PREDICTION OF LIVE BODY WEIGHT THROUGH BIRD AGE AND/OR SHANK LENGTH IN DIFFERENT FOWL TYPES

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ABSTRACT:

This study was designed to describe and to fit linear statistical models to predict live body weight (LBW) through shank length (SL) and LBW or SL through bird age in three breeds of chickens: Fayoumi (PP), Golden Montazah (GM) and Dandarawi (Dand) and two breeds of ducks: Pekin and Moscuvy and Japanese quail . The data of SL in 'mm' and LBW in grams were collected from each bird in biweekly intervals up to 12 weeks of age for chickens , ten weeks for ducks and up to 6 weeks of age for quail.

The following results were obtained

1. There was a definite relationship ($P \leq 0.001$) between LBW and SL for all studied sex groups, except for Moscuvy males. SL was positively correlated with LBW ranging from 0.794 to 0.977.
2. As SL increased by one mm for studied groups, LBW progressively ($P \leq 0.001$) increased ranging from 9.12g (Dandarawi males) to 55.41g (Pekin females), indicating that 63% to 95.5% of the variation in LBW were explained by SL.
3. The cubic form had higher value for coefficient of determination 'R^2' and lower standard error of estimate 'SE' than quadratic, logarithmic and exponential models in Moscuvy males. The cubic and quadratic forms had the best fit for predicting LBW from SL for ducks males, regardless of ducks breed.
4. Age in days significantly increased ($P \leq 0.001$) LBW of different types of fowl of both sexes or each sex separately. All groups showed positive regression coefficient ranging from 4.320g/one-day in case of Japanese quail males to 59.499g/ one-day in case of Moscuvy males.
5. Regardless of breed, males of both chickens and ducks had higher regression coefficients than their females. On the contrary, females in the case of Japanese quail showed higher rate of increase of LBW as influenced by age than their males.
6. Similarly, trends of positive significant influence of age in days on SL in millimeters but lower in magnitude than LBW were observed in most studied groups or sex groups.
7. There were definite relationships between LBW and SL and bird age significantly affected either LBW or SL. Comparing 'R^2' of fitted equations indicated that linear model was found to be suitable for predicting LBW through bird age (with R^2 ranging from 0.809 to 0.966) or SL (with R^2 ranging from 0.630 to 0.955).
8. In the absence of age, shank length can be used to predict live body weight.

Key Words: Prediction -Live body weight - Age - Shank length – Fowl.

INTRODUCTION

The development of a broiler industry requires knowledge of the genetic aspects of growth pattern for different breeds and lines and their hybrids so that they might be selected for specific types of production **(Knizetova *et al.*, 1994)**. Breed differences in six breeds of chickens were detected by **Jaap and Thomson (1940)** for the ratio between shank length (SL) and live body weight (LBW). **Wise (1970)** noted that broilers had similar proportions by weight of the various body parts as layers when compared at the same weight, however, broilers had shorter bones and more compact body parts. But not much work had been undertaken to predict LBW from SL in other types of poultry.

The use of live body measures as indicators of conformation were advocated by **Jaap and Penquite (1938)**. Various investigations conducted to find out the correlation between LBW and SL in poultry. **Kanoun (1984)** tried to predict LBW of chicken through body measurements. **Verma *et al.* (1977)** and **Tierce and Nordskog (1985)** and **Sunanda *et al.* (1991)** used different statistical models to predict LBW from SL of Desi ducks and regression equations were fitted for predicting LBW from SL in ducks. Similarly, **Shanawany and Morris (1992)** reported that body weight linearly related to shank length of chickens. Many of the body measurements including SL are good indicators of skeletal size **(Chambers, 1993 and El Full and Farahat, 2004)**. Several investigators reported that SL had generally high positive genetic and phenotypic correlations with various economic traits (**Petek *et al.*, 2000**,**Singh *et al.*, 2001** and **Kumar *et al.*, 2002)**. Therefore, shank length affected the layer performance and would be a very useful method for estimating pullet value.

Models, which are nonlinear in the parameters, are intrinsically linear if a transformation will make them linear, logarithmic and exponential curves are typical examples as illustrated by **Steel and Torrie (1981)**.

This study was initiated to describe and to fit linear statistical models to predict LBW through SL in six genetic groups of Japanese quail, ducks and Egyptian chickens and to predict LBW or SL through bird age.

MATERIALS AND METHODS

This work was carried out in the Poultry Research Station, Poultry Production Department, Faculty of Agriculture at Fayoum, Cairo University during the period from August 2002 to November 2003. All chicks were wing-banded, immunized for Marek's disease immediately after hatching and brooded in floor brooders. The appropriate feeding, vaccination and management practices were kept uniform as possible throughout the experimental period for each type of fowl throughout the experimental period. Chickens fed the same recommended standard diets that appropriate for each type and age. Feed and water were offered *ad lib.* The minerals and vitamins were adequately supplied to cover the requirements according to the **Egyptian Ministerial Decree No. 1498 (1996)** and **NRC (1994)**.

This study was initiated using the following numbers of different genetic stocks:

Fowl type	**Males**	**Females**	**Males + Females**
Chickens:			
Fayoumi ,PP	999	1070	2069
Golden Montazah, GM	844	905	1749
Dandarawi , Dand	1323	1510	2833
All chickens	3166	3485	6651
Pekin ducklings	62	65	127
Moscuvy ducklings	72	88	160
All ducks	134	153	287
Japanese quail	133	141	274
Total fowl types	3433	3779	7212

PP: A line of Fayoumi selected for high egg production in the first 90 days of production .

The data of SL in 'mm' and LBW in grams were collected from each bird in biweekly intervals up to 12 weeks of age for chickens, ten weeks for ducks and up to 6 weeks of age for quail.

This study was initiated using shank growth of different types of fowl for predicting live LBW traits. Separate growth models were presented for both sexes together and for each sex separately. The following regression models were used:

No.	**Model**	**Description**
1	**Polynomial linear models**	
1.1.	Linear 1	$Y = b0+(b1*X)$. Where 'Y': is the predicted LBW, 'X': is the SL, 'b0' and 'b' are the constants to be determined through method of least squares.
1.2.	Linear 2	$Y= b0+ b1^{*} (X)$. Where 'Y': is the predicted LBW, 'X': is the bird age, 'b0' and 'b' are the constants to be determined through method of least squares.
1.3.	Linear 3	$Y= b0+ b1^{*} (X)$. Where 'Y': is the predicted SL, 'X': is the bird age, 'b0' and 'b' are the constants to be determined through method of least squares.
2	Quadratic	$Y= b0+(b1^{*}X)+ (b2*X^{**2})$. This model can be used to model a series which "takes off" or a series which dampens.
3.	Cubic	$Y= b0+(b1^{*}X)+ (b2*X^{**2})+ (b3*X^{**3})$.
4.	Nonlinear models	
4.1.	Logarithmic	$Y= b0+(b1^{*}\ln (X))$.
4.2.	Exponential	$Y= b0^{*}(e^{**(b1*X)})$ or $\ln(Y)= \ln (b0) + (b1^{*}X)$.

In order to compare the relative efficiency of various growth curve models and to select the most suitable curve, the following two criteria were used. One is the coefficient of determination (R^2) and the other is standard error (SE). A larger value of R^2 and smaller value on SE indicate best fit of the curve.

RESULTS AND DISCUSSION

Analyses of variance of both LBW and SL between males and females were applied for each age within each studied group or type. The results showed a significant sex effect favoring males than females for either LBW or SL at all ages studied in PP, Dand, GM and Moscuvy ducks (except for SL at 14 days of age). However, no significant differences were found between LBW of males and females for Pekin ducks at all ages and Japanese quail at 14 and 28 days of age. Females of Japanese quail showed significantly (P≤0.01) heavier LBW at 42 days of age than males.

As shown in Figure 1, males had heavier LBW (P≤0.01) for all chickens at all ages studied and all ducks, except for 14 days of age than females regardless of breed. Whereas, except for LBW at 42 days of age, Japanese quail showed no significant differences between LBW or SL of males and females as shown in Table 1.

Table 1. Means of live body weight (g) and shank length (mm) for different types of fowl at different ages.

Group	Age , days	Males		Females		Males + Females	
Chickens:		LBW	SL	LBW	SL	LBW	SL
Fay, PP	28	215.69A	53.84 a	196.25B	51.18 b	205.97	52.51
	56	485.56 A	75.95 a	418.89 B	70.64 b	452.23	73.29
	84	803.66 A	93.76 a	650.63 B	84.41 b	727.14	89.08
Dand	28	181.49 A	50.89 a	161.61 B	47.89 b	171.55	49.39
	56	504.14 A	78.51 a	420.02 B	71.98 b	462.08	75.24
	84	813.97 A	96.01 a	653.19 B	85.79 b	733.58	90.90
G M	28	278.68 A	57.86 a	251.90 B	54.91 b	265.09	56.38
	56	802.21 A	90.88 a	660.39 B	84.23 b	731.30	87.56
	84	1279.70 A	110.29a	1032.69 B	99.38 b	1156.19	104.84
Ducks:							
Pekin	14	240.64 A	47.50 a	271.63 A	49.80 a	258.58	48.80
	28	1060.88A	73.30 a	1078.45A	70.70 a	1071.05	71.80
	42	1622.88A	80.00 a	1559.91A	72.40 b	1586.42	75.60
	56	2156.88A	80.80 a	2010.91A	75.30 b	2072.37	77.60
	70	2295.37A	89.10 a	2093.73A	79.30 b	2178.63	84.20
Moscuvy	14	278.87A	44.60 a	243.93B	43.50 a	253.75	43.90
	28	828.77A	72.10 a	685.29B	62.20 b	725.60	67.80
	42	1402.65A	81.00 a	1315.82B	76.60 b	1340.22	78.80
	56	2470.88A	96.30 a	2094.08B	80.90 b	2199.96	88.10
	70	3590.32A	100.80 a	2827.38B	93.70 b	3041.76	95.70
Japanese Quail							
	14	43.58A	27.60 a	47.57 A	28.71a	45.57	28.15
	28	112.57 A	38.73 a	119.27 A	38.71a	115.92	38.72
	42	175.72 B	40.53 a	189.86 A	40.41a	182.79	40.47

A and B: mean values of LBW in the same age within the same group followed by different superscripts are significantly different at P≤ 0.01, a and b: mean values of SL in the same age within the same group followed by different superscripts are significantly different at P≤ 0.01.

The linear equation of the form $\hat{Y} = a + b X$ was fitted to predict the average LBW (grams) from the average SL (mm) of different types of fowl. The values of the parameter ‘a’ and ‘b’, ‘r’, ‘R^2’ and fitted equations were given in Table 2.

Fig.

Table 2. The parameters, coefficient of determination (R^2) of LBW when the linear equation $\hat{Y}$= a +b X was used for predicting the average body weight in grams ($\hat{Y}$) from average SL in mm (X) of different types.

Group	Sex	a	b	r	R^2	Sig.	Fitted equation
Chickens:							
Fay, PP	M	-575.579	14.421	0.966	0.933	***	$\hat{Y}$ = -575.579+ 14.421 X
	F	-498.608	13.333	0.961	0.924	***	$\hat{Y}$ = -498.608+ 13.333 X
	M+F	-540.159	13.947	0.965	0.930	***	$\hat{Y}$ = -540.159+ 13.947 X
Dand	M	-185.538	9.122	0.794	0.630	***	$\hat{Y}$ = -185.538+ 9.122 X
	F	-446.352	12.515	0.962	0.926	***	$\hat{Y}$ = -446.352+ 12.515 X
	M+F	-292.595	10.407	0.861	0.741	***	$\hat{Y}$ = -292.595+ 10.407 X
G M	M	-814.493	18.546	0.977	0.955	***	$\hat{Y}$ = -814.493+ 18.546 X
	F	-690.090	16.833	0.970	0.941	***	$\hat{Y}$ = -690.090+ 16.833 X
	M+F	-767.883	17.916	0.974	0.949	***	$\hat{Y}$ = -767.883+ 17.916 X
All chickens	M	-485.962	13.662	0.938	0.880	***	$\hat{Y}$ = -485.962+ 13.662 X
	F	-576.065	14.726	0.956	0.914	***	$\hat{Y}$ = -576.065+ 14.726 X
	M+F	-528.183	14.129	0.912	0.832	***	$\hat{Y}$ = -528.183+ 14.129 X
Ducks:							
Pekin	M	-2198.427	51.447	0.850	0.722	***	$\hat{Y}$ = -2198.427+51.447X
	F	-2442.928	55.410	0.845	0.714	***	$\hat{Y}$ = -2442.928+55.410X
	M+F	-2286.749	52.898	0.848	0.718	***	$\hat{Y}$ = -2286.749+52.898X
Moscuvy	M	1805.361	0.125	0.040	0.002	NS	
	F	-1531.427	38.893	0.897	0.805	***	$\hat{Y}$ = -1531.427+38.893X
	M+F	1468.992	0.273	0.071	0.005	NS	
All ducks	M	1676.031	0.178	0.051	0.003	NS	
	F	-1609.286	40.967	0.863	0.744	***	$\hat{Y}$ =-1609.286+ 40.967X
	M+F	1446.367	3.831	0.079	0.006	**	$\hat{Y}$ = 1446.367+ 3.831 X
Japanese Quail	M	-178.658	8.121	0.884	0.872	***	$\hat{Y}$ = - 178.658 + 8.121 X
	F	-231.154	9.740	0.869	0.755	***	$\hat{Y}$ = - 231.154 + 9.740 X
	M+F	-203.512	8.900	0.871	0.759	***	$\hat{Y}$ = - 203.512 + 8.900 X

Sig: significance, **: significantly different at $P\leq 0.01$,***: significantly different at $P\leq 0.001$, NS: not significant.

The significance of regression and correlation coefficients showed that there were definite relationships ($P\leq0.001$) between LBW and SL for all studied sex groups of chicken breeds, Pekin ducks and Moscuvy females, except for Moscuvy males (Table 2). SL was positively correlated with LBW ranging from 0.794 to 0.977 as shown in Table 2. Similar trends of using SL measurements for predicting LBW were reported in chickens **(Kanoun, 1984)**, Desi ducks **(Verma *et al.*, 1977, Tierce and Nordskog, 1985 and Sunanda *et al.*, 1991)**. Moscuvy males had lower insignificant ($P>0.05$) coefficient of determination than females of the two groups. However, as SL increased by one mm for other studied groups (chickens, ducks and Japanese quail), LBW progressively ($P\leq0.001$) increased ranging from 9.122g (Dand' males) to 55.410g (Pekin females). The corresponding R^2 which ranged from 0.630 to 0.955. In other words, SL positively increased LBW of these groups indicating that SL explained 63% to 95.5% of the variation in LBW.

The values of the parameters 'a', 'b', coefficient of determination 'R^2', standard error of estimate 'SE' and fitted equations when polynomial linear form (quadratic and cubic forms), logarithmic and exponential forms were used for predicting LBW from SL were given in Table 3. Moscuvy males had higher R^2 and lower SE for polynomial models than logarithmic model. Similarly, the cubic form was better than the quadratic, logarithmic and exponential forms for predicting LBW from SL for ducks males, regardless of ducks breed. Because the value of R^2, when cubic was used, was high and standard error of estimate was low as shown in Table 3.

It can be concluded that the cubic form was the best fit for predicting LBW from SL for either Moscuvy males and ducks males, regardless of ducks breed.

Age in days significantly increased ($P \leq 0.001$) LBW of different types of fowl of both sexes or each sex separately. All groups showed positive regression coefficient which ranged from 4.320g/one-day in case of Japanese quail males to 59.499g/ one-day in case of Moscuvy males. It can be seen that GM 'males, females and both sexes showed higher 'b's' (15.405, 12.309 and 13.911g) than either those of PP or Dand. Regardless of breed, males of both chickens and ducks had higher b's than their females. On the contrary, females in the case of Japanese quail showed higher rate of LBW increase as influenced by age than their males as shown in Table 4.

Table 3. The parameters, coefficient of determination (R^2) and standard error of estimate (SE) of LBW when the polynomial or nonlinear equations were used for predicting the average body weight in grams ($\hat{Y}$) from average SL (X) in mm for males of either Moscuvy or all ducks.

Curve type	a	B	R^2	SE	Sig.	Fitted equation
Moscuvy duck Males						
Polynomial models:						
Quadratic	-2366.172	529.089 -0.745	0.746	619.113	*** ***	$\hat{Y}$ = -2366.172+529.089SL-0.745SL^2
Cubic	-2332.548	518.619 -0.001	0.747	617.883	*** ***	$\hat{Y}$ = -2332.548+518.619SL-0.001SL^3 (SL^2 was not entered because tolerance limits reached)
Nonlinear models:						
Logarithmic model	-2624.033	2165.687	0.428	927.076	***	$\hat{Y}$ = -2624.033+2165.687 log SL.
Exponential model	1297.424	0.0018	0.005	0.906	NS	
All duck males						
Polynomial models:						
Quadratic model	-2286.386	52.273 -0.007	0.747	558.423	*** ***	$\hat{Y}$ = -2286.386+52.273SL - 0.007SL^2
Cubic model	-2252.156	51.235 -1.03 E^{-06}	0.748	557.571	*** ***	$\hat{Y}$ = -2252.156+51.235SL -1.03$^{E.06}$$SL^3$ (SL^2 was not entered because tolerance limits reached)
Nonlinear models:						
Logarithmic model	-8217.617	2296.956	0.467	809.628	*** ***	$\hat{Y}$ = -8217.617+2296.956 log SL.
Exponential model	1246.007	0.0002	0.005	0.872	*	$\hat{Y}$ = 1246.007+$(0.0002)^{SL}$

Sig.:significance,*:significantly different at $P \leq 0.05$,***: significantly different at $P \leq 0.001$, NS: not significant

Table 4. The parameters, coefficient of determination (R^2) of LBW when the linear equation $\hat{Y}$= a +b X was used for predicting the average LBW in grams ($\hat{Y}$) from age in (X) of different types.

Group	Sex	a	b	r	R^2	Sig.	Fitted equation
Fayoumi, PP	M	-12.773	9.218	0.946	0.895	***	$\hat{Y}$ =-12.773 + 9.218 X
	F	1.855	7.398	0.943	0.889	***	$\hat{Y}$ = 1.855 + 7.398 X
	M+F	- 6.084	8.327	0.935	0.873	***	$\hat{Y}$ = -6.084 + 8.327 X
Dandarawi	M	-26.252	9.671	0.962	0.926	***	$\hat{Y}$ =-26.252 + 9.671 X
	F	- 8.974	7.694	0.960	0.921	***	$\hat{Y}$ =- 8.974 + 7.694 X
	M+F	-17.043	8.617	0.948	0.899	***	$\hat{Y}$ =-17.043 + 8.617 X
Golden Montazah	M	-52.334	15.405	0.982	0.964	***	$\hat{Y}$ =-52.334 + 15.405X
	F	-25.524	12.309	0.983	0.966	***	$\hat{Y}$ =-25.524 + 12.309X
s	M+F	-39.397	13.911	0.970	0.940	***	$\hat{Y}$ =-39.397 + 13.911X
All chickens	M	-32.40	11.315	0.912	0.832	***	$\hat{Y}$ =-32.400 + 13.315X
	F	-12.487	8.904	0.899	0.809	***	$\hat{Y}$ = -12.487 + 8.904X
	M+F	-22.444	10.091	0.912	0.832	***	$\hat{Y}$ = -22.444 + 10.091X
Pekin ducks	M	5.764	34.555	0.932	0.868	***	$\hat{Y}$ = 5.764 + 34.555X
	F	73.452	31.274	0.916	0.839	***	$\hat{Y}$ = 73.452 + 31.274X
	M+F	37.004	33.042	0.822	0.851	***	$\hat{Y}$ = 37.004 + 33.042X
Moscuvy ducks	M	-713.071	59.499	0.964	0.930	***	$\hat{Y}$ =-713.071+ 59.499X
	F	-346.305	38.648	0.965	0.932	***	$\hat{Y}$ =-346.305 + 38.648X
	M+F	-585.944	50.369	0.917	0.841	***	$\hat{Y}$ =-585.944 + 50.369X
All ducks	M	-416.135	49.031	0.836	0.914	***	$\hat{Y}$ =-416.135 + 49.031 X
	F	-208.039	36.070	0.892	0.944	***	$\hat{Y}$=-208.039+36.070 X
	M+F	-339.515	43.307	0.808	0.899	***	$\hat{Y}$ = -339.515+43.307 X
Japanese Quail	M	-7.999	4.320	0.981	0.962	***	$\hat{Y}$ = -7.959 + 4.320 X
	F	-9.400	4.628	0.976	0.953	***	$\hat{Y}$ = 9.400 + 4.628 X
	M+F	-8.743	4.483	0.977	0.954	***	$\hat{Y}$ = -8.743 + 4.483 X

Sig : significance and ***: significantly different at P≤ 0.001,M, F and M+ F:see footnote in Table3.

Similarly, trends of positive significant influence of age in days on SL in millimeters but lower in magnitude than LBW were observed in most studied groups or sex groups, except for SL of Moscuvy males, combined sexes of Moscuvy ducks and all duck females which were insignificantly affected by age. The rate of increase in SL which ranged from 0.418 mm in case of Japanese quail females to 0.936mm in GM males as shown in Table 5.

Comparing the coefficient of determination in the three studied linear models, it can be seen that higher 'R^2' values were observed for the second (predicting LBW through age) and first (predicting LBW through SL) models than the third (predicting SL through age) model.

In conclusion, there were definite relationships between LBW and SL and either LBW or SL significantly were affected by bird age. Comparing 'R^2' of fitted equations indicated that linear model was found to be suitable for predicting LBW through bird age or SL. Although all traits could be used to predict live body weight, the use of age (P≤0.001) yielded an R^2 which ranged from 0.809 to 0.966. In the absence of age, the use of shank length yielded an R^2 which ranged from 0.630 to 0.955. It can be concluded that in the absence of age, shank length can be used to predict live body weight.

Table 5. The parameters, coefficient of determination (R^2) of LBW when the linear equation $\hat{Y}$= a +b X was used for predicting the average SL ($\hat{Y}$) from age in (X) of different types.

Group	Sex	a	b	r	R^2	Sig.	Fitted equation
Fayoumi, PP	M	33.738	0.724	0.940	0.883	***	$\hat{Y}$ = 33.738 + 0.724 X
	F	34.109	0.611	0.928	0.860	***	$\hat{Y}$ = 34.109 + 0.611 X
	M+F	33.732	0.671	0.918	0.843	***	$\hat{Y}$ = 33.732 + 0.671 X
Dandarawi	M	30.022	0.806	0.778	0.606	***	$\hat{Y}$ = 30.022 + 0.806 X
	F	30.658	0.677	0.941	0.885	***	$\hat{Y}$ = 30.658 + 0.677 X
	M+F	30.361	0.737	0.826	0.682	***	$\hat{Y}$ = 33.361 + 0.737 X
Golden Montazah	M	33.904	0.936	0.977	0.954	***	$\hat{Y}$ = 33.904 + 0.936 X
	F	35.034	0.794	0.967	0.936	***	$\hat{Y}$ = 35.034 + 0.794 X
	M+F	34.449	0.868	0.956	0.915	***	$\hat{Y}$ = 34.449 + 0.868 X
All chickens	M	31.833	0.829	0.846	0.716	***	$\hat{Y}$ = 31.833 + 0.829 X
	F	32.365	0.698	0.908	0.824	***	$\hat{Y}$ = 32.365 + 0.698 X
	M+F	32.052	0.762	0.856	0.733	***	$\hat{Y}$ = 32.052 + 0.762 X
Pekin ducks	M	49.867	0.519	0.771	0.594	***	$\hat{Y}$ = 49.867 + 0.519 X
	F	51.346	0.435	0.752	0.566	***	$\hat{Y}$ = 51.346 + 0.435 X
	M+F	50.542	0.480	0.759	0.576	***	$\hat{Y}$ = 50.542 + 0.480 X
Moscuvy ducks	M	61.598	0.936	0.048	0.002	NS	
	F	37.472	0.819	0.887	0.787	***	$\hat{Y}$ = 37.472 + 0.819 X
	M+F	46.470	0.932	0.066	0.004	NS	
All ducks	M	41.756	0.702	0.841	0.708	***	$\hat{Y}$ = 41.756 + 0.702 X
	F	55.666	0.840	0.051	0.003	NS	
	M+F	47.361	0.802	0.068	0.005	*	$\hat{Y}$ = 47.361 + 0.802 X
Japanese Quail	M	22.689	0.462	0.879	0.772	***	$\hat{Y}$ = 22.689 + 0.462 X
	F	24.235	0.418	0.894	0.800	***	$\hat{Y}$ = 24.235 + 0.418 X
	M+F	23.510	0.439	0.885	0.783	***	$\hat{Y}$ = 23.510 + 0.439 X

Sig : significance and ***: significantly different at $P \leq 0.001$,M, F and M+ F:see footnote in Table3.

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التنبؤ بوزن الجسم الحى من خلال العمر و/أو طول الساق فى أنواع مختلفة من الطيور

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صممت هذه الدراسة لوصف وتحديد النموذج الاحصائى الخطى الأمثل للتنبؤ بوزن الجسم الحى من خلال طول الساق وكذا التنبؤ بوزن الجسم وطول الساق من خلال عمر الطائر فى ثلاثة أنواع من الدجاج: الفيومى والمنتزه الذهبى والدندراوى ونوعين من البط: البكين والمسكوفى والسمان اليابانى. وقد تم جمع بيانات طول الساق بالملليمتر ووزن الجسم بالجرامات والذى تم كل أسبوعين وحتى عمر ١٢ أسبوع للدجاج و ١٠ أسابيع للبط وحتى عمر ستة أسابيع للسمان.

وقد تم الحصول على النتائج التالية:

١. توجد علاقة مؤكدة (P≤0.01) بين وزن الجسم الحى و طول الساق لكل المجموعات المدروسة من الجنسين فى أنواع الدجاج والبط البكين وإناث المسكوفى ماعدا ذكور المسكوفى. طول الساق ارتبط ارتباطاً موجباً مع وزن الجسم الحى حيث تراوح بين ٠.٧٩٤ الى ٠.٩٧٧.

٢. كلما زاد طول الساق ١ مم كلما زاد وزن الجسم الحى (P≤0.001) بزيادة تراوحت بين ٩.١٢ جرام /يوم (ذكور الدندراوى) إلى ٥٥.٤١جرام/يوم (إناث البكين) مبينة أن نحو ٦٣% إلى ٩٥.٥% من الاختلافات فى وزن الجسم الحى يسببها طول الساق.

٣. الصـورة التكعيبيـة كـان لهـا معامـل تقدير أعلـى وخطـأ قياسـى للتقـدير منخفضـاً عـن الصـورة التربيعيـة واللوغاريتميـة والأسية بالنسبة لذكور المسكوفى. وأن أفضل تقدير للتنبؤ بـوزن الجسم الحـى مـن طـول الساق لذكور البط بغض النظر عن نوع البط هو الصورة التربيعية والتكعيبية.

٤. يسبب العمر باليوم زيادة معنوية فى وزن الجسم الحى فى الأنواع المختلفة من الطيور من كل الجنسين و لكل جنس على حدة كما أظهرت كل المجاميع معاملات انحدار موجبة تراوحت بين ٤.٣٢٠جرام/يوم فـى حالة ذكور السمان اليابانى الى ٥٩.٤٩٩جرام/يوم فى حالة ذكور البط المسكوفى.

٥. بغض النظر عن النوع، فذكور كل من الدجاج والبط كانت لهم معاملات انحدار أعلـى مـن إناثهـا.و علـى العكس، فإناث السان اليابانى أظهرت معدلات زيادة أعلى فى وزن الجسم الحـى نتيجـة تأثرهـا بـالعمر عن ذكورها.

٦. بالمثل، لوحظت اتجاهات معنوية موجبة للعمر باليوم على طول الساق بـالملليمتر ولكنهـا أقل فـى القيمـة منها عن وزن الجسم الحى فى معظم المجموعات المدروسة فـى معدل الزيـادة بطـول السـاق حيث تـراوح بين ٠.٤١٨ ملليمتر فى إناث السمان اليابانى و ٠.٩٣٦ ملليمتر فى ذكور المنتزه الذهبى.

٧. توجد علاقات واضحة بين وزن الجسم الحى و طول الساق وكل من وزن الجسم الحـى و طـول السـاق والتـى تـأثرت بعمـر الطـائر. وبمقارنـة معـاملات التقدير "R^2" للنمـاذج المدروسـة فقد أظهـرت أن النمـوذج الخطى مناسب للتنبؤ بوزن الجسم الحى خلال عمر الطائر بمعامل تقدير تـراوح بين ٠.٨٠٩ إلـى ٠.٩٦٦ وطول الساق للطائر بمعامل تقدير تراوح بين ٠.٦٣٠ إلى ٠.٩٥٥.

٨. فى حال عدم معرفة العمر، فإن طول الساق يمكن استخدامه للتنبؤ بوزن الجسم الحى.