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Genetic Evaluation for some Growth and Body Measurements Traits in Bronze Turkey Raised in Egypt

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ABSTRACT

A total number of 50 males of bronze turkey were used in this study. Body weights (BW) in kg were recorded at 36, 40 and 44 weeks of age. Body measurements (BM) such as body length (BL), breast circumference (BC), keel length (KL) and shank length (SL) in cm were measured at 36, 40 and 44 weeks of age were also studied. Results show that means of body weight were 14.42, 13.83, 12.50 kg; 47.11, 47.11, 47.35 for BL; 39.09, 39.09, 38.43 for BC; 23.00, 23.12, 23.39 for KL and 18.96, 19.14, 18.19 for SL at 36, 40 and 44 weeks, respectively. Percentages of additive genetic variance ($\sigma^2_{a\%}$) were 25.0, 22.4 and 20.0% for BW; 34.2, 34.2 and 39.3 for BL; 34.2, 34.1 and 38.9 for BC; 34.0, 34.0 and 37.3 for KL and 39.0, 34.0 and 9.8 for SL at 36, 40 and 44 weeks, respectively. While, Percentages of maternal additive variance ($\sigma^2_{m\%}$) were lower than additive genetic variance (σ^2_a) and were 11.3, 9.7 and 6.9% for BW; 7.1, 7.0 and 10.2 for BL; 7.1, 7.1 and 10.7 for BC; 7.0, 7.0 and 10.3 for KL and 10.6, 7.0 and 12.8 for SL at 36, 40 and 44 weeks, respectively. Heritability (h^2_a) body weights traits had moderate heritability and were 0.25, 0.22 and 0.20. Heritability (h^2_a) had high heritability and were 0.34, 0.35 and 0.39 for BL; 0.34, 0.34 and 0.39 for BC; 0.34, 0.35 and 0.37 for KL and 0.39, 0.34 and 0.14 for SL at 36, 40 and 44 weeks, respectively.The ranges in predicted breeding values (PBV) for males ranged from 0.404 to 0.833 kg for BW, 4.05 to 4.89 cm for BL traits, 2.54 to 4.89 cm for BC, 0.46 to 1.78 cm for KL and 0.49 to 3.36 cm for SL traits, for dams ranged from 0.46 to 0.73 kg for BW, 3.10 to 3.22 cm for BL traits, 1.42 to 3.22 cm for BC; 0.45 to 0.77 cm for KL and 0.45 to 1.23 cm for SL traits, for sires ranged from 0.18 to 0.55 kg for BW, 1.41 to 2.99 cm for BL traits, 1.00 to 1.41 cm for BC, 0.19 to 0.51 cm for KL and 0.159 to 1.2 cm for SL traits. Estimates of Pearson correlations (rG) among predicted breeding values for most of traits studied in males of bronze ranged from low to high (but in general being high) and significantly positive.

INTRODUCTION

In Egypt, meat production of turkey represented 2% of the total poultry production. Turkey production needs more research works considering with the reduction of its costs followed by a relative decrease in the price (Iraqi *et al.,* 2001). Iraqi (1999) reported that animal model is the standard model for genetic evaluation of poultry flocks today. He concluded that applying single- or multi- traits animal model in evaluation allows estimation of additive genetic variance without bias. Furthermore, with animal model, the inclusion of common environmental effect allows obtaining the true estimates of additive genetic variance (Falconer and Mackay, 1996; Mrode, 1996). Also, even in an animal model, if maternal effects are present but not accounted correctly, estimated additive direct variance from dam component will also include all or part of the maternal variance.

Genetic improvements in the commercial turkey are achieved via selection in the pure lines of the primary breeding companies. Pure lines can be generally classified into two different categories; sire lines and dam lines. Inclusion of traits and their weighting is based largely on their economic to the turkey industry (Wood, 2009).

Genetic parameter estimates such as heritability, genetic variation and genetic correlations are therefore important when developing a selection index. These parameters are used when redacting direct and correlated responses to selection and their accuracy will have a large impact on the progress in a breeding program. In order to ensure the accuracy of a selection index, the genetic parameters must be recalculated often. In addition to changing the genetic parameters in the selection index, examining the trends from the genetic parameter estimates will give insight into the fluctuation in genetic variation over time within a population (Willems, 2014).

The fact that early morph metric measurements are highly correlated with body weight and carcass parameters and often can be recorded in a single assessment which makes them cheaper and more practicable to measure in the field than later body weight and carcass parameters, they become important information that a producer may use to predict body weight and carcass weight in the field. The turkey industry has witnessed tremendous improvement in recent years as rapid early growth and high feed efficiency in turkeys.

The objective of this work was to estimate additive genetic variance, , heritability, evaluate the performance of males for productive traits in bronze through breeding values predicted of all birds and evaluate the relationship among body weight and body measurements traits of turkeys.

MATERIALS AND METHODS

This work was carried out at Mehallet-Mousa Turkey Station, Animal Production Research Institute, Kafr El-Sheikh Governorate. Fifty toms of bronze turkey were taken randomly at sexual maturity. Water and feed were offered *ad libitum*.

Data:

Data of individually body weights (BW) in kg for 50 males of 13 sires and 22 dams were recorded at 36, 40 and 44 weeks of age. Body measurements (BM) such as body length (BL), breast circumference (BC), shank length (SL) and keel length (KL) in cm were measured at 36, 40 and 44 weeks of age. The symbols of the traits studied were described in Table 1.

Statistical analysis:

Data for growth and body Measurements traits were analyzed using single trait animal model (STAM).

MTDFRAML program of Boldman *et al.,* (1995). Variances obtained by REML method of VARCOMP procedure. *(SAS, 2002)* were used as starting values for the estimation of variance components. Analysis was done according to the following animal model.

The assumed model in matrix notation was:

$$\mathbf{y = Xb + Z_{aUa} + Z_m U_m + e,}$$

Where,

y= vector of observations on animal, b= vector of fixed effect peculiar to o month of production, U_a= vactor of random additive genetic effects, U_m= maternal genetic effect and e = vectors of random error; X, Z_a, and Z_m are incidence matrix relating individual records to b, a, m and p, respectively. Correlations among predicted breeding values (as a form of genetic correlation) and phenotypic correlations were calculated using SAS, 2002)

RESULTS AND DISCUSSION

Means, standard deviation (SD) and coefficients of variation (CV%) for body weights at 36, 40 and 44 weeks of age and their body measurements BL, BC, KL and SL at 36, 40 and 44 weeks of age traits are given in Table 1. The present means of body weight at 36, 40 and 44 weeks of age were 14.42, 13.83 and 12.50 kg, respectively. While, means of body length (BL), breast circumference (BC), Keel length (KL) and Shank length (SL) at 36, 40 and 44 weeks of age traits were 47.11, 47.11 and 47.35 cm for BL, 39.09, 39.09 and 38.43 cm for BC, 23.00, 23.12 and 23.39 cm for KL and 18.96, 19.14 and 18.19 cm for SL at 36, 40 and 44 weeks, respectively. The values of CV% for body weight and body measurements traits in the present study ranged from 5.35 to 7.87 for body weight. While, were 3.21 to 8.20 for body measurements traits (Table 1).

Table 1. Means , standard deviation (SD) and coefficient of variability (CV%) for body weights and body measurements in males of bronze.

Trait	Mean	SD	CV
Body weight at 36 weeks (BW36)	14.42	0.77	5.35
Body weight at 40 weeks (BW40)	13.83	0.80	5.80
Body weight at 44 weeks (BW44)	12.50	0.98	7.87
body length 36 weeks (BL36)	47.11	2.60	5.52
body length 40 weeks (BL40)	47.11	2.60	5.52
body length 44 weeks (BL44)	47.35	2.38	5.04
breast circumference 36 weeks BC36)	39.09	1.53	3.92
breast circumference 40 weeks BC40)	39.09	1.53	3.92
breast circumference 44weeks (BC44)	38.43	1.28	3.33
Shank Length at 36weeks (SL36)	18.96	0.79	4.17
Shank Length at 40 weeks (SL40)	19.14	1.57	8.20
Shank Length at 44weeks (SL44)	18.19	0.95	5.22
Keel Length at 36 weeks (KL36)	23.00	1.04	4.50
Keel Length at 40 weeks (KL40)	23.12	0.77	3.33
Keel Length at 44 weeks (KL44)	23.39	0.75	3.21

BW (kg); BL,BC,SL,KL (cm)

Amin (2014) found that the local Black Baladi (BB) progeny had the lowest significant mean of keel length than the other three genotypes at all studied ages except at 24 weeks of age. The progeny of White Nicholas (WN) had the highest breast width mean at 20 and 24 weeks of age while the progeny of local Black Baladi (BB) had the lowest breast width mean at all ages except those at 4 and 8 weeks of age. Iraqi *et al.,* (2001) found that bronze turkey were 0.493, 1.45, 3.00, 4.6, 5.8 and 7.2 kg for LBW at 4, 8, 12, 16, 20 and 24 weeks of age, respectively. While, CV% ranged from 8.7 to 26.4 % for LBW and ranged from 3.3 to 6.7% for BM traits. Amin (2014) observed that means of the local black baladi were, 3404 and 4185 gm at 16 and 20 weeks of age, while WN was 4374 and 5553.7 g at 16 and 20 weeks of age. Means of the BB were, 15.0, 13.8 and 45.0, WN were, 16.26, 15.6 and 50.86 for SL, KL and BC at 16 weeks of age, respectively.

Variance components:

Estimates of direct additive genetic variance estimates (σ^2_a), maternal additive genetic variance components (σ^2_m) for body weight at 36, 40 and 44 weeks of age and body measurements BL, BC, KL and SL at 36, 40 and 44 weeks of age are given in Table 2. Percentages of direct additive genetic variance σ^2_a ranged from 20 to 25% for body weights, 34.2 to 35.3% for body length (BL), 34.2 to 38.9 for body circumference (BC), 34.0 to 39.0% for keel length (KL), 34.0 to 38.9 for shank length (SL) at 36, 40 and 44 weeks of age, respectively (Table 2). Similar trend was observed by Abplanalp and Kosin (1952) and Balat *et al.,* (1993) with bronze and mehallah 85 turkey. Iraqi *et al.,* (2001) found that percentages of additive genetic variance σ^2_a for body weight (LBW) traits at early ages in males were lower (52% at hatch) than later ages (75% at 24 weeks), while the reverse trend (62% and 56% for LBW at hatch and 20 weeks of age, respectively. On the other hand, percentages of σ^2_a for BM traits in females were very low after 16 weeks of age. This may be due to high similarity between pullets for these traits. Results obtained from present stuffy could encourage to improve these traits. While the percentage of maternal additive variance components ranged from ranged from 6.9 to 11.3% for body weights, 7.0 to 10.7% for body length (BL), 7.1 to 10.7 for body circumference (BC), 7.0 to 10.6% for keel length (KL), 7.0 to 10.3 for shank length (SL) at 36, 40 and 44 weeks of age, respectively (Table 2).

Heritability:

Estimates of direct heritability (h^2a) and maternal heritability (h^2m) for body weight and body measurements are shown in Table 2. Direct heritability estimates were moderate and ranged from 0.20 to 0.25 for body weights, 0.34 to 0.39 for body length (BL), 0.34 to 0.39 for body circumference (BC), 0.34 to 39.0 for keel length (KL), 0.34 to 0.37 for shank length (SL) at 36, 40 and 44 weeks of age, respectively (Table 2). These results were within range of (Arthur *et al.,* 1975; Buss 1990; Kranis *et al.,* 2006 . Rafat *et al.,* 2011; Willems, 2014) found moderate to high heritabilities for BW at various ages, ranging from 0.20 to 0.71.While maternal heritability estimates (h^2m) ranged from 0.05 to 0.11 .These results were within range of (Arthur *et al.,* 1975; Buss 1990; Kranis *et al.,* 2006 Direct heritability (h^2a) for body weight traits studied was decreased slightly with the advance of age, the same trend was observed by (Akbaş *et al.* 2004 and Willems, 2014). This result may explain the changes of genetic variances for weights over ages (Table 2). Aslam *et al.,* (2011) found that Body weight traits BW40, BW60, BW80, and BW120 days were found to be heritability estimates (h2) of 0.32, 0.39, 0.42, and 0.40, respectively, while the BW at 1 and 17 days were found to have low heritability, with estimates of 0.0 and 0.12 respectively, body length (BL), breast circumference (BC), Keel length (KL) and Shank length (SL) at 36, 40 and 44 weeks of age had high heritability and were 0.34, 0.35 and 0.39 for BL, 0.34, 0.34 and 0.39 for BC, 0.34, 0.35 and 0.37 for KL and 0.39, 0.34 and 0.14 for SL at 36, 40 and 44 weeks, respectively. While maternal heritability (h2m) were 0.07, 0.07 and 0.11 for BL, 0.07, 0.07 and 0.11 for BC, 0.07, 0.07 and 0.10 for KL and 0.11, 0.07 and 0.18 for SL at 36, 40 and 44 weeks , respectively (Table 2). Willems, (2014) showed moderate heritabilities (0.29) for breast circumference. Slightly higher than studies which measured both the length and the width of the turkey breast by calipers (Aslam *et al.,* 2011). Body length (BL), breast circumference (BC), Keel length (KL) and Shank length (SH) at 36 40 and 44 weeks of age had low to moderate heritability and ranged from 0.14 to 0.39. While maternal heritability (h^2m) was low to moderate and ranged from 0.07 to 0.18. (Table 2). Johnson and Asmundson (1956) observed that the heritability estimates of shank length, keel length and body depth were moderate to high in value and ranged ranged from 0.36 to.60. Iraqi *et al.,* (2001) found hat estimates of h^2a ranged from 0.52 to 0.75 for LBW traits, 0.0 to 0.46 for SL traits and 0.35 to 0.55 for KL traits in males. The corresponding values in females were 0.0 to 0.62, 0.0 to .024 and 0.0 to 0.42 for the same traits, respectively. Laaina *et al.,* (2016) found that direct and maternal heritability estimates for weight adjusted to 365 days of age the animal model were 0.17±0.04 and 0.07±0.03, respectively. High estimates of additive heritability (h2a) indicating that additive variance is of considerable importance and consequently these traits studied could be improved by selection.

Table 2. Estimates of variance components (σ^2_a , σ^2_m) and their percentages , direct and maternal heritabilities (h^2_a , h^2_m) for weights and body measurements of males in bronze.

Traits	σ^2_a	%	σ^2_m	%	σ^2_e	σ^2_p	h^2_a	h^2_m
Body weights at:								
BW36	0.154	25.0	0.069	11.3	0.293	0.516	0.25	0.11
BW40	0.162	22.1	0.07	9.8	0.37	0.602	0.22	0.10
BW44	0.195	20.0	0.065	6,9	0.609	0.869	0.20	0.07
Body easurementst:								
BL 36	3.278	34.2	0.680	7.1	4.146	8.104	0.34	0.07
BL 40	3.275	34.2	0.670	7.0	4.145	8.09	0.38	0.07
BL 44	4.000	35.3	1.09	10.7	3.52	8.61	0.39	0.06
BC 36	1.211	34.2	0.251	7.1	1.534	2.996	0.34	0.07
BC 40	1.210	34.1	0.250	7.1	1.533	2.993	0.34	0.07
BC 44	1.215	38.9	0.334	10.7	1.09	2.639	0.39	0.05
KL 36	0.814	39.0	0.222	10.6	0.732	1.768	0.39	0.11
KL 40	0.353	34.0	0.073	7.0	0.453	0.890	0.34	0.07
KL 44	0.303	37.0	0.084	10.2	0.309	0.696	0.37	0.10
SL 36	0.353	38.9	0.073	7.0	0.453	0.879	0.34	0.07
SL 40	0.353	34.0	0.073	7.0	0.453	0.879	0.34	0.07
SL 44	0.655	37.3	0.181	10.3	0.652	1.488	0.37	0.10

[+]Traits as defined in Table 1. σ^2_a = direct additive variance; σ^2_m =maternal additive variance; h^2_a= direct heritability; h^2m= maternal heritability.

Predicted breeding values for males:

Predicted breeding values for males (with records) the minimum, maximum ranges of predicted breeding value (PBV) in addition to their standard errors (SE). accuracy (r_{IA})and positive of PBV for body weight traits (BW36, BW40 and BW44) and body measurements traits are given in Table 3. The ranges in predicted breeding values (PBV) for body weights of males increased with the advancement of age while the reverse trend were observed for body measurements traits. They ranged from 0.404 to 0.833 kg for BW, 4.05 to 4.89 cm for BL traits, 2.54 to 4.89 cm for BC, 0.46 to 1.78 cm for KL and 0.49 to 3.48 cm for SL traits, (Table 4). The trend of the of these results are similar to Iraqi *et al.,* (2001). Iraqi *et al.,* (2001) observed that the ranges in predicted breeding values (PBV) for males ranged from 13.80 to 4491.93 for LBW, 0.002 to 17.08 mm for SL traits, and 27.37 to 34.86 mm for KL traits. Ranges of PBV obtained in this study may be due to that additive genetic variance for body weights increased with the advance of age, while the reverse trend was observed for body measurements.These results revealed that improving the traits studied could be based on the BLUP estimates obtained.

The positive PBV% ranged from 42-46 %, 48-48% , 48-58%, , 44-54%,and 50-52% for BW,BL,BC, KL and SL traits, respectively, while the corresponding average positive PBV% were 53 43.5, 47.3, 54.7, 48.0 and 51.3%, respectively.

Accuracy ($r_{IA}$of PBVs is defined as the correlation (r) between the true breeding value (A) and the estimated breeding value (I) . Accuracy estimates of PBV recorded low accuracy for for body weight traits compared to body measurements. This may be due to the heritability estimates for body weight traits were lower than those of body measurements (Table 2). Bourdon (1997) reported that estimates of accuracy r_{IA} for PBV dependent on heritability and available pedigree information on an individual. Estimates of accuracy r_{IA} in the pesent study are within the range of Pribly and Pribylova (1991) ; Iraqi (1999) and Iraqi *et al.* 2001). It may be suggested that SE of prediction is a function of Reliability and the variance of the true breeding values (V_{TBV}), and consequently, increasing V_{TBV} lead to decreasing the SE of PBV for body weight trais.

Predicted breeding values for sires of males (without records):

Predicted breeding values for sires of males (without records) the minimum, maximum, ranges and their accuracies of predicted breeding value (PBV), their standard errors and accuracy for body weight and body measurements traits are given in Tables 4. The trend of ranges in predicted breeding values (PBV) for sires of males were similar to those obtained for ranges of males. These results are in agreemrnt of Iraqi *et al.* (2001). They ranged from 0.18 to 0.55 kg for BW, 1.41 to 2.99 cm for BL traits, 1.00 to 1.41 cm for BC, 0.19 to 0.51 cm for KL and 0.159 to 1.2 cm for SL traits.

Positive PBV and its percentage for body weights and measurements traits studied are shown in Table 4. The positive PBV% ranged from 53.8-53.8%, 61.5-61.5%, 61.5-61.5%, 38.5-46.2%, 46.2. and 46.2-53.8% for BW, BL, BC.KL and SL traits, respectively, while the corresponding average positive PBV% were 53.8, 61.5, 61.5, 43.6, and 48.7%, respectively. It is noticed that positive PBV% for sires of males is higher than those obtained for males .This may be due to that number of positive PBV for sires of males is large compared to their number. The estimates of r_{IA} for the minimum, maximum of PRV for sires (without records) had the same trend obtained for males with records Accuracy estimates for PBV recorded high accuracy for body weights and measurements were low compared to those obtained for males.

Positive PBV and its percentage for body weights and measurements traits studied are shown in Table 5 The positive PBV% ranged from 31.8-54.5%, While Positive PBV% ranged from 40.4-54.5

The average of r_{IA} across all minimum and maximum predicted breeding values for dams of males was 0.64 and 0.60 for body weights and measurements, respectively.. Iraqi *et al.* (2001) reported the average of r_{IA} across all minimum and maximum predicted breeding values for dams of males was 0.40.

Predicted breeding values for dams of males (without records):

Predicted breeding values for dams of males the minimum, maximum and ranges of predicted breeding value (PBV) in dams of males, their standard errors and accuracy for body weight and body measurements traits are given in Table 5. The trend of ranges in predicted breeding values (PBV) for dams of males were similar to those obtained for ranges of males. These results are in agreemrnt of Iraqi *et al.* (2001). The ranges in predicted breeding values (PBV) for dams ranged from 0.46 to 0.73 kg for BW, 3.10 to 3.22 cm for BL traits, 1.42 to 3.22 cm for BC, 0.45 to 0.77 cm for KL and 0.45 to 1.23 cm for SL traits.

The estimates of r_{IA} for the minimum, maximum of PRV had the same trend obtained for males with records. The average of r_{IA} across all minimum and maximum predicted breeding values for dams of males was0.61. Iraqi (1999) reported the average of r_{IA} across all minimum and maximumtransmitting ability for dams of males was 0.026 for body weight traits in Dokko-4 chickens. Iraqi *et al.* (2001) reported the average of r_{IA} across all minimum and maximum predicted breeding values for dams of males was 0.54.

Table 3. Minimum, maximum and ranges of predicted breeding values (PBV) for males (with records), their standard errors ,(SE), accuracy of prediction (r_{IA}), positive and positive% of PBV for weights and body measurements in bronze.

Traits	Minimum			Maximum			Range	Positive	Positive%
Body weights at:	PBV	SE	r_{IA}	PBV	SE	r_{IA}			
BW36	-0.174	0.22	0.50	0.23	0.22	0,51	0.404	23	46
BW40	-0.413	0.31	0.64	0.42	0.31	0.64	0.833	21	42
BW44	-0.413	0.31	0.64	0.42	0.31	0.64	0.833	21	42.
Body measurements at:									
BL 36	-2.121	1.45	0.77	1.93	1.44	0.78	4.05	24	48
BL 40	-2.47	1.31	0,76	2.42	1.31	0,76	4.89	24	48
BL 44	-2.47	1.31	0,76	2.42	1.31	0,76	4.89	24	48
BC 36	-1.38	0.74	0.74	1.16	0.75	0.73	2.54	29	58
BC 40	-1.38	0.74	0.74	1.16	0.75	0.73	2.54	29	58
BC 44	-2.47	1.31	0.76	2.42	1.31	0.76	4.89	24	48
KL 36	-0.82	0.59	0.76	0.96	0.59	0.76	1.78	27	54
KL 40	-0.38	0.41	0.73	0.53	0.40	0.73	0.91	22	44
KL 44	-0.20	0.25	0.57	0.26	0,25	0,56	0.46	23	46
SL 36	-0.80	0,40	0.73	0.56	0.41	0.73	1.36	26	52
SL 40	-0.98	0.82	0.75	2.50	0.82	0.75	3.48	25	50
SL 44	-0.20	0.27	0.45	0.29	0.27	0.44	0.49	26	52

+Traits as defined in Table 1.

Table 4. Minimum, maximum and ranges of predicted breeding values for sires of males (without records), their standard errors ,(SE), accuracy of prediction (r_{IA}), positive and positive% of PBV for body weights and measurements in bronze.

Traits	Minimum			Maximum			Range	Positive	Positive%
Body weights at:	**PBV**	**SE**	r_{IA}	**PBV**	**SE**	r_{IA}	**PBV**		
BW36	-.10	0.24	-.30	0.08	0.24	0.31	0.18	7	53.8
BW40	-.19	0.36	0.43	0.18	0.36	0.44	0.37	7	53.8
BW44	-.19	0.36	0.43	0.18	0.36	0.44	0.37	7	53.8.
Body measurements at:									
BL 36	-.2.03	1,95	0.53	0.96	1.91	0.56	2.99	8	61.5
BL 40	-0.76	1.76	0.47	0.65	1.72	0.51	1.41	8	61.5
BL 44	-0.76	1.76	0.47	0.65	1.72	0.51	1.41	8	61.5
BC 36	-0.57	0.96	0,49	0.43	0,98	0.46	1.00	8	61.5
BC 40	-0.57	0.96	0,49	0.43	0,98	0.46	1.00	8	61.5
BC 44	-0.76	1.76	0.47	0.65	1.72	0.51	1.41	8	61.5
KL 36	-0.20	0.76	0.51	0.31	0.79	0.47	0.51	6	46.2
KL 40	-0.12	0.51	0.51	0.16	0.52	0.47	0.28	5	38.5
KL 44	-0.09	0.29	0.33	0.10	0.28	0.38	0.19	6	46.2
SL 36	-0.42	0.51	0.52	0.33	0.52	0.50	0.75	7	53.8
SL 40	-0.40	1.1	0.47	0.74	1.06	0.52	1.2	6	46.2
SL 44	-0.70	0.27	0.25	0.08	0.29	0.35	0.15	6	46.2

+Traits as defined in Table 1.

Table 5. Minimum, maximum and ranges of predicted breeding values for dams of males (without records), their standard errors ,(SE), accuracy of prediction (r_{IA}), positive and positive% of PBV for body weights and measurements in bronze.

Traits	Minimum			Maximum			Range	Positive	Positive%
Body weights at:	**PBV**	**SE**	r_{AA}	**PBV**	**SE**	r_{AA}	**PBV**		
BW36	-0.17	0.15	0.80	0.29	0.18	0.70	0.46	11	50
BW40	-0.32	0.34	0.52	0.41	0.32	0.61	0.73	11	50
BW44	-0.32	0.34	0.52	0.41	0.32	0.61	0.73	11	50
Body measurements at:									
BL 36	-1.12	1.9	0.56	1.58	1.76	0.64	3.10	12	54.5
BL 40	-1.84	1.67	0.55	1.38	1.57	0.62	3.22	11	50.0
BL 44	-1.84	1.67	0.55	1.38	1.57	0.62	3.22	11	50.0
BC 36	-0.84	0.97	0.48	0.58	0.91	0.56	1.42	12	54.5
BC 40	-0.84	0.97	0.48	0.58	0.91	0.56	1.42	12	54.5
BC 44	-1.84	0.17	0.55	1.38	1.57	0.62	3.22	11	50.0
KL 36	-0.38	0.74	0.57	0.39	0.74	0.58	0.77	9	40.9
KL 40	-0.24	0.48	0.58	0.21	0.44	0.67	0.45	7	31.8
KL 44	-0.30	0.22	0.71	0.19	0.24	0.62	0.49	11	50.0
SL 36	-0.46	0.44	0.67	0.28	0.48	0.58	0.72	12	54.5
SL 40	-0.37	0.96	0.63	0.86	1.06	0.53	1.23	12	54.5
SL 44	-0.18	0.24	0.58	0.27	0.24	0.62	0.45	11	50.0

+Traits as defined in Table 1.

Genetic correlations among predicted breeding values (rG) and phenotypic correlations (rP):

rG Correlations (above diagonal) and phenotypic (rP) (below diagonal) for body weights and measurements are presented in table 6. Genetic correlations were computed among predicted breeding values to determine the birds that would be selected for improving the body weights and measurements traits.Genetic correlations (rG) among body weights were be positive and highly significant correlated. Genetic correlations among body weight traits were positive and significantly. Genetic correlations among body weight traits and body circumference (BC) ranged from low (0.005) for Bw with BC44 to moderate (0.364) for BW with BC36&BC40. While BW with Keel length (KL) ranged from low (0.169) to moderate (0.376). Shank length showed negative low pearson correlations with keel length except for SL with KL44. Body weight traits showed mostly positive pearson correlated and medium in value. Body lenghth (BL) with body circumference (BC) showed negarive pearson correlations and moderate in value .

These results showed that rG among body weight , body circumference, Keel lenghth and shank length at 36 weeks of age were positive and significantly.

The phenotypic correlations (rP) among body weights were found to be positive_highly correlated._rP correlations among body weight traits and BC were low, while rP among BW and BC44 were significantly positive and moderate. BW traits with KL found to be low and negative correlated. Except for KL44 is positive low estimates. Shank length with KL showed mostly negative and low in value. Body length (BL) with body circumference showed positive and moderate valuen

The estimates of rG and rP in the present study are within the range obtained by McCarteny (1961), Johnson and Asmundson (1956), Iraqi *et al.,* (2001), Oyegunle (2013) , Willems *et al.,* (2014) Ojedapo and Amao (2015). Iraqi *et al,* (2001) observed that, the estimates of Gr were computed between breeding values predicted for all studied traits in males and females. of BBB were significantly and positive ranged from low 0.01 to high 0.95 (but in general being high) and significantly positive. Willems *et al.,* (2014) found that Genetic correlations between breast confirmations score, 10- and 18-week body weights were moderate, 0.50 and 0.45, respectively. Oyegunle (2013) found that the genetic correlations between BDW, BRG, BDL, KL, TL and SL ranged from a low value of 0.27 to a moderate value of 0.48. While that of phenotypic estimates ranged from a very high value of 0.83 to 0.93. A moderate genetic correlation of 0.34 and low values of 0.19 and 0.21 were recorded for BDL/KL, BDL/TL and BDL/SL respectively. While a high phenotypic were 0.92, 0.89 and 0.83, respectively. The genetic correlation estimates for TL/SL was as low as 0.12, while the phenotypic estimates were as high as 0.93.

Table 6. Estimates of pearson correlations (above diagonal) and Phenotypic correlations (below diagonal) for males in Bronze.

Traits	BW36	BW40	BW44	BL36	BL40	BL44	BC36	BC40	BC44	KL36	KL40	KL44	SL36	SL40	SL44
BW36		0.969***	0.969***	-0.139	0.005	0.005	0.358	0.358**	0.005	0.367***	0.145	0.187*	0.366**	0.145	0.187
BW40	0.979***		0.999***	-0.008	0.082	0.082	0.364**	0.364**	0.082	0.276*	0.116	0.169	0.276	0.116	0.169
BW44	0.814***	0.797***		-0.008	0.082	0.082	0.364**	0.364**	0.082	0.276	0.116	0.169	0.276	0.116	0.169
BL36	0.013	0.071	-0.198		0.537***	0.537***	-0.339	-0.339	0.537***	-0.290*	0.107	0.070	-0.290	0.107*	0.070
BL40	0.013	0.071	-0.198	0.999***		0.999***	-0.205	-0.205	0.999***	0.137	0.292*	0.032	0.137	0.292*	0.032
BL44	0.058	0.134	0.001	0.569***	0.999***		-0.205	-0.205	0.999***	0.137	0.292*	0.032	0.137	0.292*	0.32
BC36	0.181	0.179	0.331*	-0.653***	-0.653***	-0.562***		0.999***	-0.205	0.051	-0.166	0.169	0.087	0.051	-0.166
BC40	0.181	0.179	0.331*	0.563***	0.563***	-0.592***	0.999***		-0.205	0.051	-0.166	0.168	-0.085	-0.024	0.087
BC44	0.523***	0.559***	0.439**	0.215	0.215	0.251	0.045	0.045		0.137	0.292*	0.032	0.215	0.404**	0.469***
KL36	-0.184	-0.228	-0.216	0.189	0.189	0.098	-0.529***	-0.529***	-0.329*		0.501***	0.096	-0.235	-0.137	-0.074
KL40	-0.184	-0.087	-0.105	0.643***	0.643***	0.612***	-0.727***	-0.727***	-0.057	0.475***		0.127	-0.300	-0.127	-0.0317
KL44	0.043	0.112	0.065	0.018	0.018	0.557***	-0.205	-0.205	0.183	0.243	0.285		0.408**	0.195	0.022
SL36	0.315*	0.251	0.036	-0.115	-0.115	-0.019	-0.110	-0.110	0.036	-0.013	-0.159	-0.222		0.676***	0.152
SL40	0.447**	0.370	0.287*	-0.194	-0.194	-0.088	-0.079	-0.079	0.134	0.126	-0.143	-0.083	0.883***		
SL44	0.146	0.023	0.192	-0.301*	-0.301*	-0.324*	0.999***	0.0001	0.055	0.070	-0.301*	-0.059	0.044	0.334*	0.334

+Traits as defined in Table 1. ns = non significant, *=P<0.05, p<0.01.

CONCLUSION

1- Estimates of predicted breeding values using animal model are more reliable, i.e. the prediction are BLUP associated with lower predicted error variance.
2- Estimates of heritabilities and positive genetic correlations among predictors lead to conclude that males could be selected based on BLUP estimates obtained at early ages.
3- Accuracy and selection, animals should be selected with high accuracy be used as breeders. Animals with low accuracy may not perform as predicted- chance of obtaining higher merit progeny (but equal chance of obtaining lower merit progeny), Animals with high accuracy perform close to predict.

REFERENCES

Akbaş, Y. ; Takma. Ç. and Yaylak, E., (2004). Genetic parameters for quail body weights using a random regression model. South African Journal of Animal Science 2004, 34 (2)

Amin (2014). using stepwise multiple regression models to predict body weight and some carcass traits from some body measurements at early age in turkeys. egypt. poult. sci. vol (34) (iii): (809-830) (2014)

Aslam ML, Bastiaansen JW, Crooijmans RP, Ducro BJ, Vereijken A, Groenen MA. (2011). Genetic variances, heritabilities and maternal effects on body weight, breast meat yield, meat quality traits and the shape of the growth curve in turkey birds. BMC Genet. 2011 Jan 25;12:14. doi: 10.1186/1471-2156-12-14.

Boldman, K.G., Kriese, L.A., Van Vleck, L.D., Van Tassell, C.P. and Kachman, S.D., (1995). A manual for use of MTDFREML. A set of programs to obtain estimates of variance and covariances. USDA. Agricultural Research Service.

Bourdon, R.M. (1997). Understanding animal Breeding. Prentice-Hall. Inc. Upper, Saddle River, New Jersy.

Buss EG. (1990). Genetics of growth and meat production in turkeys, in: CRAWFORD, R.D. (Ed.) Poultry Breeding and Genetics. Amsterdam, Elsevier; pp. 645–675.

Iraqi, M.M. (1999). Estimation and evaluation of sire transmitting abilities for growth traits in chickens. Ph. D. Thesis, Faculty of Agriculture, Moshtohor, Zagazig Univerisity. Egypt.

Iraqi, M.M., Mostafa, M.Y. and Kosba, M.A. (2001). Estimation of genetic parameters when the common environmental effect is ignored or considered in the animal model for productive traits in broad breasted bronze turkey. *Egypt. Poult. Sci. Vol. 21 (I): 183-207.*

Johnson, A. S. and Asmundson, V. S. (1956). genetic and environment factors affecting size of body and body parts of turkeys.(9) 296:301.

Koerhuis ANM. (1996). Non-normality of egg production distributions in poultryand the effects of outlier elimination and transformation on size andcurvilinearity of heritability.Livest Prod Sci1996,45:69-85.

Koerhuis ANM: Non-normality of egg production distributions in poultryand the effects of outlier elimination and transformation on size andcurvilinearity of heritability. Livest Prod Sci,45:69-85.

Iraqi, M.M. (1999). Estimation and Evaluation of Sire Transmitting Abilities for Growth Traits in Chickens. *Ph.D.* Thesis, Faculty of Agriculture, Moshtohor, Zagazig University / Benha Branch, Egypt.

Ojedapo, L. o. and Amao, S. R. (2015). Genetic Variation and Phenotypic Correlations of an Exotic Turkey Reared in Savanna Region of Nigeria. International Journal of Agriculture Innovations and Research . Volume 4, Issue 2, ISSN (Online) 2319-1473

Oyegunle, A (2013). Genetic , phenotypic and enivironmental correlation estimates among physical body traits of three turkey genotypes. Int. J. Agric. Food Sci. 2013

Pribyl, J. and Pribylova, J. (1991). The use of BLUP method for the constriction of selection indexes in egg-laying poultry. Scientia Agriculture Bohemoslovaca UVTIZ 23(2): 135-144.

Rafat, S. A. , Namavar, P. , Shodja, D. J. , H. Janmohammadi, H , Khosroshahi, H. Z. and David, I. (2011). Estimates of the genetic parameters of turkey body weight using random regression analysis. Animal (2011), 5:11, pp 1699–1704 & The Animal Consortium 2011.

Arthur JA, Abplanalp H. Linear estimates of heritability and genetic correlation for egg production, body weight, circumference and egg weight of turkeys. Poult Sci. 1975;54:11–23.

Willems, O (2014). Evaluation methods and technologies for improving feed efficiency in the turkey (Meleagris gallopavo).ph.D Thesis, The University of Guelph, Ontario, Canada.

Wood, B.J. (2009). Calculating economic values for turkeys using a deterministic production model. Canadian Journal of Animal Science 89: 201-213.

التقييم الوراثي لبعض صفات النمو ومقايس الجسم في الرومي البرونزى المرباة في مصر

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تم استخدام عدد 50 سجل إنتاجي من ذكور الرومي البرونزى من قطيع إنتاج الرومى محطة محلة موسى بكفر الشيخ التابع لمعهد بحوث الانتاج الحيواني ، مركز البحوث الزراعية ، مصر وقد درست صفات وزن الجسم وصفات طول الجسم و محيط الصدر و طول عظمة القص و طول الساق عند عمر ٣٦, ٤٠ و ٤٤ اسبوع وقد اوضحت النتائج مايلى:كانت متوسطات أوزان الجسم ١٢,٥٠،١٣,٨٣،١٤,٤٢ كجم و ٤٧,١١، ٤٧,١١ ، ٤٧,٣٥ سم لطول الجسم و٤٧,١١، ٤٧,١١، ٤٧,٣٥ سم لطول الجسم و ٣٩,٠٩ ، ٣٩,٠٩ ، ٣٨,٤٣ سم لمحيط الصدر و ٢٣,٠٠ ، ٢٣,١٢ ، ٢٣,٣٩ سم لطول القص و ١٨,٩٦ ، ١٩,١٤، ١٨,١٩ سم لطول الساق عند ٣٦, ٤٠, ٤٤ أسبوع من العمر على التوالى.كانت نسبة التباين الوراثى المضيف ٢٥,٠، ٢٢,٤، ٢٠,٠% لوزن الجسم و ٣٤,٢ ، ٣٤,٢، ٣٩,٣% لطول الجسم و ٣٤,٢، ٣٤,١، ٣٨,٩ لمحيط الصدر و ٣٤,٠، ٣٤,٠، ٣٧,٣% لطول القص و ٣٩,٠، ٣٤,٠، ٩,٨% لطول الساق عند ٣٦, ٤٠, ٤٤ أسبوع من العمر على التوالى , بينما كانت نسبة التباين الامى أقل من نسبة التباين الوراثى المضيف و كانت ١١,٣، ٩,٧، ٦,٩% لوزن الجسم و كانت ٧,١، ١٠,٢، ٧,٠ % لطول الجسم و ٧,١، ٧,١، ١٠,٧% لمحيط الجسم و ٧,٠، ١٠,٣، ٧,٠% لطول القص و ١٠,٦، ١٢,٨، ٧,٠% لطول الساق عند ٣٦, ٤٠, ٤٤ أسبوع من العمر على التوالى. كانت قيم المكافىء الوراثى متوسطة ٠,٢٥، ٠,٢٢، ٠,٢٠ بينما كانت قيم المكافىء الوراثى الامى منخفضة ٠,١١ ، ٠,١٠، ٠,٠٧ لوزن الجسم عند ٣٦, ٤٠, ٤٤ أسبوع من العمر على التوالى.كانت قيم المكافىء الوراثى متوسطة ٠,٣٤، ٠,٣٥، ٠,٣٩ لطول الجسم و ٠,٣٤، ٠,٣٤، ٠,٣٩ لمحيط الجسم و ٠,٣٤، ٠,٣٥، ٠,٣٧ لطول القص و ٠,٣٩ ، ٠,٣٤، ٠,١٤ لطول الساق عند ٣٦, ٤٠, ٤٤ أسبوع من العمر على التوالى, بينما كانت قيم المكافىء الوراثى الامية منخفضة ٠,٠٧، ٠,٠٧، ٠,١١ لطول الجسم و ٠,٠٧، ٠,٠٧، ٠,١١ لمحيط الجسم و ٠,٠٧، ٠,٠٧، ٠,١١ لطول القص و ٠,١١، ٠,٠٧، ٠,١٨ لطول الساق عند ٣٦, ٤٠, ٤٤ أسبوع من العمر على التوالى.تراوح مدى القيم التربوية المتوقعة للذكور من٠,٤٠٤ – ٠,٨٣٣ لوزن الجسم و ٤,٠٥ – ٤,٨٩ لطول الجسم و ٢,٥٤ – ٤,٨٩ لمحيط الجسم و ٠,٤٦ – ١,٧٨ لطول القص و ٠,٤٩ – ٣,٣٦ لطول الساق . تراوح مدى القيم التربوية المتوقعة لأمهات الذكور من ٠.٤٦ – ٠,٧٣ كجم لوزن الجسم و٣,١٠ – ٣,٢٢ سم لطول الجسم و ١,٤٢- ٣,٢٢ سم لمحيط الجسم و ٠,٤٥- ٠,٧٧ سم لطول القص و ٠,٤٥- ١,٢٣ سم لطول الساقتراوح مدى القيم التربوية المتوقعة لأباء الذكور من ٠.١٨ – ٠,٥٥ كجم لوزن الجسم و١,٤١ – ٢,٩٩ سم لطول الجسم و١,٠٠- ١,٤١ سم لمحيط الجسم و ٠,١٩- ٠,٥١ سم لطول القص و ٠,١٥٩- ١,٢ سم لطول الساق.تراوحت معاملأت ارتباط بيرسون من منخفضة الى عالية.