results herein regarding the SL for local chicken strains, Kosba et al. (2002) found that the average of age at sexual maturity in selected and control local Egyptian strain were 153.5 and 155.4 days. Also, EL-Soudany (2003) came to similar trend in Golden Montazah and Matrouh strains that age at sexual maturity averages were 154.4 and 166 days respectively.

Table 3. Effects of shank length on age, at 1st egg laying, at 30% and 60% laying rates

Shank Length Groups	Age at 1st laying (day)	Age at 30% laying rate (day)	Age at 60% laying rate(day)
Short (4.5 – 5.5cm)	153.1b	154.9	165.7
Medium (5.6 -7.4cm)	142.6a	151.7	160.8
Long (> 7.4 cm)	142.3a	150.0	160.6
SEM	1.62	0.96	0.93
P value	0.05	NS	NS

a-b Means within a column not sharing similar superscripts are significantly different (P<0.05), NS (P>0.05).

Egg production:

Results in Table 4 showed that the main effect of different measurements for short, medium and long SL of Matrouh birds on egg production, egg weight and egg mass during early part of the laying periods. There was a significant decrease in egg production percentage due to short SL through all laying periods. For the pike part of lying period (31-34 wks of age), laying rate was significantly affected by shank length measurements.

Concerning egg lay, it is clear from data of Table 4 that the hens with short SL laid fewer eggs through all periods compared with the medium and long SL, while the groups of medium SL laid similar egg percentages with those in group of long SL during 22-26, 27-30 and 32-36 wks of age of the experimental periods. Similar to our findings, Merat et al. (1994) reported that rate of egg lay of dwarf white leghorn hens was lower than normal sized hens. On the other hand, Yeasmin and Howlider (1998) found that the dwarf deshi hens had significantly higher rate of egg lay than their normal sized counterparts. The same study was conducted on quail by Yilmazdikmen and Ipek (2006b) who found that mean egg production of long SL group was higher than those for short one. Besides Missohou et al. (2003) reported that shank length and body weight were lower in dwarf than in normal sized chickens.

Egg weight:

Shank length had no significant influence on egg weight throughout all experimental periods except that for the period between 27- 30 wks of age as birds with long shank length significantly produced smallest egg weight compared with those for other SL measure, (Table 4).These results are in agreement with those reported by Yilmazdikmen and Ipek (2006b) mentioned the effect of shank length on egg weight of quail was not significant, but numerically egg weight was higher in long SL group. Nestor et al. (1985) did not observe any differences in egg weight between the selected for increased shank width line and normal shank width line. Whereas, Shinde et al. (1993) found that long SL dwarf layers' eggs weight are heavier than short SL layers' eggs weight. Apuno et al. (2011) stated that negative correlations (r=-0.147) between egg weight and shank length are indications that shank length may not be suitable for improving egg weight .

Egg mass:

Egg mass was not statistically affected by SL through the experimental periods (22-26, 27-30 and 32-36 wks of age). While hens with long SL

significantly produced heights value of egg mass followed by medium and finally short SL during the period between 31-34 wks of age. Other conclusion was reported by El-Full and Gihan Farahat (2012) in quill who found that females having medium shank length had the best egg weight and egg mass (Table 4).

Table 4. Effect of shank length on egg production, egg weight and egg mass for Matrouh hens through different laying periods (wks)

Shank Length Groups	Egg production, % (wks)				Egg weight (g) (wks)				Egg mass (g) (wks)			
	22-26	27-30	31-34	35-38	22-26	27-30	31-34	35-38	22-26	27-30	31-34	35-38
Short (4.5 -5.5 cm)	24.6b	45.2b	54.8c	52.8b	31.9	40.2a	41.4	37.9	7.85	18.17	22.69c	20.01
Medium (5.6-7.4cm)	27.9a	48.9a	62.6b	57.8a	34.5	39.9a	41.4	38.6	9.63	19.51	25.92b	22.31
Long (> 7.4 cm|)	28.a	49.7a	68.3a	58.2a	31.7	38.2b	41.6	37.1	9.10	18.99	28.41a	21.59
SEM	1.66	1.30	1.52	0.9	0.92	0.31	0.19	0.33	0.59	0.53	0.66	0.35
P value	0.05	0.05	0.005	0.03	NS	0.005	NS	NS	NS	NS	0.009	NS

a.b.c Means within a column not sharing similar superscripts are significantly different (P<0.05), NS (P>0.05)

Physiological parameters:

Data of Table 5 showed that plasma calcium values were significantly (P<0.05) increased for male chicks with long SL compared with those for medium and short ones, while phosphorus values for the same male chicks were not significantly affected . Moreover the same trend of the relation between plasma calcium concentration and SL for male chicks was observed for female ones except that there were no significant differences between long and medium SL and between medium and short SL with respect to plasma calcium value. Generally, plasma calcium and phosphorus concentrations for male and female Matrouh birds showed the upward trend with the increase shank length from long compared to medium and short ones. Abdel Magid (2006) indicated that phosphorus concentration increased at the peak of egg production and decreased at the age before that in Fayoumi hens.

Table 5: Effect of shank length on plasma calcium and phosphorus concentration of Matrouh male and female chicks at 16 th week of age.

Traits	Shank length (cm)				
	Short	Medium	Long	SEM	P value
Male	(5-5.9cm)	(6-8.4cm)	(> 8.4 cm)		
Calcium (mg/dl)	9.41 b	9.38b	9.89a	0.118	0.01
Phosphorus (mg/dl)	3.94	4.20	4.20	0.159	NS
Female	(4.5-5.5cm)	(5.6-7.4cm	(> 7.4 cm)		
Calcium (mg/dl)	8.40b	9.10ab	9.29a	0.263	0.05
Phosphorus (mg/dl)	3.83	3.95	3.87	0.262	NS

a, and b Means within each row have no similar letter(s) are significantly different (P ≤ 0.05).

Data of Table 6 show the effect of SL on bone calcium and phosphorus concentrations for Matrouh chicks at 16th weeks of age. Values of bone calcium and phosphorus were not significantly affected in the male birds. However, long SL for female chicks represented higher (P<0.05) increase of bone phosphorus concentration (mg/dl) compared with those for medium and short ones.

Table 6: Effect of shank length on bone calcium and phosphorus concentrations of Matrouh male and female chicks at 16 th week of age

Traits	Shank length (cm)				
	Sort	Medium	Long	SEM	P value
Male	(5-5.9cm)	(6-8.4cm)	(>8.4 cm)		
Calcium (mg/dl)	10.32	10.32	10.35	0.021	NS
Phosphorus (mg/dl)	6.64	6.64	6.66	0.019	NS
Female	(4.5-5.5cm)	(5.6-7.4cm)	(>7.4 cm)		
Calcium (mg/dl)	10.33	10.32	10.33	0.015	NS
Phosphorus (mg/dl)	6.66b	6.64 b	6.73a	0.025	0.05

a and b Means within each row have no similar letter(s) are significantly different (P ≤ 0.05).

Blood biochemical parameters for male and female Matrouh birds as affected by SL at 38th wk of age are presented in Table 7. In male birds, means of plasma TP (g/dl), ALB (g/dl), GLB (g/dl), ALB/GLB ratio and calcium (mg/dl) were not statistically affected by SL. However, birds have medium SL for male birds represented highest record (P<0.05) of plasma phosphorus concentration (mg/dl) compared with those for long and short ones, while plasma cholesterol concentration was significantly decreased for birds with long SL compared with those for medium and short SL. These results are in accordance with those reported by Abdel-Magid (2006) for Fayoumi chicken.

In female Matrouh birds at 38th wk of age, SL had no significant influence on plasma ALB, ALB/GLB ratio, calcium and cholesterol values. While, birds with medium SL represented significant increase of TP and GLB compared with those for long and short lengths except that there was no significant difference between long and medium lengths for TP. Moreover, birds with short SL significantly had lowest value of phosphorus compared with those for other groups. These results are in harmony with those reported by Abdel Magid (2006) in Fayoumi chicken. However, birds with long and medium SL for female Matrouh birds represented higher significant (P<0.05) increase of plasma phosphorus concentrations compared with those for short one. There is a paucity of information describing direct association change between shank length and the rest of studied blood parameters. The coincided increase of body weight with the increase of SL as illustrated in Table 2, could explain the results of studied blood parameters, in Table 7. Enaiat et al.(2010) showed that there were live body weight improve as SL become long, so there were a significant positive correlations between live body weight and all studied blood parameters (TP, AlB, GlB, Ca and Ph) in Matrouh strain. In addition to, Bahie El -Deen et al. (2009) found that high

body weight group in quill had significantly higheat estimate for TP (3.96g/dl) than the medium and low body weight groups (3.69 & 3.75 g/dl). Calcium concentration was high at 12 wk of age (9.38-9.89 mg/dl) and low at the end of 90 d of egg production (9.55-8.49 mg/dl). Moreover, the decrease of calcium level in Matrouh females, with the short SL compared with those for other measures could be explained on the light of egg production increase (Table 4) as confirmed by Ghany et al. (1961) who indicated that Ca level decreased in accordance with the increase of egg number, and there was a significant negative correlation between these two variables in Rod Island Red. Also, Bar et al. (1978) mentioned that lowering in plasma Ca concentration after sexual maturity may refer to enhancement of Ca metabolism, which necessary for eggshell formation

Table 7: Effect of shank length on some blood plasma constituents of Matrouh male and female birds at 38th wk of age.

Traits	Shank length (cm)				
	Short	Medium	Long	SEM	P value
Male	(5-5.9cm)	(6-8.4cm)	(>8.4cm)		
Total protein (g/dl)	6.81	6.61	6.92	0.272	NS
Albumin (ALB) (g/dl)	3.79	3.60	3.53	0.135	NS
Globulin (GLB) (g/dl)	3.02	3.01	3.39	0.300	NS
ALB/GLB (Ratio)	1.35	1.23	1.08	0.170	NS
Calcium (mg/dl)	8.40	8.00	8.37	0.174	NS
Phosphorus (mg/dl)	6.72 b	7.57 a	6.52 b	0.099	0.05
Cholesterol (mg/dl)	167.50 a	169.50 a	153.83 b	3.604	0.05
Female	(4.5-5.5cm)	(5.6-7.4cm)	(>7.4cm)		
Total protein (g/dl)	5.87b	8.07 a	6.70 ab	0.454	0.05
Albumin (ALB) (g/dl)	3.49	3.38	4.12	0.245	NS
Globulin (GLB) (g/dl)	2.38 b	4.69 a	2.58 b	0.464	0.01
ALB/GLB (ratio)	1.92	0.74	1.91	0.426	NS
Calcium (mg/dl)	8.49	9.74	9.55	0.497	NS
Phosphorus (mg/dl)	4.65 b	6.34 a	6.32 a	0.344	0.01
Cholesterol (mg/dl)	221.50	201.00	194.83	10.678	NS

a, and b Means within each row have no similar letter(s) are significantly different (P ≤ 0.05).

Carcass characteristics

Carcass characteristics for both sexes were affected by SL for birds aged 16 wks are presented in Table 8. Regarding Matrouh males, means of liver, bursa and heart percentages were not statistically affected by SL. whereas, males with long SL represented significantly (P<0.05) highest values of live body weight, percentages of empty carcass, spleen and fat cavity compared with those for short and medium ones.

Regarding Matrouh females, studied lengths of shank had no statistical influence on liver, bursa, spleen and heart percentages. Moreover, birds with long SL represented highest (P<0.05) live body weight, empty carcass and fat cavity percentage compared with those for medium and short ones. These results approach with those reported by different research- workers.

Table 8: Effect of shank length on some carcass characteristics of Matrouh chickens at 16th week of age.

Traits	Shank length (cm)				
	Short	**Medium**	**Long**	**SEM**	**P value**
Male	(5-5.9cm)	(6-8.4cm)	(>8.4 cm)		
Live Body weight (g)	969.4c	1076b	1261.60a	28.68	0.001
Empty carcass (%)	70.11b	71.6b	74.74a	3.72	NS
Liver (%)	2.19	2.42	2.09	0.25	NS
Bursa (%)	0.31	0.15	0.05	0.19	NS
Spleen (%)	0.22 b	0.23 b	0.37a	0.08	0.01
Fat cavity (%)	0.48c	0.64b	0.89a	0.09	0.001
Heart (%)	0.55	0.50	0.51	0.07	NS
Female	(4.5-5.5 cm)	(5.6-7.4cm)	(>7.4cm)		
Live Body weight	770.6b	793.0b	987.2a	36.67	0.001
Empty carcass (%)	67.44b	68.38b	73.26a	5,9	NS
Liver (%)	2.56	2.33	2.77	0.38	NS
Bursa (%)	0.21	0.28	0.30	0.09	NS
Spleen (%)	0.24	0.26	0.263	0.08	NS
Fat cavity (%)	0.41b	0.67a	0.69a	0.14	0.04
Heart (%)	0.43	0040	0.40	0.04	NS

a, b Means within each row have no similar letter(s) are significantly different ($P \leq 0.05$).

Tsudzuk et al. (2007) found significant correlation between SL, carcass weight and some carcass characters. Also Ramadan et al. (2014) found that there were significant associations between shank lengths and the live body weight, carcass weights and other carcass parts.

From the foregoing results and discussions, it could be concluded that shank length could be used as useful tool for improving body weight and egg production.

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علاقة طول الساق ببعض الصفات الانتاجيه والفسيولوجيه لدجاج مطروح

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تم تربية ٢٥ ذكر و ٧٥ دجاجه مطروح عمر ٣٢ اسبوع كجيل أساسي. الكتاكيت الناتجه من آباء الجيل الاساسى تم تربيتها و اعتبارها جيل اول (١٥٠ كتكوت من كل جنس) ٠ وعند ١٢ اسبوع من العمر تم وزن الذكور والاناث مفرده وتقسيمهم لثلاثة مجموعات حسب طول الساق ٠تم تصنيف الذكور (قصيرة الساق ٥ -٥,٩ سم .متوسطة ٦ -٨,٤ سم وطويلة الساق > ٨,٤) و تصنيف الاناث (قصيرة الساق ٤,٥- ٥,٥ ومتوسطه ٥,٦ – ٧,٤ وطويلة الساق >٧,٤) . تم وزن الطيور بدقة ٠,٠١ جم في الأعمار الآتيه (١٢و١٦و٢٠و٢٤و٢٨و٣٢ و ٣٦) أسبوع من العمر

تم ذبح ٣٠ طائر مطروح (ذكر وانثى) ١٠ طيور من كل مجموعه عند الأسبوع ١٦ من العمر لتحديد تركيزكل من الكالسيوم والفوسفور في الدم والعظم بالاضافه لتعيين صفات الذبيحه لنفس الطيور

تم تحديد عمر النضج الجنسي ووزن وكتلة البيض ومعدل انتاج البيض لكل مجموعه طوال فترات التجربه (٢٢-٣٨) اسبوع من العمر .

تم جمع عينات الدم من وريد الجناح في الأسبوع ٣٨ من العمر لتحديد البروتين الكلي والالبيومين والجلوبيلين ونسبة الألبيومين الى الجلوبيلين وتركيز الكالسيوم والفوسفور والكلوسترول.

والنتائج المتحصل عليها في طيور الجيل الاول كالاتي::

- الطيور ذات الساق الطويل من الاناث والذكور تميزت بوزن اثقل مقارنة بذات الساق القصيره طوال فترات التجربه
- تأخر عمر النضج الجنسي للطيور قصيرة الساق مقارنة بمتوسطه وطويله الساق
- نسبه انتاج البيض للدجاجات قصيره الساق اقل معنويا مقارنه لطويله ومتوسطه الساق خلال فترات التجربه
- عموما كتله ووزن البيض لم تتاثر معنويا بطول الساق خلال جميع فترات التجربه (٢٢-٣٢)اسبوع من العمر ماعدا الفتره (٢٧-٣٠)اسبوع لوزن البيض والفتره (٣١-٣٤)اسبوع لكتله البيض
- وجد تاثير معنوي لطول الساق على تركيز كالسيوم البلازما في الاسبوع ال ١٦ من العمر مقارنا بمتوسطه وقصيره الساق للجنسين بالرغم من عدم وجود اختلاف معنوي بين طويله ومتوسطه الساق للاناث علاوه على ذلك لا يوجد تاثير معنوي لطول الساق على تركيز فسفور البلازما
- لا يوجد تاثير لطول الساق على تركيز كالسيوم وفسفور العظام في الاسبوع ال ١٦ من العمر على كلا الجنسين ماعدا تركيز الفسفور للاناث
- طول الساق في الذكور والاناث له تاثير معنوي لوزن الجسم الحي ونسبه الذبيحه المجوفه مقارنه بمتوسطه وقصيره الساق