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(Original Article)

Phenotypic and Genotypic Changes in Growth Measures of Selected and Control Line Over Generations in Dandarawi Chicken

Mohamed Abdelhady[1*]; Mohamed A. Abdellatif[1] and Khaled Roushdy[2]

[1]Poultry Production Department, Faculty of Agriculture, Assiut University, Egypt.
[2]Animal Production Research Institute & National Gene Bank, Agriculture Research Center, Giza, Egypt.

∗ Corresponding author email: mohamed.abdelhady@agr.aun.edu.eg
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Abstract

Genetic improvement of body weight has received great attention in the poultry industry. So, this study was carried out on the flock of Dandarawi chicken through five successive generations at the Poultry Research Farm, Faculty of Agriculture, Assiut University to determine the genetic response in growth measures due to selection for high body weight at 8 weeks of age and estimate the realized heritabilities.

The chicks in each generation divided into two lines, selected line for high body weight at 8 weeks of age and control line. Body weight, shank length and keel length were recorded, selection differential, cumulative selection response and realized heritability for growth traits over generations were estimated.

The results showed that the birds of selected line were higher in body weight, shank and keel length compared with those in control line (P≤0.01) at different ages. There were significant differences (P≤0.01) between generations, lines, and sexes in all traits studied at different ages. Also, there were significant interactions between the main effects considering the different studied traits.

After five generations, the cumulative responses to selection for body weight were 4.75, 110.79, 223.80, 321.41, 297.89, and 323.53 gram at 0, 4, 8, 12, 16, and 20 weeks of age, respectively. Also, realized heritability estimates varied from moderate to high (0.30- 0.61) for all growth traits studied over generations at different ages.

According to the obtained results, it is necessary to continue the program of selection to achieve further improvement in growth measurements in Dandarawi chicken.

Keywords: *Selection; Phenotypic; Genotypic; Dandarawi*; *Realized heritability.*

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Introduction

The increasing demand for poultry products has led poultry breeders to engage in artificial selection of chickens which play a vital role to increase the productivity of poultry. Also, due to the economic effects of genetic improvement of body weight has received great attention in the poultry industry (Mebratiea *et al.,* 2019). The mass selection is effective to improve certain traits that have high heritability estimates such as body weight (Rishell, 1997 and Alnahhas *et al.,* 2016).

The heritability estimates of body weight were moderate to high and the considered genetic variation to be additive in nature as reported by (Marks, 1985; Abdellatif, 1999b and Younis *et al.,* 2013). After five generations of selection realized heritability of body weight at 8-weeks of age was 0.29 (Siegel, 1962). Liu *et al.,* (1994) revealed that realized heritability of 8-week body weight ranged from 0.22 to 0.28 for a high weight line and it was varied from 0.14 to 0.39 after four generations from selection for body weight at 8-weeks of age in Dandarawi chickens (Abdellatif, 1999b).

As shown in the different selection programs there were highly significant differences between lines selected for high and low body weight (Abd El-Karim and Ashour, 2014; Ashour *et al.,* 2015; Abou El-Ghar and Abd El-Karim, 2016; El-Attrouny *et al.,* 2017; Abdelhady *et al*., 2019; Sultana *et al.,* 2021; and Rizk *et al.,* 2022).

The genetic gain in a selected trait could be determined by the difference between the mean of selected group and population means (Falconer, 1983). Genetic parameters are liable to change in a population under continuous selection (Falconer and Mckay, 1996).

Therefore, the present study was designed to determine the genetic response in growth measures due to selection for high body weight at eight weeks of age and to estimate the realized heritability for all the recorded growth traits over four successive generations in Dandarawi chicken.

Materials and Methods

Experiment location and period

The current study was carried out at the Poultry Research Farm, Poultry Production Department, Faculty of Agriculture, Assiut University, over five successive generations from 2016 to 2021.

Experiment design

The study was conducted on the flock of Dandarawi chicken and the chicks in each generation represented in two lines, selected line (S) for high body weight at 8 weeks of age was individually selected according to body weight as equal or more than average the control line (C) to the nearest gram. Similar manner was applied to select the birds in each generation. Data involved 7066 pedigreed chicks produced by 2452 dams and 248 sires through five successive generations as shown in Table1.

Table 1. The number of parents (sires and dams) and progeny by each generation and line

Generation	Selected				Control			
	Sires	Dam	Progeny		Sires	Dam	Progeny	
			Male	Female			Male	Female
0	29	290	365	478	15	150	167	411
1	28	270	409	399	24	225	341	362
2	22	220	220	261	30	295	458	435
3	21	210	408	380	31	310	337	311
4	22	222	354	336	26	260	310	324
Total	122	1212	1756	1854	126	1240	1613	1843

Flock management

During the experimental period all birds over generations were received the same managerial treatments, feed with a commercial ration and water were provided *ad- libitum*. At hatching time, all chicks were weighed, wing banded, and reared in floor brooders, then transferred to the floor pens. All the birds were treated and medicated similarly throughout the experimental period.

Studies Traits

1- Individually Body Weight (BW) was recorded at 0, 4, 8, 12, 16 and 20 weeks of age.

2- Body Measurements: Shank length (SL) measured at 4, 8, 12, 16 and 20 weeks of age, and Keel length (KL) measured at 8, 12, 16 and 20 weeks of age.

3- Selection Differential (SD): was calculated for each generation as the difference between the average of the selected birds and the average of their population (Falconer, 1983) as follow: SD = (S-C).

4- Cumulative Selection Response (ΔG): was calculated by the difference between the selected line in the fourth generation and the control line in the base generation as follow: (ΔG) = (S_4-C_0).

6- Realized Heritability (h^2_R): was estimated over generations by dividing the selection response by the selection differential (Falconer, 1983), as follow: (h^2_R) = (ΔG/ SD), where (ΔG) = cumulative selection response, (SD) = cumulative selection differential. All genetic estimations were recorded for all growth measures at all ages of study.

Statistical Analysis

Data were statistically analyzed by using the international software program SAS 9.2 (SAS institute, 2009) by using the following General Linear Model (GLM) of SAS software:

$$Y_{ijkm}=\mu+ G_I + L_J +S_K + (GL)_{IJ}+ (GS)_{IK} + (LS)_{JK} + (GLS)_{IJK} + e_{IJKm}$$

Where, Y_{ijkm}= observation of each bird,μ = population mean, G_I = effect of generation (i= 0,1,2,3, and 4),L_J = effect of line (j = 1, 2),S_K = effect of sex (k = 1, 2),$(GL)_{IJ}$ = interaction (generation × line), $(GS)_{IK}$ = interaction (generation × sex), $(LS)_{JK}$ = interaction (line ×sex), $(GLS)_{IJK}$ = interaction (generation × line × sex) and e_{IJKm}= the experimental error.

Differences between means were tested using Duncan's Multiple (Duncan, 1955) at 5%.

Results and Discussions

Body Weight (BW)

Performance

Least square means and standard errors of body weight (BW) at 0, 4, 8, 12, 16 and 20 weeks of age during the five generations of selection as affected by generation, line, sex, and their interactions are shown in Table 2. It was observed that there were highly significant differences (P≤ 0.01) between generations in all ages during the study. Body weight in four generation was higher when compared with the base population, first, second, and third generation. Also, there were highly significant differences (P≤ 0.01) between lines and sex at 0, 4, 8, 12, 16 and 20 weeks of age. The results showed superiority of selected line in body weight compared with the control line in the different age studied. Body weight of males was heavier than females in all different ages.

Similar results were reported by Kosba *et al.,* (2006); Abd El-Ghany (2006); Saleh *et al.,* (2008); Younis *et al.,* (2013); Ashour *et al.,* (2015); Abou El-Ghar and Abd El-Karim (2016); El-Attrouny *et al.,* (2017); Sultana, (2019); Rizk *et al.,* (2022). Abdellatif (1999a) and Abdelhady *et al*., (2019) demonstrated that body weight of males was heavier than females, as well as the selected line was significantly higher in body weight than the control line in Dandarawi chicken strain.

Interactions between generations and lines were highly significant (P≤ 0.01) in body weight at all age of study (Table 2), which means that the responses in body weight of the two lines occurred in different manner over generations where body weight in the selected line at all age of study over generation increased regularly, but it was irregularly increment considering the control line. These results in agreed with Abdellatif, (1999a); Younis *et al.,* (2013) and Ashour *et al.,* (2015); and Abdelhady *et al.,* (2019).

Regardless of line, there was highly significant interaction between generations and sex (P≤ 0.01) in body weight at all ages of study, it observed that the males had heavier body weight than females over generations, except in the second generation at zero week of age females had higher weight than males (Table 2). Also, the interaction between line and sex considering body weight was significant and highly significant (P≤0.05 and P≤0.01) at all age of study. It noticed that body weight of males and females in the selected line had highest weight than corresponding in the control line as shown in Table 2.

There were significant and highly significant interactions between generation, line, and sex (P≤0.05 and P≤0.01) at 0, 4, 8, 12, 16 and 20 weeks of age. These results in agreement with those obtained by Abd El-Ghany (2006); Saleh *et al.,* (2008); Younis *et al.,* (2013) and Ashour *et al.,* (2015), but in contrast to those reported by Abou El-Ghar and Abd El-Karim (2016). Regarding to the significant interactions between the main effects, may be due to that the changes in body weight were not equal per generation (Younis *et al.,* 2013) and it could be said that there were other factors affecting on body weight than the main effects (Wong-Valle *et al.,* 1993 and Abdellatif, 1999a).

Table 2. Least Squares Means ± S.E of body weight (g) at 0, 4, 8, 12, 16 and 20 weeks of age as affected by generation, line, sex and their interactions

		W0	W4	W8	W12	W16	W20
Generations							
G0		33.73±0.09	275.63±1.05	690.41±2.19	1099.20±5.16	1276.35±7.36	1422.81±7.92
G1		35.50±0.09	290.35±1.44	724.85±2.48	1109.69±6.16	1268.28±8.11	1459.65±8.02
G2		34.73±0.10	290.79±1.38	728.02±2.96	1093.06±5.71	1296.60±7.60	1461.48±7.91
G3		35.47±0.10	320.64±1.71	792.50±3.52	1190.46±6.77	1377.31±8.96	1510.06±8.48
G4		35.75±0.10	331.25±2.01	804.10±4.45	1207.66±7.73	1390.39±9.52	1517.75±9.46
Lines							
C		33.65±0.05	277.30±0.83	684.88±1.53	1062.25±3.26	1252.68±4.51	1378.10±4.15
S		36.36±0.06	324.26±1.05	806.74±2.13	1231.49±4.17	1407.28±5.68	1586.95±5.04
Sex							
F		34.73±0.06	277.71±0.72	686.70±1.35	1054.17±2.60	1244.78±2.64	1428.62±2.98
M		35.36±0.06	327.18±1.15	813.46±2.31	1303.69±4.38	1676.17±6.93	1867.79±10.19
Interaction (generation x line)							
G0	**C**	33.02±0.12	263.92±1.45	688.61±3.53	1061.99±7.75	1232.88±11.36	1359.88±12.19
	S	34.21±0.12	283.66±1.39	706.73±2.65	1136.41±6.61	1312.31±9.25	1485.75±9.15
G1	**C**	34.40±0.12	282.14±2.02	687.14±3.39	1028.26±6.85	1203.67±8.05	1374.59±8.70
	S	36.45±0.12	297.49±2.00	757.66±3.15	1191.12±8.96	1373.95±14.29	1544.72±12.52
G2	**C**	33.73±0.11	274.16±1.64	684.32±3.07	1050.75±6.59	1248.53±9.05	1368.31±8.34
	S	36.58±0.15	321.66±1.77	809.14±4.25	1191.03±8.74	1390.68±11.61	1599.02±9.75

Table 2. continue

G3	**C**		33.36±0.12	281.82±2.01	698.03±3.41	1086.33±7.53	1288.16±10.85	1390.00±8.63
	S		37.21±0.12	352.57±2.02	870.18±4.05	1332.43±6.77	1493.08±11.73	1650.78±9.32
G4	**C**		33.55±0.11	283.95±1.98	686.38±3.72	1090.63±7.45	1295.67±10.55	1398.47±8.87
	S		37.77±0.13	374.71±2.42	912.26±5.07	1383.40±8.44	1530.77±12.99	1683.41±11.00
Interaction (line x sex)								
C	**F**		33.52±0.07	258.10±0.78	639.63±1.46	975.86±2.38	1173.19±2.70	1338.79±2.79
	M		33.79±0.08	299.24±1.36	736.58±2.22	1229.12±4.40	1590.89±5.49	1764.56±7.53
S	**F**		35.94±0.08	297.20±1.04	733.48±1.66	1153.58±3.44	1336.45±3.40	1544.43±3.26
	M		36.81±0.09	352.84±1.60	884.08±3.09	1426.05±5.84	1828.98±9.62	1999.01±12.51
Interaction (generation x line x sex)								
G0	**C**	**F**	33.04±0.14	257.18±1.62	636.76±3.11	989.62±5.61	1155.22±7.14	1310.96±8.16
		M	32.96±0.22	280.50±2.74	740.23±6.74	1259.03±12.38	1623.86±14.1	1818.54±14.5
	S	**F**	34.41±0.15	266.64±1.59	665.42±2.50	1061.97±4.43	1247.08±5.11	1447.65±6.56
		M	33.94±0.16	305.94±1.89	760.82±3.55	1339.64±9.49	1714.91±12.4	1853.18±11.8
G1	**C**	**F**	34.32±0.17	261.74±2.07	645.62±3.31	960.52±4.92	1156.88±5.07	1336.53±5.91
		M	34.48±0.16	303.79±3.13	731.20±5.05	1210.40±9.8	1539.56±11.9	1745.00±18.9
	S	**F**	36.23±0.16	273.37±1.97	705.12±2.40	1094.35±4.89	1280.34±5.60	1493.85±5.38
		M	36.76±0.17	321.00±3.03	808.91±4.49	1377.80±9.60	1794.02±15.4	1982.78±19.6
G2	**C**	**F**	33.98±0.16	249.17±1.31	629.51±2.68	949.67±4.45	1165.74±5.06	1328.53±5.09
		M	33.50±0.15	297.89±2.49	736.39±4.15	1220.62±8.04	1588.89±10.20	1766.13±14.41
	S	**F**	36.28±0.22	300.09±1.88	751.17±2.99	1128.33±5.30	1342.73±5.70	1557.11±4.11
		M	36.93±0.21	347.25±2.13	877.91±5.83	1424.83±11.83	1879.29±32.11	2018.10±24.72
G3	**C**	**F**	32.99±0.16	259.76±1.88	657.67±3.71	990.55±5.75	1191.36±6.58	1354.71±5.87
		M	33.69±0.17	302.17±3.06	735.28±4.76	1228.17±9.61	1592.38±11.77	1742.88±16.66
	S	**F**	36.51±0.16	322.00±1.43	780.21±2.47	1266.25±3.74	1418.90±5.02	1609.37±4.00
		M	37.87±0.16	381.04±3.04	953.97±4.50	1484.46±9.75	1903.78±15.48	2068.64±17.97
G4	**C**	**F**	33.13±0.15	265.57±1.81	632.96±3.47	1003.56±5.50	1205.68±6.20	1362.64±6.02
		M	33.98±0.16	303.15±3.25	742.21±5.01	1235.40±10.17	1597.21±11.79	1756.80±15.39
	S	**F**	36.86±0.17	338.66±2.05	797.40±2.64	1301.56±4.71	1453.61±5.67	1638.28±4.26
		M	38.63±0.18	408.93±3.42	1021.29±4.75	1561.48±10.23	1938.06±16.18	2134.72±18.04
Significances								
Gen.			**	**	**	**	**	**
Line			**	**	**	**	**	**
Sex			**	**	**	**	**	**
Gen.*Line			**	**	**	**	**	**
Gen.*Sex			**	**	**	**	*	NS
Line*Sex			**	**	**	*	**	**
Gen.*Line*Sex			*	**	**	*	**	**

Genetic Parameters

Estimates of selection Differential (SD), selection response (ΔG) and realized heritability (h^2_R) for body weight at 0, 4, 8, 12, 16 and 20 weeks of age during five generations are given in Table 3. Selection differential estimates of body weight were 1.19, 19.74, 17.66, 74.42, 79.43, and 125.87 gram for base generation. Moreover, the selection differentials of four generation were 4.22, 90.76, 225.88, 292.77, 235.1, and 284.94 gram at 0, 4, 8, 12, 16 and 20 weeks of age, respectively. It noticed that the values of selection differential were positive and inconsistent over generations because of the total number of pullet available by generation (Wang *et al.,* 1991; Abdellatif, 1999b; and Younis *et al.,* 2013). In contrast, Abou El-Ghar and Abd El-Karim, (2016), found that there were negative values for selection differential in the second generation due to selection in Inshas strain (-5.5, -66.0, -94.6 gram) at 4, 8, and 12 weeks of age, respectively.

It seems that the cumulative selection responses of body weight after five generations of selection were 4.75, 110.79, 223.80, 321.41, 297.89, and 323.53 gram at 0, 4, 8, 12, 16 and 20 weeks of age, respectively (Table 3). These obtained results indicated that positive change of body weight at different ages is assumed with the advancement of selection for body weight at 8 weeks of age.

Similar results were reported by (Saleh *et al*., 2008; Younis *et al.,* 2013; Ashour *et al.,* 2015; Sultana, 2019; Abdelhady *et al*., 2019; Sultana *et al.,* 2021; and Rizk *et al.,* 2022). On contrast, Abou El-Ghar and Abd El-Karim, (2016) showed that there was negative selection response -8.4, -86.5, and -113.5 gram at 4, 8, and 12 weeks of age, respectively, in the second generation of selection in Inshas strain.

Table 3. Selection differential, selection response, and realized heritability for body weight (BW) over generations at 0, 4, 8, 12, 16 and 20 weeks of age

Generation	Line	BW_0	BW_4	BW_8	BW_{12}	BW_{16}	BW_{20}
G0	**C**	33.02	263.92	688.46	1061.99	1232.88	1359.88
	S	34.21	283.66	706.12	1136.41	1312.31	1485.75
	SD	1.19	19.74	17.66	74.42	79.43	125.87
G1	**C**	34.40	282.14	687.14	1028.26	1203.67	1374.59
	S	36.45	297.49	757.66	1191.12	1373.95	1544.72
	SD	2.05	15.35	70.52	162.86	170.28	170.13
G2	**C**	33.73	274.16	684.32	1050.75	1248.53	1368.31
	S	36.58	321.66	809.14	1191.03	1390.68	1599.02
	SD	2.85	47.5	124.82	140.28	142.15	230.71
G3	**C**	33.36	281.82	698.03	1086.33	1288.16	1390.00
	S	37.21	352.57	870.18	1332.43	1493.08	1650.78
	SD	3.85	70.75	172.15	246.1	204.92	260.78
G4	**C**	33.55	283.95	686.38	1090.63	1295.67	1398.47
	S	37.77	374.71	912.26	1383.40	1530.77	1683.41
	SD	4.22	90.76	225.88	292.77	235.1	284.94
ΔG		4.75	110.79	223.80	321.41	297.89	323.53
h^2_R		0.34	0.45	0.37	0.35	0.36	0.30

G= Generation, S= selected line, C=control line, SD= selection differential, ΔG= cumulative selection response, h2R = realized heritability.

The selection responses in the present study recorded high estimates than reported in the other selection programs for body weight in local strains of chicken (Younis *et al.,* 2013; Ashour *et al.,* 2015; Abou El-Ghar and Abd El-Karim 2016 and El-Attrouny *et al.,* (2017), who reported that the cumulative selection response through three generations of selection in Benha chicken strain were 0.7, 21.9, 84, 123.6, and 127 gram at 0, 4, 8, 12, and 16 weeks of age, and it was in the same trends with Nassar, (2017); Sultana *et al.,* (2021); and Rizk *et al.,* (2022).

The realized heritability estimates of selected body weight over five generation based on the selection differential by line and generation are presented in Table 3. It was 0.34, 0.45, 0.37, 0.35, 0.36, and 0.30 at 0, 4, 8, 12, 16 and 20 weeks of age, respectively. The estimates showed that the heritability of body weight decreased with the advance of age. Therefore, it is possible genetically increases body weight quickly at early ages without waiting for later ages to reduce the cost of breeding, save time and effort. Also, it seems that the realized heritability of selected body weight varied from moderate to high estimates at different ages of study. This indicates that the variability due to the additive genes action is probably higher than the other genetic effects such as dominance and epistatic in a selection program on Dandarawi chickens. These results in harmony with that obtained by Abdellatif, (1999b).

Body Measurements

Performance

Shank length

Least square means and standard errors of shank length (SL) at 4, 8, 12, 16 and 20 weeks of age during the five generations of selection as affected by generation, line, sex, and their interactions are presented in Table 4. The differences between generations at all ages during the study were highly significant (P≤ 0.01). It noticed that all birds in four generation had longer shank length than the base population, first, second, and third generation at different ages. Also, there were highly significant differences (P≤ 0.01) between lines and sex at 4, 8, 12, 16 and 20 weeks of age. The birds of selected line had longer shank length compared with control line at 4, 8, 12, 16 and 20 weeks of age and it increased gradually in regular manner, as well as males were longer shank length than females at different ages (Table 4). These results in full agreement with Abd El-Ghany (2006); Younis *et al.,* (2013); Abd El-Karim and Ashour (2014); and Ramadan *et al.,* (2014); Abou El-Ghar and Abd El-Karim (2016); and Abdelhady *et al*., (2019).

The interactions between generations and lines were highly significant (P≤ 0.01) in shank length at all age of study (Table 4). It means that responses in shank length of the two lines occurred in different manner over generations where shank length in the selected line at all ages of study over generation increased regularly, but it was irregularly increment regarding the control line. These results confirm those reported by Rizkalla *et al*., (2002); Abd El-Ghany (2006); Saleh *et al.,* (2008); Younis *et al.,* (2013); Abd El-Karim and Ashour (2014); and Abdelhady *et al.,* (2019). Also, there were highly significant interaction between generations and sex (P≤0.05 and P≤0.01) in shank length at all age of study. It observed that the males had longest shank length compared with females over generations, except in the second generation at 4 week of age females that had the same long of males (Table 4).

Table 4. Least Squares Means ± S.E of shank length (SL) (cm) at 4, 8, 12, 16 and 20 weeks of age as affected by generation, line, sex, and their interactions

		SL4	SL8	SL12	SL16	SL20
Generations						
G0		4.15±0.01	6.49±0.02	7.52±0.03	7.78±0.03	7.98±0.03
G1		4.65±0.01	6.85±0.02	7.95±0.03	8.41±0.03	8.82±0.03
G2		4.48±0.01	6.71±0.02	7.79±0.02	8.40±0.03	9.04±0.03
G3		4.66±0.02	6.93±0.02	7.87±0.03	8.46±0.03	9.03±0.04
G4		4.77±0.02	6.99±0.02	7.98±0.03	8.64±0.04	9.28±0.04
Lines						
C		4.35±0.01	6.54±0.01	7.58±0.01	8.10±0.02	8.59±0.02
S		4.73±0.01	7.04±0.01	8.11±0.02	8.58±0.03	9.12±0.03
Sex						
F		4.42±0.01	6.52±0.01	7.47±0.01	8.08±0.01	8.70±0.02
M		4.68±0.01	7.09±0.01	8.52±0.02	9.33±0.04	9.99±0.05
Interaction (generation x line)						
G0	**C**	4.02±0.02	6.30±0.03	7.36±0.04	7.60±0.04	7.86±0.04
	S	4.24±0.02	6.62±0.02	7.66±0.04	7.91±0.04	8.07±0.04
G1	**C**	4.61±0.02	6.69±0.02	7.75±0.03	8.19±0.03	8.63±0.03
	S	4.69±0.02	7.00±0.02	8.26±0.05	8.77±0.05	9.17±0.05
G2	**C**	4.31±0.02	6.51±0.02	7.64±0.02	8.24±0.03	8.82±0.03
	S	4.80±0.02	7.07±0.03	8.14±0.05	8.70±0.04	9.37±0.05
G3	**C**	4.33±0.02	6.56±0.02	7.50±0.03	8.10±0.04	8.59±0.04
	S	4.93±0.02	7.24±0.02	8.36±0.04	8.91±0.05	9.55±0.05
G4	**C**	4.44±0.02	6.62±0.02	7.63±0.04	8.30±0.04	8.90±0.04
	S	5.07±0.02	7.33±0.03	8.52±0.05	9.14±0.05	9.80±0.05
Interaction (generation x sex)						
G0	**F**	4.07±0.01	6.25±0.02	7.18±0.02	7.54±0.02	7.82±0.02
	M	4.29±0.02	6.89±0.03	8.46±0.05	8.91±0.07	9.46±0.08
G1	**F**	4.52±0.02	6.58±0.02	7.61±0.02	8.22±0.02	8.71±0.03
	M	4.78±0.02	7.13±0.02	8.76±0.05	9.53±0.08	9.90±0.10
G2	**F**	4.48±0.02	6.57±0.02	7.56±0.02	8.24±0.02	8.95±0.03
	M	4.48±0.02	6.85±0.03	8.28±0.05	9.24±0.07	9.94±0.09
G3	**F**	4.51±0.02	6.60±0.03	7.50±0.03	8.20±0.03	8.91±0.03
	M	4.80±0.02	7.24±0.02	8.52±0.05	9.46±0.07	10.28±0.11

Table 4. Continue

G4		**F**	4.60±0.02	6.68±0.02	7.62±0.03	8.39±0.03	9.16±0.03
		M	4.94±0.03	7.29±0.03	8.66±0.05	9.62±0.09	10.45±0.13
Interaction (line x sex)							
C		**F**	4.25±0.01	6.35±0.01	7.25±0.01	7.88±0.01	8.49±0.02
		M	4.46±0.01	6.76±0.01	8.22±0.02	9.02±0.03	9.60±0.05
S		**F**	4.59±0.01	6.70±0.01	7.75±0.02	8.34±0.02	8.97±0.03
		M	4.87±0.01	7.39±0.01	9.01±0.04	9.83±0.07	10.48±0.07
Interaction (generation x line x sex)							
G0	**C**	**F**	3.96±0.02	6.40±0.02	6.99±0.02	7.39±0.02	7.71±0.03
		M	4.16±0.03	6.66±0.04	8.33±0.06	8.63±0.06	9.25±0.13
	S	**F**	4.61±0.01	6.32±0.02	7.32±0.03	7.65±0.03	7.91±0.03
		M	4.34±0.02	6.99±0.02	8.55±0.06	9.10±0.11	9.64±0.08
G1	**C**	**F**	4.48±0.02	6.48±0.03	7.47±0.02	8.05±0.02	8.54±0.03
		M	4.74±0.02	6.90±0.03	8.49±0.05	9.16±0.07	9.56±0.08
	S	**F**	4.56±0.03	6.67±0.02	7.84±0.04	8.50±0.03	9.02±0.04
		M	4.81±0.02	7.31±0.02	9.07±0.09	9.93±0.12	10.44±0.14
G2	**C**	**F**	4.33±0.02	6.45±0.03	7.37±0.02	8.04±0.02	8.75±0.03
		M	4.28±0.02	6.57±0.03	8.08±0.04	9.07±0.07	9.58±0.10
	S	**F**	4.73±0.03	6.79±0.03	7.89±0.04	8.58±0.04	9.26±0.04
		M	4.88±0.03	7.42±0.03	9.11±0.08	9.95±0.09	10.48±0.08
G3	**C**	**F**	4.18±0.02	6.23±0.03	7.08±0.02	7.81±0.02	8.47±0.03
		M	4.48±0.03	6.86±0.03	8.13±0.05	9.04±0.06	9.73±0.12
	S	**F**	4.79±0.03	6.89±0.03	7.99±0.03	8.66±0.03	9.41±0.04
		M	5.06±0.03	7.56±0.03	9.22±0.05	10.33±0.08	10.93±0.08
G4	**C**	**F**	4.32±0.02	6.40±0.03	7.26±0.03	8.05±0.03	8.81±0.04
		M	4.56±0.03	6.85±0.03	8.24±0.05	9.13±0.07	9.86±0.11
	S	**F**	4.87±0.04	6.96±0.03	8.11±0.03	8.86±0.03	9.65±0.04
		M	5.27±0.03	7.69±0.03	9.42±0.06	10.67±0.08	11.28±0.10
Significances							
Gen.			**	**	**	**	**
Line			**	**	**	**	**
Sex			**	**	**	**	**
Gen.*Line			**	**	**	**	**
Gen.*Sex			**	**	**	*	*
Line*Sex			*	**	**	**	**
Gen.*Line*Sex			*	**	**	*	NS

SL= shank length, Gen. = Generation, C= Control line, S= Selected line, M= males, F= females.

*:P≤ 0.05, **:P≤ 0.01, N. S: Not significant.

Considering, the interactions between line and sex, it was significant and highly significant (P≤0.05 and P≤0.01) at all age of study. It noticed that the males and females in the selected line had longest shank length than that corresponding in the control line as shown in Table 4.

The result showed that significant and highly significant interactions between generation, line, and sex ($P \leq 0.05$ and $P \leq 0.01$) at 4, 8, 12, 16 and 20 weeks of age (Table 4). These results agreed with those obtained by Younis *et al.,* (2013), and Abdelhady *et al.,* (2019), but disagreed with those obtained by Abd El-Karim and Ashour (2014).

Keel length

In (Table 5), the differences between generations were highly significant ($P \leq 0.01$) in keel length at 8, 12, 16, and 20 weeks of age. It obvious that the birds in four generation had longer keel length than the base population, first, second, and third generation at different ages.

As well as there were highly significant differences ($P \leq 0.01$) between lines and sex at 8, 12, 16 and 20 weeks of age. The birds of selected line had longer keel length compared with control line at 8, 12, 16 and 20 weeks of age and it increased gradually in regular manner, in the same trend males had longer keel length than females at different ages (Table 5). Similar results were reported by Abd El-Ghany (2006); Younis *et al.,* (2013); Abd El-Karim and Ashour (2014); and Ramadan *et al.,* (2014); Abou El-Ghar and Abd El-Karim (2016); and Abdelhady *et al*., (2019).

The interactions between generations and lines were highly significant ($P \leq 0.01$) in keel length at all ages of study (Table 5). Which means that the responses in keel length of two lines occurred in different manner over generations, where keel length in the selected line at all ages of study over generation increased regularly but it was irregularly increases considering the control line. These results confirm those reported by Rizkalla *et al*., (2002); Abd El-Ghany (2006); Saleh *et al.,* (2008a and b); Younis *et al.,* (2013); and Abdelhady *et al.,* (2019). Also, there were highly significant interaction between generations and sex ($P \leq 0.01$) in keel length at all age of study. It observed that the males had the longest keel length compared with females over generations (Table 6). Regarding, the interaction between line and sex, it was highly significant ($P \leq 0.01$) at 8 and 20 weeks of age, but it was insignificant at 12 and 16 weeks of age. It seems that the keel length of males and females in the selected line had longer than that of corresponding in the control line as shown in Table 5.

It noticed that significant interaction between generation, line, and sex ($P \leq 0.05$) at 8 and 20 weeks of age, but it was insignificant at 12 and 16 weeks of age (Table 5). These results agreed with those obtained by Younis *et al.,* (2013), and Abdelhady *et al.,* (2019).

Referring to the significant interactions between the main effects, which means that shank length and keel length were greatly affected by other factors than the main effects in the current study (Wong-Valle et al., 1993 and Abdellatif, 1999a), and may be due to that the changes in shank and keel length were not equal per generation (Younis *et al.,* 2013). In general, it could be indicated that the improvement of body weight through selection affected in a positive direction on body measurements (shank and keel length).

Table 5. Least Squares Means ± S.E of keel length (KL) (cm) at 8, 12, 16 and 20 weeks of age by generation, line, sex, and their interactions

			KL8	KL12	KL16	KL20
Generations						
G0			7.17±0.02	8.16±0.03	8.46±0.03	8.76±0.03
G1			7.68±0.02	8.66±0.03	9.43±0.03	9.97±0.03
G2			7.50±0.02	8.58±0.03	9.37±0.03	10.06±0.03
G3			7.64±0.02	8.68±0.03	9.46±0.04	10.17±0.04
G4			7.74±0.02	8.68±0.03	9.42±0.04	10.18±0.04
Lines						
C			7.31±0.01	8.32±0.02	8.90±0.02	9.48±0.02
S			7.78±0.01	8.82±0.02	9.57±0.03	10.25±0.03
Sex						
F			7.25±0.01	8.17±0.01	8.99±0.02	9.70±0.02
M			7.87±0.01	9.31±0.02	10.14±0.03	10.92±0.06
Interaction (generation x line)						
G0	**C**		7.01±0.03	7.96±0.04	8.24±0.04	8.59±0.04
	S		7.28±0.02	8.31±0.04	8.64±0.04	8.90±0.04
G1	**C**		7.57±0.03	8.50±0.04	9.15±0.03	9.71±0.03
	S		7.78±0.02	8.90±0.05	9.89±0.04	10.45±0.05
G2	**C**		7.32±0.02	8.43±0.03	9.12±0.02	9.66±0.03
	S		7.82±0.03	8.91±0.04	9.87±0.04	10.65±0.04
G3	**C**		7.24±0.03	8.33±0.04	9.01±0.03	9.64±0.05
	S		7.97±0.02	9.15±0.04	10.05±0.04	10.80±0.04
G4	**C**		7.32±0.02	8.28±0.03	8.91±0.04	9.63±0.03
	S		8.13±0.03	9.29±0.05	10.17±0.05	10.94±0.04
Interaction (generation x sex)						
G0	**F**		6.89±0.02	7.78±0.02	8.20±0.03	8.60±0.02
	M		7.64±0.03	9.19±0.05	9.67±0.07	10.30±0.08
G1	**F**		7.37±0.02	8.33±0.03	9.26±0.03	9.86±0.02
	M		8.00±0.03	9.44±0.05	10.41±0.07	11.04±0.11
G2	**F**		7.31±0.02	8.26±0.03	9.21±0.03	9.97±0.03
	M		7.69±0.02	9.25±0.05	10.29±0.06	10.93±0.12
G3	**F**		7.36±0.02	8.32±0.03	9.25±0.04	10.07±0.04
	M		7.90±0.03	9.31±0.05	10.29±0.07	11.25±0.13
G4	**F**		7.44±0.02	8.31±0.03	9.22±0.04	10.08±0.04
	M		8.04±0.03	9.37±0.05	10.21±0.08	11.16±0.17
Interaction (line x sex)						
C	**F**		7.09±0.01	7.92±0.02	8.68±0.02	9.38±0.02
	M		7.55±0.02	9.07±0.03	9.87±0.03	10.43±0.05
S	**F**		7.41±0.01	8.48±0.02	9.38±0.03	10.11±0.03
	M		8.16±0.02	9.69±0.04	10.57±0.06	11.56±0.09
Interaction (generation x line x sex)						
G0	**C**	**F**	6.84±0.02	7.56±0.03	8.01±0.03	8.43±0.03
		M	7.41±0.04	9.04±0.06	9.38±0.06	10.21±0.13
	S	**F**	6.92±0.02	7.94±0.03	8.36±0.03	8.74±0.03
		M	7.73±0.03	9.31±0.06	9.86±0.10	10.39±0.10

Table 5. Continue

G1	C	F	7.29±0.03	8.18±0.03	9.02±0.02	9.62±0.03
		M	7.86±0.04	9.34±0.06	10.06±0.07	10.66±0.10
	S	F	7.44±0.03	8.56±0.04	9.68±0.03	10.31±0.04
		M	8.10±0.03	9.56±0.08	10.78±0.09	11.66±0.16
G2	C	F	7.17±0.03	8.04±0.03	8.88±0.03	9.58±0.04
		M	7.46±0.02	9.11±0.05	10.13±0.06	10.33±0.07
	S	F	7.53±0.04	8.67±0.03	9.77±0.03	10.53±0.03
		M	8.17±0.02	9.83±0.08	10.93±0.08	11.86±0.10
G3	C	F	7.07±0.03	7.90±0.04	8.71±0.04	9.55±0.05
		M	7.40±0.04	8.97±0.05	9.93±0.06	10.54±0.10
	S	F	7.60±0.03	8.81±0.04	9.87±0.03	10.68±0.03
		M	8.31±0.03	9.91±0.06	11.02±0.07	12.09±0.08
G4	C	F	7.09±0.02	7.88±0.03	8.65±0.03	9.56±0.04
		M	7.55±0.04	8.95±0.05	9.77±0.05	10.38±0.13
	S	F	7.78±0.03	8.90±0.04	9.99±0.02	10.81±0.03
		M	8.47±0.04	10.13±0.07	11.15±0.09	12.25±0.11
Significances						
Gen.			**	**	**	**
Line			**	**	**	**
Sex			**	**	**	**
Gen.*Line			**	**	**	**
Gen.*Sex			**	**	**	**
Line*Sex			**	**NS**	**NS**	**
Gen.*Line*Sex			*	**NS**	**NS**	*

KL= keel length, Gen.= Generation, C= control line, S= selected line, M= males, F= females.
*:P≤ 0.05, **:P≤ 0.01, NS: Not significant

Genetic Parameters

Concerning the Selection Differential (SD), selection response (ΔG) and realized heritability (h^2_R) estimates for shank length at 4, 8, 12, 16 and 20 weeks of age during five generations are presented in Table 6. Selection differential of shank length was 0.22, 0.32, 0.30, 0.31, and 0.21 centimeter for base generation, while for four generation it was 0.63, 0.71, 0.89, 0.84, and 0.90 centimeter at 4, 8, 12, 16 and 20 weeks of age, respectively (Table 6). There is a divergent selection differential estimates over generations due to the total number available by generations and may be due to the selected numbers of males and females in each generation were different (Wang *et al.,* 1991; Abdellatif, 1999b; Younis *et al.,* 2013; and Abou El-Ghar and Abd El-Karim, 2016).

The cumulative selection responses in shank length after five generations of selection at 4, 8, 12, 16 and 20 weeks of age were 1.05, 1.03, 1.16, 1.54, and 1.94 centimeter, respectively (Table 6). These results indicated that the selected line showed significantly longer shank length than the control line. It seemed that the selection responses in shank length showed high estimates than reported in the other selection programs in local chicken strains. Younis *et al.,* (2013), found that the cumulative selection response in shank length (0.31 cm) at 12 weeks of age through three generations of selection in Dokki-4 chicken strain and (0.6 cm) in the second generation of selection in Inshas strain (Abou El-Ghar and Abd El-Karim, 2016).

The realized heritability estimates of shank length over five generation based on the selection differential by line and generation are presented in Table 6. It noticed that the realized heritability of shank length had high estimates (0.52, 0.40, 0.38, 0.52 and 0.61) at 4, 8, 12, 16 and 20 weeks of age, respectively (Table 6). This indicate that the variability due to the additive genes action is probably higher than the other genetic effects in a selection program on Dandarawi chickens (Abdellatif, 1999b).

Table 6. Selection differential, selection response, and realized heritability for shank length (SL) over generations at 4, 8, 12, 16 and 20 weeks of age

Generation	Line	SL_4	SL_8	SL_{12}	SL_{16}	SL_{20}
G0	C	4.02	6.30	7.36	7.60	7.86
	S	4.24	6.62	7.66	7.91	8.07
	SD	0.22	0.32	0.30	0.31	0.21
G1	C	4.61	6.69	7.75	8.19	8.63
	S	4.69	7.00	8.26	8.71	9.17
	SD	0.08	0.31	0.51	0.52	0.54
G2	C	4.31	6.51	7.64	8.24	8.82
	S	4.80	7.07	8.14	8.70	9.37
	SD	0.49	0.56	0.5	0.46	0.55
G3	C	4.33	6.56	7.50	8.10	8.59
	S	4.93	7.24	8.36	8.91	9.55
	SD	0.6	0.68	0.86	0.81	0.96
G4	C	4.44	6.62	7.63	8.30	8.90
	S	5.07	7.33	8.52	9.14	9.80
	SD	0.63	0.71	0.89	0.84	0.90
ΔG		1.05	1.03	1.16	1.54	1.94
h^2_R		0.52	0.40	0.38	0.52	0.61

G= Generation, S= selected line, C=control line, SD= selection differential, ΔG= cumulative selection response, h^2_R = realized heritability.

As for Selection Differential (SD), selection response (ΔG) and realized heritability (h^2_R) for keel length at 8, 12, 16 and 20 weeks of age during five generations are presented in Table 7. Selection differential estimates of keel length were 0.27, 0.35, 0.40, and 0.31 centimeter for base generation, while in four generation were 0.81, 1.01, 1.26, and 1.31 centimeter at 8, 12, 16 and 20 weeks of age, respectively. It noticed that the values of selection differential were positive and fluctuated over generations because of the total number available by generations and may be because the selected number of males and females in each generation were different (Wang *et al.,* 1991; Abdellatif, 1999b; and Younis *et al.,* 2013). In contrast, Abou El-Ghar and Abd El-Karim, (2016), found that negative value for selection differential in keel length in the first generation was (-0.1cm), while in the second generation it was positive (0.2cm) at 12 weeks of age in Inshas chicken strain.

The cumulative selection responses in keel length after five generations of selection were 1.12, 1.33, 1.93, and 2.35 centimeter at 8, 12, 16 and 20 weeks of age, respectively (Table 7). These finding indicated that there were positive changes in keel length at different ages.

This study indicated that, the selection responses recorded high estimates than reported in the other selection programs for body weight in local chicken strains. Younis *et al.,* (2013), found that the cumulative selection response of keel length (0.82 cm) at 12 weeks of age through three generations of selection in Dokki-4 chicken strain. On the other hand, Abou El-Ghar and Abd El-Karim, (2016), showed that there was negative selection response -0.4, and -0.08 at 12 weeks of age in the first and second generation of selection in Inshas strain, respectively.

As shown in (Table 7) The realized heritability estimates for keel length over five generations were 0.44, 0.43, 0.46, and 0.52 at 8, 12, 16 and 20 weeks of age, respectively. It noticed that the high recorded estimates of realized heritability for keel length at different age of study this due to the additive genetic effect that is probably higher than the other genetic effects in a selection program on Dandarawi chickens (Abdellatif, 1999b).

Table 7. Selection differential, selection response, and realized heritability for keel length (KL) over generations at 8, 12, 16 and 20 weeks of age

Generation	Line	Kl_8	Kl_{12}	Kl_{16}	Kl_{20}
G0	C	7.01	7.96	8.24	8.59
	S	7.28	8.31	8.64	8.90
	SD	0.27	0.35	0.40	0.31
G1	C	7.57	8.50	9.15	9.71
	S	7.78	8.90	9.89	10.45
	SD	0.21	0.40	0.74	0.74
G2	C	7.32	8.43	9.12	9.66
	S	7.82	8.91	9.87	10.65
	SD	0.5	0.48	0.75	0.99
G3	C	7.24	8.33	9.01	9.64
	S	7.97	9.15	10.05	10.80
	SD	0.73	0.82	1.04	1.16
G4	C	7.32	8.28	8.91	9.63
	S	8.13	9.29	10.17	10.94
	SD	0.81	1.01	1.26	1.31
	ΔG	1.12	1.33	1.93	2.35
	h^2_R	0.44	0.43	0.46	0.52

G= Generation, S= selected line, C=control line, SD= selection differential, ΔG= cumulative selection response, h^2_R = realized heritability.

Ultimately, the finding in the current study, revealed that the selection for high body weight at 8-weeks of age lead to positive changes for growth measures, and it is expected that after several generations of selection, Dandarawi chicken will be advantageous as a domestic chicken strain for body weight. So, it necessary to continue the program of selection to achieve more improvement for growth performance in Dandarawi chicken.

References

Abd El-Ghany, F.A. (2006). Genetic studies for growth traits in Inshas strain. Journal of Agricultural Sciences, Mansoura University. 31: 1301-1313.

Abd El-Karim, R.E., and Ashour, A.F. (2014). Effect of selection for body weight on body measurements and carcass traits. in EL-Salam strain of chicken in Egypt. Journal of Animal and Poultry Production, Mansoura University. 5: 459-461.

Abdelhady, M., Abdellatif, M.A., and Abdelfattah, M.G. (2019). Direct response due to selection for body weight at eight weeks of age in Dandarawi chicken: Body weight and conformation. Egyptian Poultry Science Journal. 39 (2):501-517.

Abdellatif, M.A. (1999a). Selection for body weight at eight weeks of age in Dandarawi chicken. I- Direct and correlated responses in growth measurements. Egyptian Poultry Science Journal. 19: 35- 52.

Abdellatif, M.A. (1999b). Selection for body weight at eight weeks of age in Dandarawi chicken. II - realized heritabilities and correlated response to selection for growth measurements. Egyptian Poultry Science Journal. 19: 691- 707.

Abou El-Ghar, R.S., and Abd El-Karim, R.E. (2016). Effect of early selection for body weight, keel length and breast circumference on egg production traits in Inshas strain of chickens. Egyptian Poultry Science Journal. 36: 375-387.

Alnahhas, N., Berri, C., Chabault, M., Chartrin, P., Boulay, M., Bourin, M.C., and Bihan-Duval, L. (2016). Genetic parameters of white striping in relation to body weight, carcass composition, and meat quality traits in two broiler lines divergently selected for the ultimate pH of the pectoralis major muscle. BMC genetics. 17(1): 1-9.

Ashour, A.F.; Badwi, Y.K., and Abd EL-Karim, R.E. (2015). Effect of selection for body weight on egg production, egg quality, fertility, and hatchability traits in EL-Salam chicken strain in Egypt. Journal of Animal and Poultry Production, Mansoura University. 6: 781-796.

Duncan, D.B. (1955). Multiple range and multiple F tests. Biometrics 11:1-42.

El-Attrouny, M., Iraqi, M., Khalil, M., and El-Moghazy, G. (2017). Genetic and phenotypic evaluation of growth traits in selection experiment performed in synthesized Benha chickens. Annals of Agricultural Science, Moshtohor. 51(1): 33-42.

Falconer, D.S. (1983). Introduction to quantities genetics. longman Ins. New York.

Falconer, D.S., and Mckay, T.F.C. (1996). Introduction to Quantitative Genetics. 4th edition (Longman Group, Essex, UK).

Kosba, M.A., Farghaly, M.H., Bahie EL-Deen, M.M., Iraqi, M.M., El-Laban, A.F.M., and Abdel-Halim, H.A. (2006). Genetic trends and evaluation for some productive traits in Alexandria chickens. Egyptian Poultry Science Journal. 26: 1497-1513.

Liu G., Dunnington E.A., and Siegel, P.B. (1994). Response to long term divergent selection for eight-week body weight in chickens. Poultry Science. 73: 1642-1650.

Marks, H. (1985). Direct and correlated responses to selection for growth. In poultry genetics and breeding. W.G. Hill; J.M. Manson and D. Hewitt. British Poultry Science Ltd., Edinburgh.

Mebratiea, W., Madsen, P., Hawken, R., Rome, H., Marois, D., and Henshall, J. (2019). Genetic parameters for body weight and different definitions of residual feed intake in broiler chickens. Genetic Selection Evolution. 51(1): 1-12.

Nassar, F.S. (2017). Productive performance in local chicken after five generations of crossing and selection for high live body weight. Egyptian Poultry Science Journal. 37(3): 779-813.

Ramadan, G. S., Moghaieb, R. E., EL-Ghamry, A.A. EL-Komy, E.M., Nassrar, F.S., Abdou, A.M., Ghaly, M.M., and Stino, F.K.R. (2014). Effect of selection for high live body weight on slaughter performance of Broiler breeds. Egyptian Poultry Science Journal. 34: 289-304.

Rishell, W. (1997). Genetic selection strategies for the future-Breeding and genetics-historical perspective. Poultry Science. 76: 1057-1061.

Rizk, A.M., Ramadan, G.S., Abdou, A.M., EI-Weshahy, O.A., and Rashed, O.S. (2022). Productive performances of tanta g-2 genotype selected for high body weight. Egyptian poultry science journal. 42(1): 1-16.

Rizkalla, H.E., Wagdy, A.Z., and Abd El-Hamied, E. F. (2002). The significance of early body measurements in Fayoumi chickens compared with a standard breed R.I.R. and some developed local strains. Journal of Agricultural Science, Mansoura University. 27(2): 869-879

Saleh, K., Younis, H.H., Rizkalla, H.E., and. Abd EL-Karim, R.E. (2008). Direct and correlated response of selection for improving body weight in El-Salam chickens. Egyptian poultry science journal. 28: 431-454.

SAS, Institute. (2009). SAS User's Guide: Statistics version 9.2 Edition, SAS Institute INC, Cary, NC, U.S.A.

Siegel, P.B. (1962). Selection for body weight at eight weeks of age. 1-Short term response and heritabilities. Poultry Science. 41:954-962.

Sultana, S. (2019). Selection for Improvement of Indigenous Chicken of Bangladesh. M.S. Thesis, Department of Animal Breeding and Genetics, Bangladesh Agricultural University, Bangladesh.

Sultana, S., Faruque, S., Bhuiyan, M.S.A., and Bhuiyan, A.K.F.H. (2021). Progress in the Performance of Indigenous Chickens Selected for Economic Traits in Bangladesh. journal of Agriculture, Food and Environment (JAFE)| ISSN (Online Version): 2708-5694 2.1: 50-54

Wang, L., McMillan, I., and Chambers, J.R. (1991). Genetic correlations among growth feed and carcass traits of broiler sire and dam populations. Poultry Science. 70: 719-725.

Wong-Valle, J.; McDaniel, G.R; Kuhlers, D.L., and Bartels, J.E. (1993). Correlated responses to selection for high or low incidence of tibial dyschondroplasia in broilers. Poultry Science. 72: 1621-1629.

Younis, H., Abdel-Ghany, F., and Awadein, N. (2013). Genetic improvement of egg production traits in dokki-4 strain. 2-correlated responses, heritability, genetic and phenotypic correlations for body weight traits. Journal of Productivity and Development, 18(3): 475-494.

التغيرات الوراثية والمظهرية في مقاييس النمو للخط المنتخب والكنترول عبر الأجيال في دجاج الدندراوي

محمد عبد الهادي بخيت[1]، محمد أبو القاسم عبداللطيف[1]، خالد رشدي[2]

[1]قسم انتاج الدواجن، كلية الزراعة، جامعة أسيوط، أسيوط، مصر

[2]معهد بحوث الإنتاج الحيواني والبنك القومي للجينات، مركز البحوث الزراعية، الجيزة، مصر

الملخص

لقد حظي التحسين الوراثي لوزن الجسم باهتمام كبير في صناعة الدواجن. لذلك أجريت هذه الدراسة على قطيع من دجاج الدندراوي خلال خمسة أجيال متتالية في مزرعة أبحاث الدواجن، كلية الزراعة، جامعة أسيوط لتحديد الاستجابة الوراثية في قياسات النمو بسب الانتخاب لوزن الجسم العالي عند عمر8 اسابيع وتقدير المكافئ الوراثي المحقق.

تم تقسيم الكتاكيت في كل جيل الي خطين، احدهما خط منتخب لوزن الجسم العالي عند عمر8 اسابيع والاخر خط المقارنة. تم تسجيل وزن الجسم، طول الساق وطول عظمة القص، وكذلك تم تقدير الفارق الانتخابي، والاستجابة الكلية للانتخاب، والمكافئ الوراثي المحقق لصفات النمو على مدى الأجيال.

أوضحت النتائج أن طيور الخط المنتخب تفوقت في وزن الجسم وطول الساق وطول عظمة القص مقارنة بتلك الموجودة في خط المقارنة ($P\leq0.01$) في مختلف الأعمار المدروسة. أيضا هناك اختلافات معنوية جداً ($P\leq0.01$) بين الأجيال، الخطوط والاجناس في وزن الجسم وطول الساق وطول عظمة القص في مختلف الاعمار. كذلك توجد تداخلات معنوية بين التأثيرات الرئيسية فيما يتعلق بالصفات المختلفة التي تم دراستها.

بعد خمسة أجيال من الانتخاب، كانت الاستجابة الكلية لوزن الجسم 4.75، 110.79، 223.80، 321.41، 297.89 و323.53 جرام عند عمر 0، 4، 8، 12، 16 و20 أسبوع على التوالي.

تباينت تقديرات المكافئ الوراثي المحقق من قيم متوسطة الي عالية (0.30- 0.61) لكل صفات النمو المدروسة عبر الأجيال في الاعمار المختلفة.

وطبقا للنتائج المتحصل عليها، من الضروري الاستمرار في برنامج الانتخاب لوزن الجسم لتحقيق مزيد من التحسن في قياسات النمو في دجاج الدندراوي.