J. Agric. Sci. Mansoura Univ., 27 (2): 869 - 879, 2002

THE SIGNIFICANCE OF EARLY BODY MEASUREMENTS IN FAYOUMI CHICKENS COMPARED WITH A STANDARD BREED R. I. R. AND SOME DEVELOPED LOCAL STRAINS

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ABSTRACT

A total number of 880 pedigreed baby chicks of four strains of chickens; the Fayoumi (FF) as local strain, Rhode Island Red (RIR) as foreign strain, and Silver Montazah (SM) and Mandara (MM) as developed local strains, were taken randomly from closed-flocks, and were subjected to some early body measurements.

The results indicated significant differences between the four strains concerning the body weight measurements and the males and females of Mandara strains were heavier significantly than the other's, at 8 and 16 weeks of age.

Mandara had higher relative growth rate (RGR) than other strains at (0-4) weeks and (4-8) weeks of age but R.I.R. had higher than the other strains at (8-12) weeks of age. However, Silver Montazah had RG higher than the others at 12-16 weeks only. Overall, estimates, growth rate averages were higher in males than in females at all periods. In contrary, Fayoumi females were higher than the males at (12 –16) weeks and R.I.R. showed the same result too.

The shank and keel length and breast circumference of Mandara were the longest compared with the other mentioned strains at (8-16) weeks of age. The Fayoumi had the similar results with this respect.

The R.I.R. showed highest growth rate compared with the other strains at 8 and 16 weeks of age, and the FF showed the lowest. Silver Montazah females had shorter shank length than the males and the keel length of R.I.R. females were longer than the males. The FF showed the shortest measure for shank length, keel length and breast circumference in both sexes compared with other strains.

Highly significant and positive correlations were found between shank length and breast circumference at 8 and 16 weeks of age. Similarly positive correlations were obtained for body weight with shank, keel length and breast circumference at the same periods. The Fayoumi showed the same results with this respect.

This results suggested that body weight could be improved by using selection index; i.e. of early body weight measurements studied, shank length, keel length and breast circumference.

INTRODUCTION

Body weight and body measurements are used as indicators for body and skeletal growth (Hafez, 1963). In addition, these characters are utilized in poultry to improve meat production. Shank length, also, was found to be important for growth rate by many investigators (Rizk and El-Ibiary, 1960 and Nordskog, 1976).

Most investigations indicated that phenotypic correlation's between body weight and each of body measurements traits were highly significantly correlated within each other. Abdel Gawad and El-Ibiary (1972), Zaidan (1977) and Verma *et al.* (1979) reported that body weights were positively highly correlated with shank length at different age. In addition, Ezzeldin *et al.*

(1991) studied also some phenotypic correlation's between body weights and, other body measurements and found that the estimates were positive and high.

Differences between local strains in body measurements were reported by some investigators. Hanan (1999) in body weight, shank and keel length, and Rizkalla (1996) in body weight, breast width, shank length and keel length.

The purpose of this work was to study early body measurements which affect meat production, in the Fayoumi chickens (FF) and compared the measurements with the others chickens ; a standard breed, Rholde Island Red (RIR) and also with developed strains, the Silver Montazah (SM) and Mandara (MM) which showed importance in the work of other investigators, since their genetic make-up composed the Fayoumi blood in a part.

This work may also help other to study the early body measurements for the purpose of improving meat production and put the foundation of developing a suitable selection index using hetrosis procedure with local strains which had no potential for adaptation and more desease resestance.

MATERIAL AND METHODS

(1) Strains studies:

a- The Fayoumi (FF) : as local strain and established by El-Hossari (1966).

b- R.I.R. (RR): as foreign strain adapted in Egypt from several years.

c- Silver Montazah (SM): as developed strain, a cross between the Dokki 4 and the R.I.R., Mahmoud *et al* (1974b).

d- Mandara (MM): as developed strain, a cross between the Dokki4 and the Alexandria, Abd El-Gawad (1981).

All strains used had been brought from " El-Takamoly poultry project" (T.P.P.) of Fayoum Governorate.

A total number of 880 pedigreed baby ckicks; contains 91 (FF), 98 (RR), 105 (SM) and 92 (MM) males and 113, 138,113,130 females with a total of 204, 236,218 and 222 un sexed chicks, respectively.

The four strains were taken from closed flocks by random and were subjected to the early body measurements studied.

(2) Early body measurements studied:

a. Body weight (B.wt)

All chicks were weighed to the nearst gram at hatch and then at 4 weeks intervals up to the 16^{th} weeks of age.

b. Gain (G)

It was calculated as formula (w_2-w_1),

W_1 = body weight at certain age

W_2 = body weight after certain period

The periods studied (0-4),(4-8),(8-12), and (12-16).

c. Relative Growth Rate (RGR)

It was calculated according to Lerner and Asmundson (1932)

$$RG = \frac{W_2 - W_1}{\frac{1}{2}(W_2 + W_1)} X100$$

W_1 = body weight at certain age
W_2 = body weight after certain period
The periods studied (0-4),(4-8),(8-12)and (12-16).

(3). Body measurements:

Shank length (SL), keel length (KL) and breast circumference (BC), were measured to the nearest millimeter at 8 and 16 weeks of age.

Shank length (SL): The length of tarsometatarsus bone
Keel length (KL): The length of sternum bone.
Breast circumference (BC): The circumference from beginning sternum bone to beginning Ilium bone.

(4) Management:

chickens were fed starting ration (19% crude protein and 2800 k cal / kg ME.) for the first 8 weeks and then switched to grower ration (15.37% crude protein and 2770 k cal / kg ME.) till the 16st weeks of age.

All chicks-were kept under normal brooding condition in floor brooder houses. Wheat straw was used as a litter in both brooding and rearing houses. The litter was about 5 cm in depth and wetting litter was continuously changed by fresh one. After the end of the brooding period chicks were moved to rearing houses. Chicks in this stage were allowed for free yard daily at 8 a.m. and housed at 4 p.m.

(5) Methods of Analysis:

Data were analyzed by a computer program a general linear models (GLM), Stat View 512+ software package (1986 Abacus Concepts, Inc.) . Correlations estimates were involved.

RESULTS AND DISCUSSION

1- Body weight (B. wt)

Table (1) showed significant difference between the four strains studied at 4, 8 and 16 weeks of age. Averages body weight of Mandara strain were higher than the other strain's Silver Montazah, R.I.R. and Fayoumi strain at 4 , 8 and 16 weeks of age, respectively.

Generally, male chicks within a given strain had heavier body weight than female in all strain at 4, 8 and 16 weeks of age.

Both sexes of Mandara strain were higher than other strains; R.I.R., Silver Montazah and Fayoumi strain.

Table (1): Mean ± S.D of body weight (gms) at 4 , 8 and 16 wks of age for different strains.

Strains	Average body weight														
	At 4 wks					At 8 wks				At 16 wks					
	No.	Males	No.	Females	No.	Overall Mean	No.	Males	No.	Females	No.	Overall mean	No.	Males	No.	Females	No.	Overall mean
FF	91	255.18 ±28.65	113	223.34 ±22.34	204	237.54 ±29.85	91	495.56 ±37.99	113	427.74 ±67.15	204	458.00 ±65.34	66	1009.26 ±124.70	112	834.89 ±133.05	178	899.55 ±154.74
R.I.R	98	296.60 ±31.43	138	254.36 ±31.22	236	271.90 ±37.56	98	599.35 ±75.63	138	481.01 ±99.93	236	530.15 ±107.69	93	1216.16 ±172.19	133	966.09 ±177.61	226	1069.00 ±214.11
SM	105	276.93 ±30.13	113	239.81 ±34.13	218	257.69 ±37.18	105	600.06 ±71.54	113	449.87 ±98.41	218	522.21 ±114.50	105	1262.89 ±176.20	113	907.59 ±167.76	218	1078.72 ±247.11
MM	92	316.10 ±32.71	130	281.05 ±28.82	222	295.58 ±35.00	92	652.44 ±104.16	130	572.45 ±85.47	222	605.60 ±101.44	78	1336.19 ±238.53	130	1067.31 ±154.30	208	1168.14 ±230.28

FF = Fayoumi R.I.R = Rhode Island Red SM = Silver Montazah MM = Mandara

2- Gain (G).

Significant different between the four strains at all periods and average gain of Mandara strain was higher than the other strains at (0-4), (4-8) and (8-12) weeks only but Silver Montazah strain was higher than the other strain at 12w – 16w only as shown in Table (2).

The Fayoumi strain had lower gain than the others but slow improvement than R.I.R and heavy than Mandara strain.

Generally, male chicks within a given strain had heavier gain than female in all strain at all period.

3- Relative growth rate (RGR)

Table (3) showed significant different between the four strains at all periods

a- 0w – 4w

The Mandara strain had RGR higher than; Silver Montazah, R.I. R or Fayoumi strain .

Generally, RG averages were higher in males than females.

b- 4w-8w

The Mandara strain had RGR higher than Silver Montazah, R.I.R or Fayoumi strain.

c- 8w-12w

The R.I.R strain had RGR higher than Silver Montazah, Mandara or Fayoumi strain.

Generally, RGR averages were higher in males than females but RGR average was higher in female Silver Montazah (48.51%) than males (47.48%)

d- 12w – 16w

The Silver Montazah strain had RGR higher than other strains; Fayoumi, R.I.R or Mandara strain.

Generally, RGR average was higher in males than females but RGR average was higher in females Fayoumi and R.I.R (21.46% *vs* 16.95%) than males (20.19% vs 15.80%), respectively.

(4) Body measurements:

a- Shank Length (SL)

Table (4) showed significant different between the four strains at 8 and 16 weeks of age and Mandara shank length had the longest than others; Silver Montazah, R.I.R. and Fayoumi strain at 8 and 16 weeks of age.

Generally, males had longer shank length than female at 8 and 16 weeks of age. These results agreed with Hanan (1999) who found that average shank length for males of the growth line of Fayoumi was 75.46 mm, and for females was 69.77 mm at 8 weeks of age. However this was not true concerning the magnitude.

Table (2): Gain in different periods studied (0-4), (4–8) , (8–12) , and (12–16) wks of age for Fayoumi, R.I.R., Silver Montazah and Mandara chicks.

Strains	Gain											
	0w – 4w			4w – 8w			8w – 12 w			12 w – 16 w		
	Males	Females	Overall mean	Males	Females	Overall mean	Males	Females	Overall mean	Males	Females	Overall mean
FF	227.40	196.53	210.29	240.38	204.40	220.46	328.58	245.34	279.49	185.12	161.81	162.06
R.I.R	260.71	218.74	236.17	302.75	226.65	258.25	438.70	334.10	377.54	178.11	150.98	161.31
SM	243.59	207.84	225.06	323.13	210.06	264.52	373.57	288.15	329.29	289.26	169.57	227.22
MM	280.81	249.00	262.18	336.34	291.40	310.02	471.40	369.51	411.73	212.35	125.35	150.81

FF = Fayoumi R.I.R = Rhode Island Red SM = Silver Montazah MM = Mandara W = Week

Table (3) : Relative growth rate (RG) in different periods (0 – 4), (4 – 8) , (8 – 12) and (12 – 16) weeks of age for Fayoumi, R.I.R., Sliver Montazah and Mandara chicks.

Strains	Relative growth rate											
	0w – 4w			4w – 8w			8w – 12 w			12 w – 16 w		
	Males	FEMALES	Overall mean	Males	Females	Overall mean	Males	Females	Overall mean	Males	Females	Overall mean
FF	160.73	157.12	158.83	64.52	63.33	63.75	49.80	44.57	46.76	20.19	21.46	19.80
R.I.R	156.82	150.87	153.54	67.41	61.52	64.25	53.59	51.55	52.51	15.80	16.95	16.32
SM	157.01	152.95	155.04	73.68	62.02	68.33	47.48	48.51	47.94	25.87	20.61	23.54
MM	159.82	159.65	159.39	68.20	68.09	69.05	53.08	48.80	50.74	17.26	12.48	13.80

FF = Fayoumi R.I.R = Rhode Island Red SM = Silver Montazah MM = Mandara W = Week

Table (4) : Mean ± SD of shank length (cm) at 8 and 16 wks of age for different strains.

Strains	Average Shank length											
	At 8 wks						At 16 wks					
	No.	Males	No.	Females	No.	Overall Mean	No.	Males	No.	Females	No.	Overall Mean
FF	91	5.15 ±0.36	113	4.96 ±0.48	204	5.05 ±0.44c	66	7.06 ±0.49	112	6.39 ±0.48	178	6.64 ±0.58[b]
R.I.R	98	5.42 ±0.40	138	4.97 ±0.38	236	5.16 ±0.45b	93	8.01 ±0.60	133	6.85 ±0.58	226	7.33 ±0.82[a]
SM	105	5.74 ±0.46	113	4.84 ±0.40	218	5.27 ±0.62b	105	8.07 ±0.51	113	6.92 ±0.51	218	7.47 ±0.77[a]
MM	92	5.69 ±0.56	130	5.27 ±0.42	222	5.44 ±0.52a	78	8.26 ±0.78	130	7.01 ±0.51	208	7.48 ±0.87a

b-Keel Length (KL)

From Table (5) it could reported that significant difference between the four strain at 8 and 16 weeks of age and Mandara keel length strain had the longest compared with Silver Montazah, R.I.R. and Fayoumi strain at the same ages.

Generally, males had longer keel length than female at 8 and 16 weeks of age. These results almost agree with the findings of Hanan (1999) who found that average keel length for males of the growth line of Fayoumi was 69.39 mm, and for females was 64.25 mm at 8 weeks of age.

Table (5): Mean ± SD of keel length (cm) at 8 and 16 wks of age for different strains.

Strains	Average Keel length											
	At 8 wks						At 16 wks					
	No.	Males	No.	Females	No.	Overall mean	No.	Males	No.	Females	No.	Overall Mean
FF	91	7.65 ±0.49	113	7.25 ±0.55	204	7.43 ±0.56c	66	9.92 ±0.55	112	9.20 ±0.69	178	9.47 ±0.73[c]
R.I.R	98	8.68 ±0.66	138	7.84 ±0.78	236	8.19 ±0.84b	93	11.45 ±1.03	133	10.39 ±0.93	226	10.83 ±1.10[a]
SM	105	8.69 ±0.77	113	7.74 ±0.55	218	8.20 ±0.82b	105	11.06 ±0.88	113	9.71 ±0.50	218	10.36 ±0.98[b]
MM	92	9.00 ±0.83	130	8.26 ±0.60	222	8.56 ±0.79a	78	11.79 ±0.90	130	10.52 ±0.93	208	11.00 ±1.11[a]

c- Breast circumference (BC)

Significant different between the four strain at 8 and 16 weeks of age and Mandara breast circumference strain and the longest compared with other strains; Silver Montazah, R.I.R. and Fayoumi at the same ages as shown in Table (6).

Generally, males had longer breast circumference than female at the same ages in all strains studied.

Table (6) : Mean ± SD of breast circumference (cm) at 8 and 16 wks of age for different strains.

Strains	Average Keel length											
	At 8 wks						At 16 wks					
	No.	Males	No.	Females	No.	Overall Mean	No.	Males	No.	Females	No.	Overall mean
FF	91	22.88 ±1.26	113	21.89 ±1.91	204	22.33 ±1.72c	66	27.32 ±1.32	112	25.73 ±1.40	178	26.32 ±1.57d
R.I.R	98	24.66 ±2.10	138	23.07 ±2.11	236	23.73 ±2.25b	93	29.99 ±2.51	133	27.65 ±2.35	226	28.61 ±2.67bc
SM	105	25.19 ±1.71	113	22.74 ±1.86	218	23.92 ±2.16b	105	30.19 ±1.56	113	26.26 ±2.24	218	28.15 ±2.76c
MM	92	25.35 ±2.30	130	24.50 ±2.07	222	24.85 ±2.20a	78	30.40 ±2.09	130	27.97 ±1.84	208	28.88 ±2.26ab

FF = Fayoumi R.I.R=Rhode Island Red SM=Silver Montazah MM=Mandara
W=week.
Means within each column bearing different letter are significant (P<0.05).

(5) Phenotypic Correlation Coefficients:

a- The phenotypic correlation between body weight (B.wt) and other measurements studied.

Results Table (7) showed highly significant and positive correlation between body weight and each of, shank length, keel length and breast circumference at 8 and 16 weeks of age.

b-The phenotypic correlation between shank length (SL) and other measurements studied .

Data in Table (7) indicated also highly significant and positive correlation between shank length and each of keel length and breast circumference at 8 and 16 weeks of age. Similarly significant and positive correlation between keel length and breast circumference at the same ages. These results agreed with El-Full (1989) and Hanan (1999) in Fayoumi strain at 8 weeks of age.

c- The phenotypic correlation within body measurements; shank length, keel length and breast circumference.

A highly significant and positive correlation within all measures at 8 and 16 weeks of age as noted in Table (7).

The Fayoumi strain showed lower values than other strains at 8 weeks of age but higher value than other strains for the correlations between body weight and breast circumference.

Also, The Fayoumi strain showed a trend of lower value than other strain at 12 and 16 weeks of age within body measurements but this was not true between body weight and shank length.

Conclusively, it can be concluded that the selection for body weight measurement, shank length, keel length and best circumference can be using for improving the body weight.

Table (7) : Phenotypic correlation within body measurements for the different strains at 8 and 16 wks of age.

Traits	Phenotypic correlation									
	At 8 wks					At 16 wks				
	1	2	3	4	Flock	1	2	3	4	Flock
SL X KL	SM	MM	R.I.R	FF	0.725**	SM	MM	R.I.R	FF	0.793**
	0.78**	0.77**	0.73**	0.45**		0.83**	0.79**	0.79**	0.53**	
SL X BC	R.I.R	SM	MM	FF	0.698**	SM	MM	R.I.R	FF	0.812**
	0.76**	0.70**	0.54**	0.51**		0.90**	0.76**	0.74**	0.72**	
KL X BC	R.I.R	SM	MM	FF	0.686**	MM	R.I.R	SM	FF	0.828**
	0.67**	0.66**	0.54**	0.48**		0.84**	0.83**	0.81**	0.55**	
B.Wt X SL	SM	R.I.R	MM	FF	0.789**	FF	SM	MM	R.I.R	0.789**
	0.78**	0.77**	0.75**	0.65**		0.84**	0.78**	0.75**	0.74**	
B.Wt X KL	R.I.R	SM	MM	FF	0.753**	SM	MM	R.I.R	FF	0.781**
	0.76**	0.65**	0.64**	0.58**		0.78**	0.78**	0.73**	0.64**	
B.Wt X BC	FF	SM	R.I.R	MM	0.770**	SM	FF	MM	R.I.R	0.837**
	0.77**	0.76**	0.74**	0.60**		0.86**	0.84**	0.84**	0.74**	

SL = Shank length
KL = Keel length
SM = Silver Montazah
R.I.R=Rhode Island Red.
BC = Breast circumference
B.Wt = Body weight
MM = Mandara
FF=Fayoumi
** Significant at (P< 0.01)
1,2,3,4, arrangement descending

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J. Agric. Sci. Mansoura Univ., 27 (2), February, 2002

معنوية قياسات وزن الجسم المبكر فى الكتاكيت الفيومى بالمقارنة مع الرود أيلاند وبعض السلالات المحلية المستنبطة

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أخذت ٨٨٠ كتكوت ذكر وانثى عشوائي لاربع انواع ، الفيومى كسلالة محلية والرودايلند الاحمر كسلالة اجنبية والمنتزة الفضى والمندرة كسلالتين مستنبطة من قطيع مغلق لدراسة قياسات الجسم فى العمر المبكر حتى عمر ١٦ اسبوع .

النتائج تشير الى وجود اختلافات معنوية بين الاربع سلالات المستخدمة فى دراسة الصفات وكانت ذكور واناث سلالة المندرة اثقل وزنا عن السلالات الاخرى عند ٨ و ١٦ اسبوع من العمر . كما لوحظ ان ذكور الكتاكيت داخل السلالة كانت اثقل وزنا من الاناث فى كل السلالات .

تميزت سلالة المندره بارتفاع معدل النمو النسبى عن السلالات الاخرى المستخدمة فى الدراسة فى عمر ٤–٨ اسبوع ولكن معدل النمو النسبى لسلالة الرودايلند الاحمر مرتفعة عن السلالات الاخرى فى عمر ٨–١٢ اسبوع ، ايضا معدل النمو النسبى لسلالة المنتزة الفضى كانت مرتفعة عن السلالات الاخرى فى عمر ١٢–١٦ اسبوع . كما لوحظ ان متوسط معدل النمو النسبى مرتفع فى الذكور عن الاناث فى كل الفترات (٠–٤، ٤–٨ ، ٨–١٢ ، ١٢–١٦ اسبوع) ولكن كان معدل النمو النسبى لاناث المنتزه مرتفع عن الذكور فى فترة ٨–١٢ اسبوع وايضا معدل النمو النسبى لاناث الفيومي والرودايلند الاحمر فى فتره ١٢ –١٦ اسبوع.

قصبة الرجل وعظمة القص ومحيط الصدر لسلالة المندرة كانت اطول من السلالات الاخرى السابق ذكرها عند ٨ – ١٦ اسبوع من العمر . بصفة عامة كانت الذكور اطول من الاناث فى نفس الفترة من العمر ولنفس القياسات . كما حققت سلاله الرودايلند الاحمر اعلى قياسات من السلات الاخرى فى عمر ٨ – ١٦ اسبوع .

العلاقة بين مقاييس الجسم فى الاعمار المبكره حتى عمر ١٦ اسبوع كانت معنوية وموجبه ولذلك يمكن عمل معايير مختلفة للانتخاب بين المقاييس : وزن الجسم ومعدل النمو – طول قصبة الساق– طول عظمة القص ومحيط الصدر لتحسين وزن الجسم لانتاج اللحم من الدواجن .