Egypt. Poult. Sci. Vol (34) (III): (809-830) (2014) **(1521)**

Egyptian Poultry Science Journal

http://www.epsaegypt.com

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

USING STEPWISE MULTIPLE REGRESSION MODELS TO PREDICT BODY WEIGHT AND SOME CARCASS TRAITS FROM SOME BODY MEASUREMENTS AT EARLY AGE IN TURKEYS

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Received: 28/06/2014 Accepted: 20/08/2014

ABSRTACT: The objectives of this study were to evaluate the relationship between live measurements and carcass traits and use the develop linear regression models to predict live weight and some of carcass traits in the local Black Baladi (BB), White Nicholas (WW) turkey strains and their repeated backcrosses according some body measurements at early age. Pearson's correlation was used to determine the coefficient of simple correlation between live weight, body measurements and the target carcass components (carcass weight and edible parts). Stepwise multiple regressions were performed to estimate live weight and carcass weight at 20 wks of age using both of body weight and body measurements traits at 16 wks of age to produce the best regression model for each of the dependent variable based on the regression coefficient. Results obtained from descriptive statistics showed that the differences of mean values among the different genotypes, live weight at 16 and 20 week of ages (BW16 and BW20), shank length (SL), keel length (KL), breast width (BW), breast circumference (BC) were highly significant ($P<0.01$) and influenced by repeated backcrosses. This was also applicable to carcass (CW), and edible parts (EP) weights. Simple Pearson correlation coefficients (r) between body weight at 20 wks of age and body measurements (SL, KL, BW and BC) and carcass yields (CW and EP) had positive and significantly high values of most of the studied traits where ($r = 0.25$ to 0.99) for the four genotypes (except BW for two repeated backcrosses which had negative and low values). The results of stepwise multiple regression reveals that BW16 seems to be the major trait in determining for predicting BW20, CW and EP base on high adjusted determination coefficient (R^2) as shown in all equations. These results based on R^2 change for each independent variable. Generally, all models for predicting the former three dependent variables had highly significant .High coefficient of multiple regression between the dependent and independent variables and consequently, high R^2 and adjusted R^2 values ($P<0.01$). The estimates of R, R^2 and adjusted R^2 for the three equations for

Key Words: turkey, stepwise regression, predicts live, carcass and edible parts weight.

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predicting W20, CW and EP were 0.94, 0.90 and 0.90, respectively, for BW20 and higher (0.98, 0.98 and 0.97, respectively, for CW. Finally, the three aforementioned estimates for the EP had equal values (0.999). Concerning the differences between the actual and predicted W20, CW and EP and the percentages differences, results showed that respect to absolute and predicted estimates, the differences (Y) - (Ỹi) (g and %) for dependent variables for overall genotypes were generally small and ranged from -1.95 to 0.23g for the absolute weight difference and the range for the percentage difference (in relation to actual Y% was -0.04 to- 0.0017%. It could be concluded that body weight at 16 week of age was shown to be a better predictor of the body weight, eviscerated carcass and edible parts weights at 20 week of age. This will help in providing a platform for designing breeding index for local Black Baladi and White Nicholas turkey improvement and their repeated backcrosses.

INTRODUCTION

The fact that early morphmetric 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. As a result there is need to develop objective means for describing and evaluating body weight and conformation characteristics especially in smallholder poultry production sector where measuring scales are unavailable Assan (2013). However, increased demand for breast meat has made producers to look for ways to optimize breast muscle growth which had low genetic correlations (0.12 to 0.15) with growth traits (Zerehdaran et al., 2004). The eviscerated carcass percent of turkey ranged from 77.4 to 80.7% and both of the breast and thigh are 37.5 and 29.3% from the eviscerated carcass respectively, (Amin, 2014). In addition, breast muscle is the most important carcass part from an economic stand point (Zuidof, 2005) and the yield of breast and thigh has a large influence on the efficiency of processing when portioned and further processed products are marketed (Khosravania et al., 2006).

Turkey as with all animal species, information on correlations among the pre- and post- slaughter traits is quite important in poultry breeding. This is because knowing which of the pre-slaughter traits affect which of the post-slaughter traits enables breeders to predict what kind of products will be obtained (Mendeş et al., 2005; Mendeş, 2009). According to Pinto et al. (2006), body weight at various ages and carcass characteristics are examples of variables that can indicate the usefulness of the chicken for commercial purposes performance testing, which forms the basis for breeding work is difficult to conduct in the case of slaughter value parameters. Moreover, selection towards meat improvement requires reliable and easy-to conformation of various body parts are the major apply methods for estimating the performance and breeding value of poultry species (Kleczek et al., 2007). Body measurements and carcass traits are inter-correlated (Shahin, 1999 and Isiguzar, 2003). However, the analysis of these traits should address interdependence among the predictors. The problem in the analysis of body measurements and carcass weight data is the difficulty in interpreting the influence of body measurements and determining the measurements which are most useful for predicting carcass weight Keskin et al., 2007). Non-invasive measurements provide an opportunity to collect slaughter value information from live birds and as a result, own information for carcass traits are available on candidates for selection while still alive. In addition, linear and non linear mathematical or statistical functions provide estimates for target variables using one or more easily measurable noninvasive body traits. Khosravania et al. (2006) observed that regression models can be used to predict carcass, breast and leg weights utilizing data on body conformation traits and weight at different ages. In vivo prediction of carcass component based on single trait is usually discouraged as not reliable. Wawro (1990) and Raji et al. (2009) proposed that more accurate results can be obtained when several parameters are used as independent variables in predicting and improving carcass performance in birds, this was when multiple traits where use in a regression analysis. Multiple regression analysis has been used to interpret the complex relationships among body weight and some morphometric measurements (Yakubu et al., 2012). Studies on the correlation between carcass parameters and indirect measurements showed a high correlation between live weight and carcass lean content in chicken (Bochno et al., 1997, 1999a and 1999b; Michalik et al., 2002; Yakubu et al., 2009), Raji et al., (2010) in quails, Ogah (2011) in guinea fowl, Rymkiewiez and Bochno (1999) and Banrjee (2011) in ducks and Bochno et al., (2000a) in geese.

The objective of this work was to evaluate the relationship between live body weight at 16 and 20 weeks of age, body measurements and some carcass traits, also, to determine the usefulness of live weight and some body measurements in predicting some carcass traits in two pure variety and backcrosses of turkeys.

MATERIALS AND METHODS

The present study was carried out at the Maryout Experimental Station at El-Amria region, Desert Research Center, Ministry of Agriculture, through three successive years. The turkeys stock consisted of two varieties, the local Black Baladi (BB) and a commercial White Nicholas (WW).

In the first generation, reciprocal were practiced between the (BB) and (WW) to get the F1 (1/2Wx1/2B and1/2B x1/2W), at the second generation, pullets of the F1 (1/2Wx1/2B) were backcrossed with toms of (WW) and pullets of (1/2Bx1/2W) were backcrossed with toms of (BB) to get progeny (¾W×¼B) and (¾B×¼W), respectively. In the third generation, pullets of the two genotypes which produced from the second generation were backcrossed again with toms from both of the pure lines to get (7/8Wx1/8B) and (7/8Bx1/8W), respectively. Hens were artificially inseminated twice a week, at hatching, birds were pedigreed, wing banded and reared on litter floor pens until 24 weeks of age. Poults were fed a starter ration contained 28% crude protein and 2860 Kcal ME/kg ration until 8 weeks of age, after that, they received a growing ration contained 22% crude protein and 2950 Kcal ME/ kg ration. At 20 weeks of age, a laying ration contained 15.5% crude protein and 2920 Kcal ME/kg ration was given. Conventional husbandry practices were followed. Feed and water were supplied ad libitum during growing period only, but during laying period feed should be supplied according to bird's requirements. Poults were vaccinated according to recommended vaccination program at the Maryout Experimental Station. At the third generation, all birds were sexed by the external characteristics. Individual body weights were recorded in gram at 16 and 20 weeks of age, also body measurements at16 weeks of age were measured. The shank length, represented the distance between the distal end of the tars- metatarsus and the proximal edge of the protuberance formed by the hypo- tarsal ridge. The keel length, represented the distance between its cranial and caudal terminals. The breast width measurement represented the width at 1 centimeter above the keel and about 1 centimeter from its anterior end. The shank and keel lengths were measured by a venire type caliper provided with two movable jaws on the left leg. While the breast width was measured with a piece of wire solder, as used by Asmundson (1942). This research included 320 birds from every genotype (40male and 40female turkeys). After a 20 week-long fattening period, 40 turkeys of each group were randomly selected from each pen. After 12 hours without food (except for water), turkeys were slaughtered for the purpose of this research. The heads, feet and shanks were removed and the birds were then eviscerated. The eviscerated carcasses weighted, then put on ice water for 3 hours after that the eviscerated carcasses were cutting a classic way, according to the regulations on quality of poultry meat carcasses into main parts (breast; thighs and back cuts, and weighed.

Statistical analysis:

Statistical analysis was performed using SAS program (SAS, 1992). All data were analyzed using the following linear model.

$$Y_{ik} = \mu + G_i + eik$$

Where

Y_{ik} = the observed value of the ikthpoults

μ = the overall mean,

G_i= the effect of the ith genotype,

e_{ik} = random error.

Pearson's correlation subroutine was used to determine the coefficient of simple correlation between live bodyweight and body measurements at 16 weeks of age and body weight and the target carcass components (carcass weight and edible parts) at 20 weeks of age. Stepwise multiple regressions was performed to estimate live weight and carcass weight at 20 weeks of age using body weight and some body measurements traits at 16 wks of age to produce the best regression model for each dependent variable based on the regression coefficient (R^2). Stepwise regression is a standard procedure for variable selection, which is based on the procedure of sequentially introducing the predictor into the model one at a time. It starts as the forward selection but at each stage the probability of deleting a predictor as backward elimination is considered. The number of predictors retained in the final model is determined by the level of significance accounted for inclusion and exclusion of predictors for the model (Chatterjee et al., 2000). Multiple regression equations were derived to estimate body weight and eviscerated carcass and edible parts weights at 20 weeks of age based on stepwise multiple regression from live body weight and non invasive body measurements at 16 weeks of age (independent variables) (keel length, shank length, breast width, and breast circumference of the turkeys). The best subset of the regression procedure was used. Using stepwise multiple regressions to produce the best regression model for each dependent variable based on the determination coefficients (R^2) and adjusted R^2.

RESULTSAND DISCUSSION

1- Means for dependent and independent variables:

Means and their corresponding standard errors for all the body weight, body measurements and carcass for the local Black Baladi (BB), White Nicholas (WW) turkey strains and their repeated backcrosses were presented in Table1. The WW variety and7/8Wx1/8B had significantly ($P<0.001$) the heaviest birds (4374.0 and 4439.0g), respectively, at 16 wks of age and (5553.7 and 5549.0g), respectively, at 20 wks of age, and the aforementioned genotypes had also significantly (P<0.001) the highest mean values for the body measurements except breast width where WW variety had significantly the highest mean. Same trend was found concerning both of eviscerated carcass weight (3736 and 3703g) and edible parts weight (4774 and 4730g) for the two genotypes, respectively, compared to the other genotypes followed by the reciprocal backcross (7/8Bx1/8W)while, BB variety had the lowest mean of all studied traits. These results were lighter than those reported by BUT (2005) of turkeys at the same age. It is also lighter compared to those reported by Isguzar (2003); Roberson et al. (2003) and BIG 9 (2012) for the British United Turkey (BUT Big 6). Gibril et al. (2013) found that initial weight was 2.49 kg and final weight was 5.9 kg at 9 and 16 wks, respectively, for the same breed of turkey. Ramkrishna et al. (2012) found that Beltsville Small White variety had significantly the highest body weight followed by Nandanam Turkey-1 and Non-descript varieties. Ready-to-cook yield in tom turkeys did not differ significantly between three turkey varieties. Results in the present study are in agreement with those of El-Naggar et al. (1992); Mostafa (1997); Mostafa and Nofal (2000) and Amin (2003) who worked on turkey and found that there were significant differences due to sex on body measurements. Mostafa and Nofal (2000) reported that White Holland turkey had significantly higher mean of shank length, keel length and breast width than Broad Breast Bronze at 24 weeks of age. Amin (2003) found that the 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 WN had the highest breast width mean at 20 and 24 weeks of age while the progeny of BB had the lowest breast width mean at all ages except those at 4 and 8 weeks of age.

2- Simple correlation coefficients (r) between body weights (g), body measurements (cm), carcass weight and edible parts:

Results presented in Table (2) showed that, for WW variety, values of simple correlation coefficients (r) between body weight at 20 weeks of age (BW20) were positive and significant, with body weight at 16 weeks of age (BW16), shank length at 16 wks of age (SL), eviscerated carcass weight (CW) and edible parts (EP) ranged between 0.89 and 0.99, while its r value with breast width (BC) was positive and moderate (0.37) also, the r estimate between carcass weight (CW) and BC was moderate (0.40) in addition, values of (r) between EP and BW16, BC and BC, also were moderate (0.35 to 0.38).

Concerning the backcross of 7/8Wx1/8B, values of (r) were positive and highly significant (P<0.001) between BW20 and BW16, SL, CW and EP and ranged between 0.88 and 0.99, while r estimate with breast width (BC) was negative and moderate (-0.50), also (r) with CW and BC was negative and moderate (-0.4) and with the other traits were in range of 0.85 and -0.99, in addition, (r) value between EP and BW, also was negative (-0.51) and positive with the other traits and ranged from 0.86 to 0.99.

As for the reciprocal backcrosses, correlation coefficients of BW20 with BW16, SL, CW and EP were positive and highly significant (P<0.001), in wide range (0.45 and 0.99), while with BW had negative and low value (-0.12), also with CW and BC were negative and low values (-0.13 and -0.12, respectively). Values of correlation coefficients of CW with the other traits were positive and ranged from 0.47 and 0.99. On the other hand, EP was correlated positively (P>0.01) with the other studied traits and ranged from 0.47 and 0.99.

With respect to BB variety, positive moderate value (P<0.01) was found between BW20 and BW while values with BW16, SL, CW and EP ranged between 0.89 and 1.00, In addition, the r value of eviscerated carcass weight with both of BW and CW were significant (0.31 and 0.87, respectively), moreover, the r values with the other traits were in range of 0.72 and 1.00. On the other hand, correlation coefficients of edible parts with both of BC and CW were significant (P<0.01) and equal (0.31).

Generally, concerning the overall mean of the four studied genotypes, breast width correlated positively (P<0.01) with BW20, eviscerated carcass weight and edible parts and has low values (0.25, 0.29 and 0.27, respectively), while values of (r) between the rest of studied traits had positive (P<0.01) and high values ranged from 0.80 to 0.99.

The high and positive correlation between live weight and carcass components observed in this study has been reported by several authors (Vali et al.,2005; Raji et al., 2009;Alkan et al., 2010) for different lines of Japanese quails, Bochno et al.(1997 and 1999a); Michalik et al. (2002); Yakubu et al. (2009) and Raji et al. (2010) in chicken, (Ogah, 2011) in guinea fowl, while in ducks (Bochno, 1999a and 2000b and Banrjee, 2011). (Bochno et al. (2000a) reported that the best predicted based on live weight and chest girth. Musa et al. (2006) reported that live weight was significantly (P<0.01) correlated (r=0.759 to 0.840) to breast muscle weight. Also, Kleczek et al. (2006) reported that chest girth and breast bone crest length could be used as indicators of the content of breast muscle in Muscovy ducks. The correlation matrix of each of the morphometric measurements could be used in predicting body weight or carcass parameters in livestock or poultry species (Ojedapo et al. 2007).

3- Prediction to body weight at 20 week of age:

Regression output including regression coefficients, F value, determination coefficients (R^2) and predicted multiple regression equations for in vivo estimation of dependent variable Ỹi (body weight at 20 week) for the local Black Baladi (BB), White Nicholas (WW) turkey and their repeated backcrosses are presented in Table 3. Results of stepwise multiple regressions and based on the high adjusted R^2 indicated that body weight at 20 week (BW20) can be predicted for White Nicholas (WW) with the use of BW16, shank length (SL) and breast width (BW) as shown in equation Ỹ1 and in repeated backcross 7/8Wx1/8B using BW16, breast circumference (BC) and keel length (KL) as shown in equations Ỹ2. The results of stepwise multiple regression to predict BW20 on linear body measurements reveals that when BW16 alone was used it accounted for 86% of the total variation in BW20, inclusion of SL in the model increase the proportion of the explained variance to 89%. The accuracy of the model was further improved (R^2 =90%) when the BW was added to the equation Y1 to prediction eviscerated carcass weight for the WW turkey. Prediction of BW20 for the BB variety, using stepwise multiple regression indicated that when BW16 alone was used, it accounted for 83% of the total variation in BW20, inclusion of SL in the model increase the proportion of the explained variance to 90%. The accuracy of the model was further improved (R^2 =92%) when the BW was added to the equationY3. Body weight at 20 week was predicted (equationsỸ3and Ỹ4) based on BW16 only for repeated backcross (7/8Bx1/8W), while for the BB variety, the independent variables were BW16, BC and SL. Generally, to predict body weight at 20 week independent variables were BW16, BC and SL as shown in equation Ỹ5. The R, R^2 and adjusted R^2 for both equations of repeated backcrosses (7/8Wx1/8B and 7/8Bx1/8W) were high; they were 0.95, 0.90 and 0.90, respectively, for equations Ỹ2 and 0.94, 0.89 and 0.88 for equation Ỹ2. Both equations were highly significant (P<0.001) with F values of 160 and 320, respectively, while the R, $R^2$and adjusted R^2 for both equations of pure line were 0.95, 0.90 and 0.90 for equation Ỹ1 and 0.96, 0.92 and 0.91 for equation Ỹ4, finally, were 0.94, 0.90 and 0.90 for equation Ỹ4.

The F value for the prediction of BW20 in the four studied genotypes and for the overall mean were highly significant (P<0.01). The predicted weight, difference between the actual and predicted weight and the percentage difference are presented on Table 4. The difference (g and %) for dependent variables Y1, Y2, Y3, Y4and Y5 for all genotypes were generally small and ranged from -1.95 to 1.3g and from -0.04 to 0.02% for the absolute weight and the percentage difference, respectively. Estimated T values between BW20 and both of the independent traits were significant for the four genotypes studied. Khrosavaria et al. (2006) reported that R^2 values ranged from 0.991 to 0.996 while F values were highly significant (P<0.001). Approximately similar finding in Muscovy ducks were found for variation between actual and predicted values (0.03 to 4.16%) for the dependent variables (Kleczek et al., 2006). Multiple regression analysis has been used to interpret the complex relationship among body weight and some morphometric measurements (Yakubu et al., 2012). Therefore, studies have developed regression equations that could be used to predict body weight from some linear body measurements (Bharat et al., 2008 Bassano et al., 2001). Typically body weight is regressed on morphometric measurements to determine a weight prediction equation.

4- Prediction to eviscerated carcass weight:

Considering prediction to eviscerated carcass weight for the BB, WW turkey and their repeated backcrosses are presented in Table 5. Result of stepwise multiple regressions to predict eviscerated carcass weight (CW) on body measurements reveals that when BW16 alone was used it accounted for 82% of the total variation in CW, inclusion of BW in the model increase the proportion of the explained variance to 85%. The accuracy of the model was further improved (R^2 = 86%) when the BW was added to the equation Y6 to prediction CW for the WW turkey. The independent variables for prediction of CW for the BB turkey were W16, BC and SL, where R2 were 0.83, 0.88 and 0.89 for the three independent variables, respectively. Prediction CW for repeated backcross using W16 and KL for the 7/8W x 1/8B backcross and BW16 for the 7/8B x 1/8Wone. The result of stepwise regression analysis indicated that BW16 seems to be the major trait in determining for predicting CW base on high adjusted R^2 as shown in equationsY6, Y7, Y8, Y9 and Y10. The F value for the prediction of CW was highly significant (P<0.01). The differences (g and %) for dependent variables Y6 to, Y10 were small (except Y8) and ranged from -2.6 to 144.2g for the absolute weight difference and the range for the percentage difference was -0.02 to 4.26%. The T values between eviscerated carcass weight and both of the independent traits were significant for the four genotypes studied, Table 6. These findings is consistent with that reported by Pinto et al. (2006) and Yakubu et al. (2009) that observed in Nigeria indigenous chicken genotype, Gueye et al. (1998) in Senegal chicken and Teguia et al. (2008) in Muscovy duck. Raji et al. (2009) reported that the relationship between live body measurement for estimation of carcass component in vivo depends on the correlation between them, these observation was noticed here with higher correlation existing between body weight and carcass components (0.906, 0.950 and 0.786) with carcass weight , breast weight and thigh weight, respectively. Raji et al., (2009) and Wawro (1990) proposed that more accurate results in predicting body weight in turkey can be obtained when several parameters are used as independent variables in predicting and improving carcass performance, this was substantiated when multiple traits where used in a regression model. In a stepwise multiple regressions of body weight, carcass weight and breast weight in guinea fowl on linear body measurements, revealed that when chest circumference alone was used, it accounted for 55% of the total variation in body weight, inclusion of keel length in the model increased the proportion of the explained variance to 74.3%. The accuracy of the model was further improved (R^2 =80.9) when thigh length, body length and wing length were added to the equation. Their results indicated that body weight can be predicted with fair degree of accuracy from chest circumference, keel length and thigh length. Pinto et al., (2006); Yakubu et al., (2009) and Gueye et al., (1998) observed similar findings in chicken. In addition, Teguia et al., (2007) in Muscovy duck reported that the relationship between live body measurements of carcass component in vivo depends on the correlation between body weight and chest circumference, keel length and thigh length. In vivo prediction of carcass components based on single trait is usually discouraged as not reliable (Ogah, 2011).

5- Prediction to edible parts weight:

Concerning prediction of edible parts (EP), their equations are presented in Table 7. Results showed that the body weight at 20 week of age seems to be the major trait in determining edible parts weight (EP). The result of stepwise regression analysis for predicting EP from live weight and linear traits show that BW20 alone accounted for 99 to100% of the variation in edible parts for all equations, this was progressively little improved to 0.999% when BC and KL were included for equationsY12 and BC was a for equationsY13 while BW16, SL and KL were included for last equationsY15. These results base on R^2 change for each independent variable. Generally, all models for predicting edible parts had highly significant F values, high coefficient of multiple regression between the dependent and independent variables and consequently, high R^2 and adjusted R^2 values (P<0.01). Several authors observed that multiple regression models developed to predict lean meat weight are dominated by live weight or carcass weight. In the present findings, prediction of both of the carcass weight and breast weight seems to have been mainly influenced singly by the body weight 82 and 90.2%. Khrosavaria et al. (2006) made similar observation in their study where their R^2 values ranged from 0.99.1 to 0.996 while F values were all highly significant (P<0.001). Wawro (1990) in turkeys, and Kleczek et al. (2006) in Muscovy ducks observed that in vivo estimation of relative carcass content of particular tissue components usually gave low coefficient of multiple correlation and determination compared to absolute weight of breast, leg and total meat and used breast bone crest length, weight and chest girth in males and weight, breast bone crest length and breast thickness in females and the coefficients of determination were 59.29 and 64.14%, respectively. The predicted, difference between the actual and predicted EP and the percentage difference are presented on Table 8. The results showed that respect to absolute and predicted EP, it could be observed that the difference (Y) - (Ỹi) (g and %) for dependent variables Y11, Y12, Y13, Y14and Y15 for all genotypes were generally small and ranged from -2.47 to -0.07g for the absolute weight difference and the range for the percentage difference (in relation to actual (Y) %) was -0.05 to- 0.017%. The small variations (0.03 to 4.16%) between actual and predicted values for the dependent variables were found. Estimated T values between edible parts and both of the independent traits were significant for the four genotypes studied.

The result from this study shows that body weight, shank length, breast width, Keel length and breast circumference at 16 weeks had positive and significantly (P<0.01) high correlation with carcass traits. Similarly, body weight at 16week of age was shown to be a better predictor of the body weight, eviscerated carcass weight and edible parts at 20 week of age. This will help in providing a platform for designing breeding index for improve the two pure varieties of turkey studied and their repeated backcrosses.

Table (1): Mean ($\overline{x}$) ± standard deviation (S.D.) for body weight (g) and body measurements(cm) at16week of age, eviscerated carcass weight and edible parts weight at 20 week of age for the local Black Baladi (BB), White Nicholas (WW) turkey varieties and their repeated backcrosses

Traits	Genotype				Overall Mean
	[1]BB	WW	7/8 W x 1/8 B	7/8 B x 1/8W	
Body weight at 16 week (BW16)	3404^{c}±681	4374.0^{a}±965	4439.0^{a}±759	3970^{b}±762.0	4055.3±908.0
Body weight at 20 week (BW20)	4185^{c}±879	5553.7^{a}±1235	5549.0^{a}±1118	5130.4^{b}±907.0	5112.2±1198.0
Shank length (SL)	15.0^{c}±1.8	16.26^{a}±2.06	16.1^{a}±1.8	15.3^{b}±1.9	15.7±2.0
Keel length (KL)	13.8^{c}±1.4	15.6^{a}±2.00	15.4^{a}±1.6	14.4^{b}±1.6	14.9±1.8
Breast width (BW)	7.7^{c}±1.0	9.09^{a}±1.48	8.6^{b}±1.1	7.4^{c}±0.9	8.3±1.4
Breast circumference (BC)	45.0^{c}±4.6	50.86^{a}±6.81	50.14^{a}±4.9	45.4^{b}± 2.4	48.0±5.7
Eviscerated carcass (CW)	2463^{c}±564	3736^{a}±6.8	3703^{a}±737	3388.6^{b}±661	3328.4±882.0
Edible parts weight (EP)	3353^{c}±747	4774^{a}±1105	4730^{a}±986	3970.5^{b}±762	4303.7±110.0

[1] The first parent of each repeated backcross denote to the sire parent,

- Means in the same row for the different genotypes having different small letters are significant at $p \leq 0.01$.

Table(2): Phenotypic correlation coefficients between body weights , body measurements at 16 weeks of age, live body weight ,eviscerated carcass and edible parts weights at 20 weeks of age for the local Black Baladi (BB), White Nicholas (WW) turkey strains and their repeated backcrosses

Genotype*	Item	BW20	BW16	(SL)	(KL)	(BW)	(BC)	(CW)	(EP)
WW	BW20	1							
	BW16	0.93**	1						
	SL	0.91**	0.91**	1					
	KL	0.90**	0.93**	0.94**	1				
	BW	0.37**	0.32**	0.25*	0.22*	1			
	BC	0.89**	0.88**	0.91**	0.93**	0.26**	1		
	CW	0.99**	0.91**	0.89**	0.88**	0.40**	0.87**	1	
	EP	0.99**	0.35**	0.91**	0.90**	0.38**	0.38**	0.91**	1
7/8W x1/8B	BW20	1							
	BW16	0.91**	1						
	SL	0.92**	0.90**	1					
	KL	0.91**	0.86**	0.93**	1				
	BW	-0.50**	-0.49**	-0.60**	-0.49**	1			
	BC	0.88**	0.80**	0.88**	0.85**	-0.42**	1		
	CW	0.99**	0.92**	0.91**	0.90**	-0.49**	0.85**	1	
	EP	0.99**	0.92**	0.92**	0.92**	-0.51**	0.86**	0.99**	1
7/8Bx1/8W	BW20	1							
	BW16	0.94**	1						
	SL	0.85**	0.89**	1					
	KL	0.78**	0.821**	0.92**	1				
	BW	-0.12	-0.22	-0.2	-0.31*	1			
	BC	0.45**	0.47**	0.49**	0.35**	0.28*	1		
	CW	0.99**	0.93**	0.84**	0.78**	-0.13	0.47**	1	
	EP	0.99**	0.85**	0.85**	0.79**	-0.12	0.47**	0.98**	1

Con. Table (2):

Genotype*	Item	BW20	BW16	(SL)	(KL)	(BW)	(BC)	(CW)	(EP)
BB	BW20	1.00							
	(BW16)	0.91**	1.00						
	(SL)	0.85**	0.75**	1.00					
	(KL)	0.74**	0.67**	0.73**	1.00				
	(BW)	0.30**	0.41**	0.18	0.32**	1.00			
	(BC)	0.89**	0.80**	0.83**	0.84**	0.23*	1.00		
	(CW)	0.99**	0.91**	0.83**	0.72**	0.31**	0.87**	1.00	
	(EP)	1.00**	0.92**	0.84**	0.74**	0.31**	0.31**	0.99**	1.00
Overall genotypes	(BW20)	1.00							
	(BW16)	0.94**	1.00						
	(SL)	0.87**	0.86**	1.00					
	(KL)	0.87**	0.87**	0.89**	1.00				
	(BW)	0.25**	0.26**	0.12*	0.21**	1.00			
	(BC)	0.84**	0.81**	0.82**	0.85**	0.32**	1.00		
	(CW)	0.98**	0.92**	0.81**	0.84**	0.29**	0.80**	1.00	
	(EP)	0.99**	0.94**	0.85**	0.87**	0.27**	0.83**	0.85**	1.00

* The first parent of each repeated backcross denote to the sire parent,
WW= White Nicholas, WB= repeated backcross7/8 W x 1/8 B, BW= repeated backcross7/8 B x 1/8W, BB= local Black Baladi, BW20=body weights (g) at 20 week, BW16=body weights (g) at16week, SL= shank length (cm), KL= keel length (cm), BW= breast width (cm), BC= breast circumference (cm), CW= carcass weight at 20 week and EP= edible parts weight at 20 week.

Table (3): Regression output including regression coefficients, F value, T value**,** R coefficients and predicted functions of dependent variable (Ỹi) (Body weight at 20 week) for the local Black Baladi (BB), White Nicholas (WW) turkey strains and their repeated backcrosses

Genotypes*	Variables	Regression coefficients		F value	T value	Determination coefficients				Functions of dependent variable (Ỹi)
		Unstandardized	Intercept (Constants)			R	R^2	R^2 Change	Adj. R^2	
WW	BW16	0.6500±0.13		175**	5.0***	0.93	0.86	0.86	0.86	Ỹ 1= -2219.5+0.65BW16+256.3 SL+83.9 BW
	SL	256.30±58.90			4.3**	0.95	0.89	0.03	0.89	
	BW	83.9±36.7000	-2219.5±598		2.2**	0.95	0.90	0.09	0.90	
7/8W x1/8B	BW16	0.6±0.10		160**	4.8**	0.92	0.84	0.84	0.84	Ỹ 2= -3857.1+0.62BW16+225.7KL +63.3BC
	BC	63.3±19.8			3.2**	0.94	0.88	0.04	0.88	
	KL	225.7±70.4	-3857.1±598		3.2**	0.95	0.90	0.02	0.90	
7/8Bx1/8W	BW16	1.12±0.06	680.00±252	322 **	17.9**	0.94	0.89	0.89	0.88	Ỹ 3= 680+1.12W
BB	BW16	0.65±0.10.0		181 **	7.2***	0.91	0.83	0.83	0.83	Ỹ 4= -2279.8+0.65BW16+105.24SL +59.12BC
	SL	105.24±37.3			2.8***	0.95	0.90	0.07	0.90	
	BC	59.12±16.0	-2279.8±401		3.7***	0.96	0.92	0.01	0.91	
Overall	BW16	0.88±0.1.00		617 **	4.2**	0.94	0.88	0.88	0.88	Ỹ 5= -1648.68+0.88BW16+36.81BC +91.72 SL
	BC	36.81±8.50			2.4**	0.95	0.90	0.02	0.89	
	SL	91.72±28.40	-1648.68±20		2.9**	0.95	0.90	0.01	0.90	

* The first parent of each repeated backcross denote to the sire parent, WW= White Nicholas, BB= local Black Baladi, BW16= Body weight at 16 weeks (g), SL= shank length (cm), BW= breast width (cm) , BC= breast circumference (cm), KL= keel length (cm) at 16 weeks and Yi= dependent variable body weight at 20 week (g).

Table (4): Mean of actual(Y) and predicted (Ỹi) values of body weight at 20 week, difference and percent difference for the local Black Baladi (BB), White Nicholas (WW) turkey strains and their repeated backcrosses

Dependent variables (Yi)	Genotype*	Actual (Y) body weight	Predicted (Ỹi) body weight	Actual (Y)-Predicted(Ỹi) (g)	In relation to Actual (Y) %
Y1	WW	5553.7	5552.4	1.3	0.02
Y2	WB	5549.3	5550.0	-0.7	-0.01
Y3	BW	5130.4	5127.0	3.4	0.07
Y4	BB	4185.8	4187.2	-1.4	-0.03
Y5	Overall mean	5112.2	5114.13	-1.95	-0.04

*The first parent of each repeated backcross denote to the sire parent, WW= White Nicholas, WB= repeated backcross7/8 W x 1/8 B, BW = repeated backcross7/8 B x 1/8W, BB= local Black Baladi, Yi= dependent variable body weight at 20 week.

Table (5): Regression output including regression coefficients, F value, T value**,** R coefficients and predicted functions of dependent variable (Ỹi) (eviscerated carcass weight) for the local Black Baladi (BB), White Nicholas (WW) turkey strains and their repeated backcrosses

Genotype*	Variables	Regression coefficients		F value	T value	Determination coefficients				Functions of dependent variable (Ỹi)
		un standardized	Intercept (Constants)			R	R^2	R^2 Change	Adj. R^2	
WW	BW16	0.5±0.100			5.6***	0.90	0.82	0.82	0.82	Ỹ6= -1161.9+0.5BW16+42.1BC +72.5BW
	BC	42.1±12.0		126.5**	3.5***	0.92	0.85	0.03	0.84	
	BW	72.5±28.1	-1161.9±397		2.6**	0.93	0.86	0.02	0.86	
7/8W x1/8B	BW16	0.51±0.090		185.4**	5.6***	0.92	0.84	0.84	0.83	Ỹ7= -1850.2 +0.51BW16+212.81KL
	KL	212.81±44.4	-1850.2 ±398		4.8***	0.95	0.89	0.06	0.89	
7/8Bx1/8W	BW16	0.81±0.05	181.10±199	**269.2	16.4***	0.93	0.87	0.87	0.87	Ỹ8= 181.1+0.81W
BB	BW16	0.45±0.07			6.9***	0.90	0.83	0.83	0.82	Ỹ9= -1518.5+0.45BW16+35.67BC +55.52SL
	BC	35.67±11.6			3.1***	0.94	0.88	0.06	0.88	
	SL	55.5227.00	-1518.5±291	138.2**	2.1*	0.95	0.89	0.01	0.89	
Overall mean	BW16	0.81±0.00			4.5***	0.98	0.97	0.97	0.97	Ỹ10= 9.82+0.45BW16+62.70 SL +28.91 BW-10.93 BC+30.89 KL
	SL	-62.70±12.3			3.6**	0.97	0.97	0.01	0.97	
	BW	28.91±7.90			4.8**	0.99	0.97	0.00	0.97	
	BC	-10.93±3.70			2.1*	0.99	0.97	0.00	0.97	
	KL	30.89±13.90	9.82±128.1	1575**	1.1**	0.99	0.98	0.00	0.97	

** The first parent of each repeated backcross denote to the sire parent, WW= White Nicholas, BB= local Black Baladi, W16= Body weight at 16 weeks (g), SL= shank length (cm), BW= breast width (cm), BC= breast circumference (cm), KL= keel length (cm) at 16 weeks and Yi= dependent variable carcass weight (g).

Table (6): Mean of actual (Y) and predicted (Ỹi) values of carcass weight, difference and percent difference for the local Black Baladi (BB), White Nicholas (WW) turkey strains and their repeated backcrosses

Dependent variables (Yi)	Genotype*	Actual (Y) carcass weight	Predicted (Ỹi) carcass weight	Actual (Y)-Predicted(Ỹi) (g)	In relation to Actual (Y) %
Y6	WW	3736.9	3739.5	-2.6	-0.07
Y7	W B	3703.4	3704.12	-0.7	-0.02
Y8	B W	3388.6	3243.83	144.2	4.26
Y9	BB	2463.1	2464.47	-1.4	-0.06
Y10	Overall mean	3328.4	3328.20	0.23	0.007

* The first parent of each repeated backcross denote to the sire parent, WW= White Nicholas, WB= repeated backcross7/8 W x 1/8 B, BW= repeated backcross7/8 B x 1/8W, BB= local Black Baladi, Yi= dependent variable carcass weight.

Table (7): Regression output including regression coefficients, F value, T value**,** R coefficients and predicted functions of dependent variable (Ỹi) (edible parts weight) for the local Black Baladi (BB), White Nicholas (WW) turkey strains and their repeated backcrosses

Genotype*	Variable	Regression coefficients		F value	T value	Determination coefficients				Functions of dependent variable (Ỹi)
		un standardized	Constants			R	R^2	R^2 Change	Adj. R^2	
WW	BW20	0.89±0.01	-182.72±41	14698*	121.2**	0.998	1.00	1.00	1.00	Ỹ11= -182.72+0.89 BW20
7/8W x1/8B	BW20	0.9±0.04		1251**	2.7***	0.993	0.990	0.990	0.994	Ỹ12= -34.9+0.9 BW20-19.5 BC + 0.9 KL
	BC	-19.5±7.20			2.2**	0.994	0.995	0.005	0.994	
	KL	0.9±25.3	-34.90±271		5.7*	0994	0.999	0.004	0.999	
7/8Bx1/8W	BW20	0.9±0.01		4659**	85.2***	0998	1.000	1.000	1.000	Ỹ13= -633.5+0.9 BW20+8.7 BC
	BC	8.7±4.02	-633.5		2.2*	0.998	1.000	0.00	1.000	
BB	BW20	-194.47±37 0.85±0.01	-633.5±165	9441**	97.2***	0.997	1.000	1.000	0.990	Ỹ14= -194.47+0.85 BW20
Overall	BW20	0.92±0.010		5827**	12.5***	0.995	0.990	0.990	0.990	Ỹ15= -394.38+0.92 BW20+15.14 BW - 34.29 SL+25.98 KL
	BW	15.14±5.59			3.2*	0.995	0.991	0.001	0.991	
	SL	-34.29±8.87			4.9*	0.995	0.996	0.001	0.996	
	KL	25.98±9.63	-394.38±90		5.5**	0.996	0.999	0.003	0.999	

*The first parent of each repeated backcross denote to the sire parent, WW= White Nicholas, BB= local Black Baladi, BW16= body weight at 16 weeks (g), SL= shank length (cm), BW= breast width (cm), BC= breast circumference (cm), KL= keel length (cm) at 16 weeks and Yi= dependent variable (edible parts).

Table (8): Mean of actual(Y) and predicted (Ỹi) values of (edible parts weight), difference and percent difference for the local Black Baladi (BB) White Nicholas (WW) turkey strains and their repeated backcrosses

Dependent variables (Yi)	**Genotype***	**Actual (Y) edible parts**	**Predicted (Ỹi) edible parts**	**Actual (Y)-Predicted(Ỹi) (g)**	**In relation to Actual (Y) %**
Y11	WW	4774.3	4776.77	-2.47	-0.05
Y12	WB	4730.1	4732.07	-1.97	-0.04
Y13	BW	4321.0	4319.1	1.85	0.04
Y14	BB	3353.1	3355.08	-1.98	-0.06
Y15	Overall	4303.7	4303.77	-0.07	-0.0017

*The first parent of each repeated backcross denote to the sire parent, WW= White Nicholas, WB= repeated backcross7/8 W x 1/8 B, BW = repeated backcross7/8 B x 1/8W, BB= local Black Baladi, Yi= dependent variable (edible parts weight).

RFERENCES

Alkan.S. K.Karaby; A. Gahi; T.Karshi; and M.S. Balcioglu (2010). Determination of body weight and some carcass traits in Japanese quails of different lines Kafkas Uni.Vet. Fak. Derg 16 (2): 277-280.

Amin, E.M. (2003). Direct and correlated responses to selection index for growth traits in turkey. Ph.D. Thesis, Fac. of Agric, Alex, Univ., Egypt.

Amin, E.M. (2014). Effect of repeated backcrossing for two generations between the local Black Baladi and White Nicholas turkeys on carcass traits. Egypt. Poult. Sci. 34 :(635-654)

Assan, N. (2013). Bioprediction of body weight and carcass parameters from morphometric measurements in livestock and poultry Scientific Journal of Review 2(6): 140-150.

Asmundson, V. S. (1942). Crossbreeding and heterosis in turkeys.Poult.Sci.27: 695- 708.

Bassano, B.; D.Bergero; A.Peracino (2001). Accuaracy of body weight prediction. J. Anim. Physiol. Anim. Nutr. 87:79-75.

Bharat, M.; C.Singh; and N.R.Chowdry (2008). Prediction of body weight. Ind. J. Anim. Res. 42, 116.

Banrjee, S. (2011). Prediction of Carcass Cuts usingsomenon Invasive Predictors on Broiler Ducks Reared in Hot and Humid Climate of Eastern India. World Applied Sciences Journal 12 (5): 642-651, 2011.

Bochno R.; J. Rymkiewicz; and M. Janiszewska (1999a). Multiple regression equations for the estimation of the content of breast muscles in White Italian geese. In Proc.12th European Symp. Waterfowl, Adana, Turkey. pp 83-89.

Bochno, R.; J. Rymkiewicz; and M. Janiszewska (1999b). Regression equations for the estimation of the meat and fat content in broiler carcasses. J. Anim. Feed Sci. 8:73–80.

Bochno, R.; J. Rymkiewicz; and M. Janiszewska (2000a). Use of an ultrasonic device for in vivo estimation of the breast muscle weight in chilled geese carcasses. Anim. Sci. Pap. Rep. 18: 127-135.

Bochno, R.; J. Rymkiewicz; and J. Szeremeta (2000b). Regression equations for in vivo estimation of the meat content of Pekin duck carcass. Br. Poult. Sci. 41:313–317.

Bochno, R.; J. Rymkiewicz; E.Wawro and J.Rymkiewicz, (1997). Regression equations for estimating content of lean and fat in the carcasses of mule ducks.Proc. 11th European Symp.Waterfowl, Nantes, France.

BIG 9, (2012). Commercial performance goals B.U.T.Aviagen Turkeys website. Aviagen Turkey Ltd.Chowley Five, Chowley Oak Business Park, tattenhall, Cheshire, CH3 9GA UK. Atwww.aviagen.com. Accessed September, 2012.

BUT, British United Turkeys (2005). Commercial Performance Goals.5th ed. British United Turkeys Ltd, Warren Hall, Broughton, UK.

Chaterjee, S.; A.S.hadi; B. Price (2000). Regression analysis by example. John Willey & Sons, Inc., New York. Aragonesa lambs. Small Ruminant Research, 20:267-274.

El-Naggar, N. M.; M.M. Sharaf; and M.A Mandour (1992). Relationship of carcass yields and somebody measurements in different turkey strains. Egypt. Poult. Sci. 12:145-164.

Gueye, E.F.; A. Ndiaye; and R. D. S. Branckaert (1998). Prediction of body weight on the basis of body measurements in mature indigenous chickens in Senegal. Livestock Research for Rural Development 10: http://www.cipav.org.co/lrrd10/ 3 sene103.htm.

Isguzar, E. (2003). Growth, carcass traits and meat quality of Bronze and White turkeys in Isparta province of Turkey. Arch. Tierz. 46: 473-481.

Kleczek, K.; K. Wawo; E. Wilkiewicz-Wawro; and W.Makowski (2006). Multiple regression equations to estimate the content of breast muscle, meat and fat in Muscovy ducks. Poultry Sci. 85:1318-1326.

Keskin, S.; I. Daskiran; and A. Kor (2007). Factor analysis scores in a multiple linear regression model for the prediction of carcass weight in Akkeci kids. J. Appl. Anim Res 31: 201-204.

Kleczek, K.; E. Wilkiewicz; K. Wawro; and W. Makowski (2007). Effect of body weights of day old Muscovy ducklings on growths and carcass Traits. Arch Tierz Dummerstorf 50: 204-213.

Khosravinia, H.; N.H.N. Murphy; and M.G Govindaiah (2006). Imposing restriction in selection for disproportionate cut-up carcass yield in an experimental flock of broiler chicken. J. Poult. Sci. 43:109-119.

Mostafa, M.Y. (1997). Genetically studies on turkey “Selection for specific gravity of live bird in turkey” Ph. D. Thesis, Fac. of Agric., Kafr Elsheikh, and Tanta Univ., Egypt.

Mostafa, M.Y.; and R.Y, Nofal (2000). Effect of crossing two breeds of turkey on live body measurements, growth performance and livability. Egypt. Poult. Sci. 20:239-252.

Michalik, D.; R. Bochno; A. Lewczuk; R. Gilewski; W. Brzozowski; and E. Wilkiewicz-Wawro (2002). Multiple regression equations for in vivo estimation of the content of meat and skin with fat in turkey carcasses. Pol. J. Nat. Sci. 12: 109-118.

Mendeş, M. (2009). Multiple linear regression models based on principal component scores to predict slaughter weight of broiler. Arch. Geflügelk. 73 (2):139-144.

Mendeş, M.; A. Karabayir; I. E. Ersoy; and T. Savas (2005). The relationship among pre and post slaughter traits of American Bronze Turkey. Arch Tierz Dummerstorf 48:283-289.

Musa, H.H.; G.H.Chen; J. H. Cheng; B.C.Li; and D.M. Mekki (2006). Study on carcass characteristics of chicken breeds raised under the intensive conditioning. J. Poult. Sci. 5(6): 530-533.

Ogah, D.M. (2011). In vivo prediction of live weight and carcass traits using body measurements in indigenous guinea fowl.Bio. Anim. Husb. 27(4): 1827- 1836.

Ojedapo, L.O.; T.A. Adedeji‘T.B. Olayeni; O.S. Adedeji; A.R. Abdullah; and O.O. Ojebiyi (2007). Influence of age and sex on body weight and somebody linear measurements of extensively reared wad goats in derived savannah zone of Nigeria. J. Anim. Vet. Adv. 6(1):114- 117.

Pinto, L. F. B.; I. U. Dacker; C. M. R. De melo; M. C.Ledur; and L. L. Coutinho (2006). Principal components analysis applied to performance and carcass traits in the chicken. Anim Res 55: 419-425.

Raji, A.O.; J.Aliyu; and J.UIgwebuike (2009). In Vivo Estimation of Carcass Components from Live Body Measurements of the Japanese quail (Cortunix Cortunix Japonica) ARPN Journal of Agricultural and Biological Science.

Raji, A.O.; J.Aliyu; J.U Igwebuike; and D.K Ibrahim (2010). Regression models for estimating breast, thigh and fat weight and yield of broilers from non invasive body measurements .AGRICULTURE AND BIOLOGY JOURNAL OF NORTH AMERICA. Online: 2151-7525.

Ramkrishna, R.S.; F.R. Sheriff; and G. Raj Manohar (2012). Growth performance and carcass yields as influenced by age and sex in different turkey varieties. Tamilnadu J. Veterinary & Animal Sciences 8 (2): 94-100.

Roberson, K.D.; J.L. Kalbfleisch; and D. Dransfield (2003). Comparison of growth performance and carcass component yield of a new strain of Tom turkeys to other commercial strains. International Journal of Poultry Science 3: 791-795.

Rymkiewicz, J.; and R. Bochno (1999). Estimation of breast muscle weight in chickens on the basis of live measurements. Arch. Geflugelkd. 63:229–233.

SAS, Institute (1992). SAS User's Guide. Statistics. SAS Institute Inc. Cary NC. U.S.A.

Shahin, K. A. (1999). Sources of shared variability in meat weight distribution and conformation in Pekin ducklings. Ann Zootech 48: 143-150.

Teguia, A.; H.M. Ngandjou, H. Defang; and J Tchoumboue (2008). Study of the live body weight and body characteristics of the African Muscovy Duck (Cairinamoschata). Trop Anim Health Prod10:40-50.

Yakybu, A.; D. kuje; and M. Okpeku (2009). Principal component as measures of size and shape in Nigeria indigenous chicken. Thai J. Agric. Sci. 42(3): 167-176.

Yakubu, A.; S.A.Okunsebor; A.A. Kiqbu; A.O.Sotolu; and T.D.Imqbian (2012). Use of factors scores for predicting body weight from some morphometric measurements of two fish species in Nigeria. J. Agric. Sci. 4(1): 60- 64.

Vali, N.; M.A. Edriss; and H.R. Rahmani (2005). Genetic Parameters of Body and Some Carcass Traits in Two Quail Strains. Int. J. Poult. Sci. 4(5): 296-300.

Wawro, K. (1990). Usefulness of body weight and size for evaluation of breeding value of turkeys alive. Acta Acad. Agric. Tech. O1st Zoot. Suppl. C. 33: 3-54. (In Polish). Animal Production 31: 315-319.

Zerehdaran, S.; A. L. J. Vereijken; J.A.M. van Arendonk; and E.H. van derWaaij (2004). Estimation of genetic parameters for fat deposition and carcass traits in broilers. Poult. Sci. 83:521–525.Zuidhof, M.J. (2005). Mathematical Characterization of Broiler Carcass Yield Dynamics. Poult. Sci. 84:1108–1122.

الملخص العربي

إستخدام نماذج الإنحدار المتعدد المتدرج للتنبؤ بوزن الجسم وبعض صفات الذبيحة من بعض مقاييس الجسم في عمر مبكر للرومى

د/ عماد محمد أمين

مركز بحوث الصحراء – وزارة الزراعة- مصر

الهدف من هذة الدراسة هو تقيم العلاقة بين مقايس الجسم الحى وصفات الذبيحة . تم أستخدام نماذج الأنحدار الخطى للتنبؤ بوزن الجسم الحى و بعض صفات الذبيحة فى الرومى المحلى البلدى الأسود (BB) و النيوكلس الأبيض (WW) و الخليط الرجعى بينهما. وقد أستخدم معامل إرتباط بيرسون لتحديد معامل الأرتباط البسيط بين كل من صفات وزن الجسم الحى، قياسات الجسم عند ١٦ أسبوع من العمر و وزن الجسم ومكونات الذبيحة (وزن الذبيحة CW والأجزاء الصالحة للأكلEP) عند ٢٠ أسبوع من العمر. وقد تم إستخدام معادلات الإنحدار المتعدد المتدرج للتنبؤ بكل من الوزن الحي ووزن الذبيحة ووزن الأجزاء المأكولة من الذبيحة عند ٢٠ أسبوعا من العمر بأستخدام وزن الجسم وكذلك بعض قياسات جسم الطائر عند عمر ١٦أسبوع لإنتاج أفضل نموذج إنحدارلكل متغيرإعتماداً على قيمة معامل الانحدار. وأظهرت نتائج التحليل الإحصائى أن الفروق بين متوسطات الصفات المدروسة للتراكيب الوراثية المختلفة مثل وزن الجسم عند عمر١٦و ٢٠أسبوع (BW16 وBW20) ، طول الساق (SL)، وطول عظمة القص (KL)، عرض الصدر(BW)، ومحيط الصدر(BC) وأيضا وزن الذبيحة (CW) والأجزاء الصالحة للأكل(EP) كانت معنوية (P <0.01) وتأثرت بالخلط الرجعى٠ بالنسبة لقيم معاملات الإرتباط البسيط بين وزن الجسم عند ٢٠أسبوعا من العمر، وقياسات الجسم (SL، KL،BW و BC) وكل من قياسات الذبيحة (CW و EP) كانت موجبة و مرتفعة ذات معنوية عالية بين معظم الصفات المدروسة حيث تراوح معامل الارتباط من ٠.٢٥الى ٠.٩٩للتراكيب الوراثية الأربعة (بأستثناء BW لكل من الخليطين الرجعيين حيث كانت معاملات الارتباط سالبة وذات قيمة منخفضة)٠ أوضحت نتائج معامل الأنحدار المتعدد المتدرج أن وزن الجسم عند عمر١٦أسبوع يبدو أنه العامل الرئيسى في

تحديد التنبؤ بقيمBW20 ، CW و EP إعتماداً على أرتفاع معاملا التحديد المعدل (adjusted R^2) كما هو مبين في كل المعادلات. هذه النتائج تعتمد على التغيير فى قيم معامل التحديد R^2 لكل متغير مستقل. بصفة عامة كل نماذج التنبؤ للثلاث متغيرات التابعة كانت ذات معنوية عالية لقيم F وإرتفاع معاملات الأنحدارالمتعدد بين المتغيرات التابعة والمستقلة نتيجة إرتفاع قيم معامل التحديدR2 و معامل التحديد المعدل٠ وقد بلغت قيم R^2 , adjusted R^2, R للثلاث معدلات للتنبؤ بصفات BW20 ,CW, EP (٠.٩٠,٠.٩٤ و٠.٩٠ على التوالى لصفة BW20 وكانت ٠.٩٨و٠.٩٨ و٠.٩٧ على التوالى لصفة CW٠ وأخيراً كانت الثلاث مقاييس السابقة بالنسبة لصفة EP متساوية (٠.٩٩٩). أما بالنسبة للفروق بين القيم الحقيقية و المتنبأ بها لصفاتCW ، BW20 وEP و النسب المئوية للفروق بينهما الخاصة بالمتغيرات التابعة فإن قيم المتوسط العام الخاص بالتراكيب الوراثية بصفة عامة منخفضة وتراوحت بين -١.٩٥ الى ٠.٢٣ جم للفرق بين الوزن الحقيقى و المتنبأ به وتراوحت بين -٠.٠٤ و٠.٠١٧% للفروق بين النسب المئوية (كنسبة من القيم الحقيقية)٠ يمكن أن نستخلص مما سبق أن وزن الجسم عند ١٦ أسبوع يعتبر مؤشراًجيداً للتنبؤ بوزن الجسم وصفات الذبيحة والأجزاء الصالحة للأكل عند عمر ٢٠ أسبوع من العمر مما يساعد في إعداد برنامج يكون دليل تربية عند التحسين في سلالتى الرومى المحلى الأسود والنيكولاس الأبيض والخليط الرجعى بين كل منهما.