IMPROVING THE PRODUCTIVITY OF BAHEIJ CHICKENS THROUGH BOTH OF BACKCROSSING AND SELECTION FOR BODY WEIGHT AT 8 WEEKS OF AGE
C. GROWTH TRAITS, BODY CONFORMATION, CHICK VIABILIT, AND CARCASS TRAITS

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ABSTRACT: Comparison study was carried out among three genotypes of Baheij breed, Baheij selected breed for increasing body weight at 8 weeks of age, Baheij upgraded groups through three generations and control group. Results were as follows:
1- Chicks of the 3rd generation were the heaviest (p<0.001) compared to those of the 1st and 2nd one at the different studied ages. Also, means of body weight of the upgraded group was the highest (p<0.001) compared to the other two groups and the selected group surpassed (p<0.001) the control one at all ages studied.
 2- The three studied factors affected significantly growth rate percentage (GR %) where birds of the 3rd generation had the highest value of GR% through most of the studied intervals. The upgraded group had the highest mean at 12-16 wks of age where, the selected group grew faster at 8-12 wks of age. Both of the upgraded and the selected groups had significantly the highest values compared with the control one at 0-12, 12-20 and at 0-16 wks of age, while both of the upgraded and control groups surpassed (p<0.001) the selected one at 12-16 wks of age.
3- Body weight (BW), shank length (SL), keel length (KL) and breast width had significantly (p<0.01) higher averages at 12 wks. of age compared to those at 8 wks of age. Also, the selected group had significantly the highest BW while, the upgraded group had the highest average of SL. Moreover, males were heavier (p<0.01) than females. 4- The birds of the 2nd generation had the best (p<0.01) chick viability at 0-4 wks of age, while the values of both of the 1st and 3rd generations were nearly similar and higher than that of the 2nd one at 4-8 wks of age. 5- Live body weight, carcass, gizzard, and heart weights differed (p<0.01) in birds of the 3rd generation compared to that of the 2nd one at 16 and 20 wks of age. On the other hand, upgraded group had the highest (p<0.01) values of most of carcass studied traits compared to the others, while the control one had significantly (p<0.01) the heaviest liver. It could be concluded that upgrading through crossing Silver Montazah sires to Baheij strain dams surpassed the selection in Baheij strain at 8 weeks of age throughout three generations in improving growth traits, chick viability, and carcass traits of progeny of both F2 and F3.

INTRODUCTION

Upgrading has most often been in "third world" countries to improve indigenous stocks, in so far as the local climatic and disease conditions allow. Highly production American and European poultry (or other livestock) often sicken and die in the tropics, but crosses of three-quarter bred with local breeds give a practical compromise between productivity and survivability (Scrivener, 2002). Baheij breed was developed through crossing with Silver Montazah strain (Mahmoud et al., 1974 and 1979). Therefore, crossing selected Silver Montazah males with Baheij females had to be applied in order to overcome the problem of reaching genetic equilibrium in Baheij breed, thus allowed effective selection for certain productive traits. Growth is a compound trait influenced by genetic and management, especially nutrition and health. Genetic improvement in growth of poultry has traditionally proceeded via selection for body weight at a fixed age. The estimates of genetic parameters provide support to analyze the genetic associations between traits in a data set. These estimates could be used to decide the selection method and choose what birds could be selected to attain the breeding goal (Ledur et al., 1993). Also, Knowledge on genetic parameters is essential for any genetic improvement program for growth or egg production. There is a lot of literature on genetic parameters for growth traits (Gondwe and Wollny, 2005; and Norris and Ngambi, 2006). Crossing was found to be effective for improving body weight as reported by Shebl et al. (1995), Nawar et al. (2004), and Amin (2007), who found positive heterosis in body weight at 6 and 12 wks of age in both sexes for two native Egyptian chicken, also, Nestor et al. (2006) and Amin (2009) reported positive effect of backcrossing on growth traits in turkey. Moreover, Mostafa and Nofal (2000), Amin (2009) found significant difference between the two sexes in body weight at different ages. On the other hand, correlations among the live body weight and body measurements and slaughter traits are important in poultry breeding. Isguzar (2003) reported that differences of body parts weights were statistically significant (p<0.05) between genotypes and between sexes of Bronze and White turkeys. Moreover, the average percentages of wings, neck and head of females Bronze turkeys were higher than White turkeys at 14 and 18 weeks of age. In contrast, Ramakrishna et al. (2012) found that ready-to-cook yield in tom turkeys did not differ significantly between three studied turkey varieties. Crossbreeding was found to improve chick viability (Nawar and Abdou, 1999; and Nawar et al., 2004). Information on the relationships among pre- and post-slaughter traits of broiler chickens is valuable to poultry farmers and researchers as it allows early selection, as well as giving a chance to make an early evaluation of the breeding program (Yakubu et al., 2009). Amin (2009) using Gimmezah (G) strain as a sire strain in G x RIR cross resulted in superiority of eviscerated carcass weight and giblets weight percentages at 24 wks of age. Concerning the selection effect, Gaya et al. (2006) cited that based on the heritability estimates obtained, the analyzed traits (BW at 38 d and at 42 d and the carcass traits (eviscerated BW, breast and leg weights, and the body composition traits (heart, gizzard, liver weights) seemed to be able to respond to selection, at variable intensities. Sandercock et al. (2009) reported that the correlations for live weight, carcass yield, breast, drum, and wing portions were high; whereas those for the thigh portion and yield were low. Also, genetic variation for relative weight of heart was moderately high and greater at 10 than at 6 wk of age and broiler carcasses had a relatively smaller proportion of heart weight. The aim of the present study is to find out the effect of either upgrading or selection (for 8 weeks of age) programs for improving

body weight at different ages, growth efficiency, and growth rate and chicks viability percentages at different intervals and both of body measurements and conformations at 8 and 12 wks of age, also, carcass traits at 16 and 20 wks of age were studied.

MATERIALS AND METHODS

This study was conducted at El-Sabahia Poultry Research Station, Alexandria, Animal Production Research Institute, Agriculture Research Center, Egypt.

Breeding and management:

Upgrading Line: In the first generation, females of the Baheij (Bj) breed were crossed to selected Silver Montazah (SM) males as a parent line according to the individual mature BW (average), thus, the females produced (1/2SM + 1/2Bj) were backcrossed to the same parent line throughout two additional generations [produced (3/4SM + 1/4Bj) and (7/8SM + 1/8Bj), in the two generations, respectively].

Selection Line: Selection scheme was accomplished to improve body weight at 8 weeks of age of Baheij breed throughout the three studied generations. On the basis of 8-week body weight birds were divided into heavy birds (mean $\pm$ 0.5 standard deviation).

Control line: Chicks of Baheij breed were randomly chosen to establish a pedigreed control population.

Continuous lighting was provided from hatching to 8 wk of age, at that time, the photoperiod was reduced to 12 h/d. and remained at this level during the rearing period. After the rearing period, at 20 weeks of age, females were housed in breeding pens (10 pullets + 1 male, each). The birds were fed a starter diet (19% crude protein and 2800 Kcal/kg) up to 8 weeks of age, grower diet (15% crud protein and 2700 K cal/kg) up to 20 weeks (17% crude protein and 2850 Kcal/kg). Thereafter, feed and water were supplied ad libitum. The average number of progeny reared in the three generations was 68, 135,

133 chick for the BjBj line, and 210, 315, 329 chick for the SM x Bj genotype, respectively.

The studied traits:

- Body weights (BW) at hatch, 4, 8, 12, 16, and 20 wks of age presented in Tables.

- Growth rate using the following equation (Lerner and Asmundson, 1932).

$GR= [W_2-W_1/1/2(W_2+W_1)] \times 100$

Where: GR: rate of growth, W1: the initial weight, W2: the second weight.

- Chick viability through the growth period (0-8 weeks) of age.

- Body measurements:

Shank length, keel length and breast width which was measured with a modified verger angle meter in millimeters. It was measured at a point very near to the front end of the breast bone and ¾ inch down from the keel at 8 and 12 weeks of age at the 3rd generation. Random sample of 6 cocks at 16 and 20 weeks of age from each genotype for the two generations were used to study the carcass traits (Absolute values and percentages of carcass, legs, gizzard liver and heart.

Statistical analysis:

Data of growth traits were analyzed using fixed models SAS institute (1988):

$Y_{ijkl} = U + Gn_i + Gt_j + S_k + (GnGt)_{ij} + (GnS)_{ik} + (GtS)_{jk} + GnGtS)_{ijk} + e_{ijkl.}$

Where: Y_{ijkl}= an observations, U = overall mean, Gn_i = the fixed effect of ith generation, Gt_j = the fixed effect of jth genotype, S_k = the fixed effect of kth sex, and $(GnGt)_{ij}$, $(GnS)_{ik}$, $(GtS)_{jk}$ and $(GnGtS)_{ijk}$ = effects of the interactions between the three factors studied, and e $_{ijkl}$ = random error.

The other traits which studied were analyzed using fixed models SAS institute (1988):

$Y_{ijk} = U + Gn_i + Gt_j + (GnGt)_{ij} + e_{ijk.}$

Where: Y_{ijk}= an observations, U = overall mean, Gn_i= the fixed effect of ith generation, Gt_j= the fixed effect of jth genotype, $(GnGt)_{ij}$= effect of the interaction between the two main factors, and e $_{ijk}$= random error. Significant differences

among means were tested by Duncan Test (1955).

RESULTS AND DISCUSSION

1- Body weight (BW): Least square means for body weight (BW) as affected by generation, genetic group for males and females are presented in Table 1. Concerning the effect of generation, the results showed that, chicks of the 3rd generation were the heaviest (p<0.001) compared to those of the 1st and 2nd one (801, 1068 and 1298 gm) at 12, 16 and 20 wks of age, respectively. The same trend was found at the early periods of growth (0, 4, and 8 wks of age as shown in Table 1). On the other hand, while the average of body weight of both of the 1st and 2nd generations were nearly similar at 12 wks of age, the superiority of the 1st one over the 2nd generation (p<0.001) was found at 16 wks of age, while the opposite was found at 20 wks of age. Also, results showed that the least square means of chicks BW of upgraded group surpassed (p<0.001) those of selected and control groups at all ages studied. At the meantime, the selected group surpassed (p<0.001) those of control one at all ages studied.

The positive effect of crossing agreed with the finding of Yalcin et al. (2000), Mohamed (2003), Aly et al. (2005), and Amin (2007) on chicken. In addition, Aly et al. (2006) reported that heterotic effects of crossing between Bandarah (B) x G cocks and their reciprocal crosses were positive in body weight at 16 weeks of age. Moreover, Nestor et al. (2006) reported that for maximum gains per generation, backcrossing probably should be used for maximum of two or three generations. Amin (2009) found that using G strain as a dam strain in G x Kosmos (KK) and RIR x KK crosses improved body weight rate at 4, 8, 12 and 16 wks of age.

As for the effect of selection on BW, selection for high and low threshold weight for onset of lay, carried out in a broiler line,

the total response to selection over two generations was 382 g. The difference in 6-wk body weight of the two lines was +19 g in favor (p>0.05) of the high line (Eitan and Soller, 1995). Williams et al. (2002) found that long-term divergent selection for high (HH) and low (LL) BW at 56 d of age in White Plymouth Rock chickens resulted in superiority of line HH chickens of the 42nd generation of selection, they were heavier at 28, 56, 168, and 266 d of age, as well as at sexual maturity than those from line LL of the same generation. Nestor et al. (2008) reported that a line (F) of turkeys was selected over 40 generations for increased 16-wk BW. Selection was effective in increasing 16-wk BW and genetic increases in 16-wk BW in the selected line were positively associated with BW at other ages (8 and 20 wks of age and at 50% production), shank length at 16 wk. of age. Moreover, Nigussie et al. (2011) found that the BW16 showed higher heritability, this trait seemed to have common genes and utilizing it as selection trait would be expected to improve growth performance of local studied chicken.

Males were heavier (p<0.001) than female at all ages studied except those of 1 day of hatch which had nearly similar weight averages. Same results were reported by Mostafa and Nofal (2000) and Amin (2008). Statistical analysis revealed no significant interaction between the three main factors except in BW at 8, 16 and 20 wks of age. Significant (p<0.001) effect of interaction between generation and genotype was found. The birds in the 3rd generation (7/8 SM + 1/8 Bj) were the heaviest (1171 and 1419 g) at 16 and 20 weeks of age, respectively.

2-Growth rate percentage (GR%): The results presented in Table 2 showed that least square means of GR% of birds differed (p<0.001) through the three consecutive generations, where birds of the 3rd Generation had the highest value of GR% through the intervals 0-12, 12-16, 12-20, 0-16 and 0-20 wks of age (182.4, 28.0,

46.8, 186.5 and 188.8%, respectively), except that of the late age (16-20 wks), the 2nd generation had the highest value (24.7%).

Both of the upgraded and the selected groups had significantly the highest values compared with the control one at 0-12, 12-20 and at 0-16 wks of age, while both of the upgraded and control group surpassed (p<0.001) the selected one at 12-16 wks at age. No significant differences were found within the three genotypes at 16-20 and 0-20 wks of age. Barbato (1991) found on meat-type chickens that growth rate exhibited significant heterosis due to both autosomes and the sex chromosomes. Highly significant differences were found between the two sexes at 0-12, 12-16, 12-20, 0-16 and 0-20 wks of age where males had higher growth rate percentage than female. These results were in agreement with those reported by Mostafa and Nofal (2000) and Amin (2008 and 2009) who found significant differences between both sexes in body weight. All interactions between the main factors were not significant except that for GR% at 0-16 wks of age. The birds of upgraded groups at both the 1st and 3rd generations were equal and had significant GR% (185.5%).

3- Body measurements (BM): Results presented in Table 3 suggested BM of birds differed by age where, body weight (BW), shank length (SL), keel length (KL) and breast width (BW) had significantly (p<0.01) higher average at 12 wks of age compared to those at 8 wks of age. Also, BW and SL differed significantly (p<0.05) within the three genotypes where, the selected group had the highest BW while, the upgraded group had the highest average of SL. Moreover, male had significantly higher values of BW (p<0.01) than females (750.1 vs. 576.3 g). These results were in agreement with those reported by El-Turkey (1981) who reported that 3rd generations were nearly similar and higher than that of the 2nd one at 4-8 wks of age. On the other hand, no significant

differences were not significant among body measurements of purebreds and crossbreds at certain ages (8 and 12 wks), while Abou-El-Ella (1982) reported that crossbreeding was found to be effective on body measurements, particularly on keel length and breast width. In addition, Amin (2009) found that all crosses and backcrosses in turkey had significantly the lowest means of growth efficiency through the period (4-20 wks of age) concerning the three generations studied and the difference between overall means of growth efficiency for both sexes was significant at all periods studied except for 12-16 and 12-20 wks of age. On the other hand, our results disagreed with those reported by Sharaf et al. (2006) concerning both shank and keel lengths at 4 weeks in quail, while the results of the same authors concerning both traits showed that average of reciprocal crossbreds surpassed both of pure and crossbred averages at 5 wks of age. General increase in some body measurements in each genotype as age increased and this finding in agreement with Adedeji et al. (2006). Mulder et al. (2009) results indicate good opportunities to simultaneously increase the mean and improve uniformity of body weight of broilers by selection. Wolc et al. (2009) was indicating the possibility of improving uniformity of BW (34-d-old male and female broiler chickens) and conformation by means of selection and genetic correlations for BW, and for conformation score, between sexes were high. Rekaya (2013) reported that genetic correlations between BW and conformation traits were moderate to high.

4-Viability percentage (V%): Results in Table 4 showed that viability of chicks differed significantly (p<0.01) through the period 0-4 and 4-8 wks of age for the three generations studied where the viability of the 2nd generation was the highest at 0-4 wks of age, while the values of the 1st and differences were found within the three genotypes, also the same results were found between the two sexes at the different

period studied. The results of this study disagreed with those reported for some investigators who confirmed the superiority of crossbred over purebreds in viability (Fairfull, 1990; Mandour et al., 1992; Aly et al., 2005; and Amin, 2007).

5-Carcass traits: Results in Table 5 showed that live body weight, carcass, gizzard, and heart weights differed significantly (p<0.01) in birds of the 3rd generation compared to that of the 2nd one at 16 and 20 wks of age (1331.6 g, 1044.6 g, 40.14 g, and 11.38 g vs. 1126.8 g, 836.1 g, 35.03g, and 8.68 g, respectively). Concerning leg and liver weights, no significant differences were found between the two generations studied. On the other hand, upgraded group had the highest (p<0.01) live weight, carcass, gizzard and heart weights compared to the others while the control group had significantly the heaviest liver. No significant effects of genotype on percentages of the studied organs. These results were in agreement with those reported by several investigators. Mandour et al. (1996) reported that the overall mean of edible giblets percentages were greater (p<0.05) for Silver Montazah line crosses than corresponding pure strain. Aly et al. (2006) reported that liver relative weight of B x G cross cocks was the heaviest, also, negative heterotic effects were found concerning relative weights of most organs studied. It was found that the lowest dressing percentage was obtained when Silver Montazah sire mated to different dams (El-Turkey, 1981). Moreover, Balat et al.

(2005) reported that carcass traits did not express any significant differences between purebreds Bj, Matrouh (Mat) and White Leghorn (WL) and crossbred (Bj x Mat. or Bj x WL), where Baheij breed was used as a sire. Moreover, Amin (2009) found heterotic effects of the reciprocal crosses among G, RIR, and KK strains which were positive for drawing weight and for eviscerated carcass weight at 24 wks of age. On the other hand, Konarzewski et al. (2000) reported that the differences between strains in growth rate during the first week after hatching were not reflected in similar differences in the relative masses of the heart, liver. Cloete et al. (2006) on ostrich, reported that heritability estimate was small (0.12) for chest circumference. Sandercock et al. (2009) found that the relative heart weight decreases with selection for body weight as has been reported by several authors (e.g., Jackson and Diamond, 1996; Rance et al., 2002; and Gaya et al., 2007). Also, Gaya et al. (2006) reported that the genetic correlation estimates between body composition traits were variable. A large genetic association between a great number of performance and carcass traits seemed to exist. It could be concluded that upgrading line through crossing Silver Montazah sires to Baheij strain dams surpassed the selected line in Baheij breed for body weight at 8 weeks of age throughout three generations, in improving most of the growth traits, certain body conformation, chicks viability, and carcass traits of progeny of both the second and the third generations which studied.

Upgrading- Selection- Growth and carcass traits- Body conformation- chicks viability.

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Table (1): Effect of genotype and generation on least squares means of body weight of male and female birds at different ages studied

Generation	Genotype	Body weight, g								
		1-day			4-wk			8-wk		
		M	F	Average	M	F	Average	M	F	Average
1	1/2SMx1/2Bj	34.7 ± 0.3	34.1 ± 0.3	34.4 ± 0.2	274.3 ± 5.7	255.9 ± 6.8	265.1 ± 4.5	460.7 ± 8.2	414.6 ± 9.7	437.7 ± 6.3
	Bj.Selected L1	34.3 ± 0.3	34.9 ± 0.3	34.1 ± 0.2	252.7 ± 6.1	236.7 ± 6.9	244.7 ± 4.6	435.6 ± 8.7	372.5 ± 9.9	404.0 ± 6.6
	BjxBj	34.2 ± 0.4	34.7 ± 0.4	33.9 ± 0.3	238.9 ± 9.8	215.4 ± 6.8	277.1 ± 6.8	411.1 ± 14.0	356.6 ± 13.8	383.9 ± 9.8
Overall mean		34.4 ± 0.2	33.9 ± 0.2	34.1 ± 0.1^{B}	255.3 ± 4.3	236.0 ± 4.5	245.6 ± 3.1^{C}	435.8 ± 6.1	381.3 ± 6.6	408.5 ± 4.5^{C}
2	3/4SMx1/4Bj	34.5 ± 0.2	34.1 ± 0.2	34.3 ± 0.1	289.3 ± 4.7	246.2 ± 4.9	267.8 ± 3.4	519.2 ± 7.0	429.3 ± 7.6	474.2 ± 5.1
	Bj.Selected L2	34.1 ± 0.2	33.6 ± 0.3	33.9 ± 0.2	269.9 ± 5.0	239.2 ± 5.2	254.5 ± 4.6	499.1 ± 7.3	407.1 ± 9.9	453.1 ± 5.3
	BjxBj	34.1 ± 0.4	33.4 ± 0.3	33.7 ± 0.3	256.6 ± 8.1	234.4 ± 7.0	245.5 ± 5.4	441.6 ± 14.0	392.2 ± 10.2	416.9 ± 7.8
Overall mean		34.2 ± 0.2	33.7 ± 0.2	34.0 ± 0.1^{B}	$271.9\pm0.3.5$	240.0 ± 3.3	255.9 ± 2.5^{B}	486.6 ± 5.1	409.5 ± 4.9	448.1 ± 3.6^{B}
3	7/8SMx1/8Bj	36.0 ± 0.2	36.6 ± 0.2	36.3 ± 0.1	307.0 ± 3.9	247.9 ± 4.7	277.5 ± 3.0	628.4 ± 5.6	506.4 ± 6.8	567.4 ± 4.4
	Bj.Selected L3	36.0 ± 0.2	36.4 ± 0.2	36.2 ± 0.2	266.9 ± 5.1	271.4 ± 5.4	269.2 ± 3.7	638.9 ± 7.3	525.0 ± 7.8	581.9 ± 5.3
	BjxBj	34.9 ± 0.8	34.2 ± 0.7	34.6 ± 0.5	254.8 ± 16.0	223.9 ± 14.0	239.3 ± 11.1	462.2 ± 2.3	402.7 ± 20.9	432.4 ± 15.9
Overall mean		35.7 ± 0.3	35.7 ± 0.3	35.7 ± 0.1^{A}	276.2 ± 6.0	247.7 ± 5.0	262.0 ± 4.6^{A}	576.5 ± 4.5	478.0 ± 7.8	527.3 ± 5.8^{A}
Crossbreds overall mean		35.0 ± 0.1	34.9 ± 0.2	35.0 ± 0.1^{a}	290.2 ± 2.8	250.0 ± 3.0	270.1 ± 2.1^{a}	536.1 ± 4.0	450.1 ± 4.6	493.1 ± 3.1^{a}
Bj.Selected overall mean		34.8 ± 0.2	34.6 ± 0.2	34.7 ± 0.1^{b}	263.2 ± 3.1	249.1 ± 3.4	256.1 ± 2.3^{b}	524.5 ± 4.5	534.9 ± 4.9	479.7 ± 3.3^{b}
Baheij overall mean		34.4 ± 0.3	33.8 ± 0.3	34.1 ± 0.1^{c}	250.1 ± 7.0	224.6 ± 6.3	237.3 ± 4.7^{c}	438.3 ± 10.0	383.8 ± 9.1	411.1 ± 6.7^{c}
Genotypes overall mean		34.8 ± 0.1	34.4 ± 0.1	34.87	267.8 ± 2.7	241.2 ± 2.6	263.5	499.6 ± 3.9	422.9 ± 3.7	492.4

- Means having different letters in every column and within every factor of treatments are significantly different (p<0.05).

- All main factors studied had highly significant (0.001) effect on the body weight except the sex which had no significant effect on body weight at hatch, while all interactions between them were not significant.

Cont. Table (1).

Generation	Genotype	Body weight, g								
		12wk			16wk			20wk		
		M	F	Average	M	F	Average	M	F	Average
1	1/2SMx1/2Bj	769$\pm$12	688$\pm$14	729$\pm$9	1042$\pm$16	840$\pm$20	941$\pm$13	1265$\pm$21	1029$\pm$25	1147$\pm$16
	Bj.Selected L1	751$\pm$12	662$\pm$15	706$\pm$10	985$\pm$17	825$\pm$20	905$\pm$13	1213$\pm$23	991$\pm$26	1102$\pm$17
	BjxBj	733$\pm$21	611$\pm$20	672$\pm$15	975$\pm$28	764$\pm$14	870$\pm$.20	1182$\pm$36	922$\pm$37	1052$\pm$26
Overall mean		751$\pm$9	654$\pm$10	702 $\pm$7[b]	1001$\pm$12	810$\pm$13	905$\pm$9 [b]	1220$\pm$16	981$\pm$17	1100$\pm$12[c]
2	3/4SMx1/4Bj	819$\pm$10	666$\pm$11	742$\pm$7	986$\pm$14	814$\pm$15	900$\pm$10	1307$\pm$18	1058$\pm$18	1183$\pm$13
	Bj.Selected L2	790$\pm$11	652$\pm$11	621$\pm$8	975$\pm$14	812$\pm$15	894$\pm$10	1289$\pm$18	1033$\pm$19	1161$\pm$13
	BjxBj	751$\pm$17.2	627$\pm$15	689$\pm$12	953$\pm$24	779$\pm$21	866$\pm$15	1178$\pm$29	970$\pm$26	1074$\pm$20
Overall mean		786$\pm$8	648$\pm$7	717$\pm$5[b]	971$\pm$10	802$\pm$10	887$\pm$7[c]	1258$\pm$13	1020$\pm$12	1139$\pm$9[b]
3	7/8SMx1/8Bj	944$\pm$8	757$\pm$10	850$\pm$6	1311$\pm$11	1032$\pm$14	1171$\pm$9	1586$\pm$14	1251$\pm$17	1419$\pm$11
	Bj.Selected L3	949$\pm$11	782$\pm$12	865$\pm$8	1294$\pm$14	990$\pm$16	1142$\pm$11	1567$\pm$18	1221$\pm$20	1394$\pm$14
	BjxBj	749$\pm$35	627$\pm$31	688$\pm$23	971$\pm$47	811$\pm$41	891$\pm$12	1175$\pm$26	986$\pm$53	1081$\pm$40
Overall mean		880$\pm$13	722$\pm$11	801$\pm$9[a]	1192$\pm$7	944$\pm$15	1068$\pm$1[a]	1443$\pm$21	1153$\pm$20	1298$\pm$15[a]
Crossbreds overall mean		844$\pm$6	704$\pm$7	774$\pm$5[a]	1113$\pm$8	896$\pm$9	1004$\pm$6[a]	1386$\pm$10	1113$\pm$13	1249$\pm$8[a]
Bj.Selected overall mean		830$\pm$7	698$\pm$7	764$\pm$5 [b]	1085$\pm$9	876$\pm$10	980$\pm$7[b]	1356$\pm$12	1081$\pm$13	1219$\pm$9[b]
Baheij overall mean		744$\pm$15	622$\pm$13	683$\pm$10 [c]	966$\pm$20	785$\pm$18	876$\pm$14[c]	1178$\pm$25	959$\pm$23	1069$\pm$17[c]
Genotypes overall mean		806$\pm$6	675$\pm$6	740	1055$\pm$8	851.9$\pm$7	953	1307$\pm$10	1051$\pm$10	1253

- Means having different letters in every column and within every factor of treatments are significantly different (p<0.05).

- All main factors studied had highly significant (0.001) effect on the body weight while all interactions between them were not significant except that for body weight at 16 and 20 wks of age, were influenced (p<0.001) by the interaction of generation x genotype,

Upgrading- Selection- Growth and carcass traits- Body conformation- chicks viability.

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Table (2): Effect of genotype and generation on least squares means of growth rate percentage of male and female birds at different ages studied

Generation	Genotype	Growth rate percentage								
		0-12 wks			12-16 wks			16-20 wks		
		M	F	Average	M	F	Average	M	F	Average
1	1/2SMx1/2Bj	180.9±0.6	180.4±0.5	180.7±0.3	30.1±1.0	20.6±1.2	25.33±0.8	20.3±0.9	21.3±1.2	20.8±0.7
	Bj.Selected L1	182.1±0.5	179.7±0.5	180.9±0.3	26.5±1.1	23.9±1.2	25.2±0.8	21.9±1.2	20.9±1.1	21.4±0.8
	BjxBj	181.7±0.9	178.3±0.4	180.0±0.6	28.5±1.7	24.1±1.7	26.3±1.2	20.1±0.8	22.6±1.8	21.4±1.1
Overall mean		181.6±0.3	179.5±0.4	180.5±0.3[C]	28.4±0.7	22.8±0.8	25.6±0.6[b]	20.7±0.8	21.6±0.3	21.2±0.5[b]
2	3/4SMx1/4Bj	183.4±0.4	179.9±0.4	181.6±0.4	19.1±0.9	21.2±0.5	20.1±0.6	28.1±0.8	25.5±0.8	26.8±0.5
	Bj.Selected L2	182.9±0.4	179.8±0.4	181.4±0.3	21.2±0.8	21.9±0.9	21.6±0.6	28.1±0.9	22.8±0.9	25.4+0.6
	BjxBj	182.4±0.6	179.2±0.6	180.8±0.5	23.4±1.4	22.3±1.3	22.9±0.9	21.7±1.4	22.2±1.3	22.0+0.8
Overall mean		182.9±0.3	179.6±0.2	181.3±0.2[b]	21.2±0.6	21.7±0.6	21.5±0.4[c]	25.9±0.6	23.5±0.6	24.7±0.4[a]
3	7/8SMx1/8Bj	185.1±0.3	181.2±0.3	183.1±0.3	32.0±0.6	30.1±0.8	31.0±0.6	18.5±0.7	19.0±0.8	18.8±0.5
	Bj.Selected L3	185.2±0.4	182±0.4	183.5±0.3	30.4±0.9	23.4±2.9	26.9±0.6	19.0±0.9	20.7±1.0	19.8±0.6
	BjxBj	181.7±1.3	179.1±1.7	180.4±1.1	26.6±2.9	25.7±2.6	26.2±2.0	19.2±2.5	19.6±2.3	19.4±1.7
Overall mean		183.9±0.4	180.8±0.4	182.4±0.3[a]	29.7±1.0	26.4±0.9	28.0±0.7[a]	18.9±1.0	19.8±1.9	19.3±0.7[c]
Crossbreds overall mean		183.1±0.3	180.5±0.2	181.8±0.2	27.1±0.5	23.9±0.5	25.5±0.3	22.3±0.5	21.9±0.5	22.1±0.3
Bj.Selected line overall mean		183.4±0.2	180.5±0.2	181.9±0.2	26.1±0.5	23.1±0.6	24.6±0.4	22.9±0.5	21.4±0.6	22.2±0.4
Baheij overall mean		181.9±0.5	178.8±0.5	180.4±0.5	26.2±1.2	24.0±1.1	25.1±0.8	20.4±1.1	21.5±1.0	20.9±0.7
Overall mean of genotypes		182.8±0.23	179.9±0.20	182.01	26.4±0.4	23.7±0.4	25.46	21.9±0.5	21.6±0.5	22.00
Significance of:										
Generation (Gn)		***			***			***		
Genotype (Gt)		**			**			NS		
Sex (S)		**			***			NS		

- Means having different letters in every column and within every factor of treatments are significantly different (p<0.05),

- All interactions between the main factors were not significant except that for growth rate % at 0-16 period, which was influenced (p<0.001) by the interaction of generation x genotype,

** Significant at p<0.01, *** Significant at p<0.001, NS: non significant.

Cont. Table (2).

Generation	Genotype	Growth rate percentage								
		12-20 wks			0-16 wks			0-20 wks		
		M	**F**	**Average**	**M**	**F**	**Average**	**M**	**F**	**Average**
1	1/2SMx1/2Bj	50.8±1.4	41.3±1.8	46.0±1.1	186.9±0.2	184.0±1.3	185.5±0.2	187.5±0.6	186.9±0.7	187.2±0.4
	Bj.Selected L1	48.1±1.6	44.2±1.8	46.2±1.2	186.3±0.2	183.7±0.3	184.9±0.2	188.8±0.5	186.5±0.6	187.8±0.4
	BjxBj	46.5±2.5	45.8±2.6	46.1±1.7	186.2±0.4	182.7±0.4	184.4±0.3	188.6±1.9	185.8±0.9	187.2±0.7
Overall mean		48.5±1.2	43.7±1.2	46.1±0.8[b]	186.4±0.1	183.5±0.2	184.9±0.1[b]	188.3±0.4	186.4±0.4	187.3±0.2[b]
2	3/4SMx1/4Bj	46.4±1.1	45.6±1.2	46.0±0.8	186.2±0.1	183.6±0.2	184.9±0.1	189.6±0.5	187.2±0.5	188.4±0.3
	Bj.Selected L2	48.5±1.3	43.8±1.3	46.2±0.9	86.2±0.2	183.7±0.3	184.9±0.1	189.4±0.4	186.2±0.4	187.8±0.3
	BjxBj	44.6±1.9	43.8±1.3	44.2±1.3	185.9±0.3	183.2±0.3	184.6±0.2	188.7±0.8	186.5±0.7	187.6±0.5
Overall mean		46.5±0.9	44.4±0.8	45.4±0.6[b]	186.1±0.1	183.5±0.1	184.8±0.1[b]	189.2±0.3	186.6±0.1	187.9±0.2[b]
3	7/8SMx1/8Bj	49.7±0.9	48.3±1.1	49.0±0.7	186.9±0.2	184.0±0.3	187.5±0.1	187.5±0.6	186.9±0.7	187.2±0.4
	Bj. Selected L3	48.6±1.2	43.6±1.4	46.1±0.9	188.9±0.2	185.7±0.6	187.3±0.1	195.8±0.4	188.3±0.4	189.6±0.2
	BjxBj	45.2±3.9	45.7±3.5	45.4±2.6	186.2±0.4	182.7±0.4	184.7±0.3	188.6±0.9	185.8±0.9	187.2±0.7
Overall mean		47.8±1.4	45.9±1.3	46.8±0.7[a]	187.9±0.2	185.1±0.2	186.5±0.1[a]	189.9±0.5	187.7±0.5	188.9±0.3[a]
Crossbreds overall mean		48.9±0.7	45.0±0.8	47.0±0.5	187.4±0.1	184.5±0.1	186.0±0.1[a]	189.3±0.3	187.5±0.3	188.4±0.2
Bj.Selected line overall mean		48.4±0.8	43.8±0.8	46.2±0.6	187.1±0.1	184.4±01	185.7±0.08	189.7±0.3	186.9±0.3	188.3±0.2
Baheij overall mean		45.4±1.6	45.1±1.5	45.3±1.6	186.0±0.3	183.2±0.2	184.6±0.2b	188.6±0.7	186.2±0.6	187.4±0.4
Overall mean of genotypes		47.6±0.6	44.7±0.6	46.77	186.8±0.1	184.0±0.1	185.99	189.2±0.2	186.9±0.2	188.55
Significance of:										
Generation (Gn)		***			***			***		
Genotype (Gt)		*			***			**NS**		
Sex (S)		***			**			***		

- Means having different letters in every column and within every factor of treatments are significantly different (p<0.05),

- All interactions between the main factors were not significant except that for growth rate % at 0-16 period, which was influenced (p<0.001) by the interaction of generation x genotype,

* Significant at p<0.05, ** Significant at p<0.01, *** Significant at p<0.001, NS: non significant.

Table (3): Effect of genotype and generation on least squares means of live body weight, shank and keel length and breast width of the two genotypes studied at 8 and 12 weeks of age for males and females of the 3rd generation

Age	Genotype	Sex	Live body Weight	Shank length	Keel length	Breast width
	7/8SMx1/8Bj	M	585.5±21.6	6.81±0.27	6.13±0.30	4.36±0.22
		F	455.2±12.8	6.83±0.14	6.10±0.15	4.40±0.09
	Average		494.5±13.3	6.83±0.13	6.11±0.14	4.39±0.09
8	Bj.Selected	M	482.5±27.5	5.70±0.30	5.0±0.5	3.45±0.11
wk	L.	F	453.9±17.14	6.68±0.19	6.23±0.28	4.26±0.11
	Average		456.8±15.6	6.58±0.18	6.11±0.27	4.18±0.12
	BjxBj	M	499.0±20.2	7.44±0.32	6.76±0.41	5.00±0.24
		F	445.1±10.2	6.98±0.14	6.24±0.15	4.55±0.08
	Average		452.4±9.5	7.04±0.13	6.31±0.14	4.61±0.08
	Overall mean of males		554.5±17.0	6.90±0.21	6.22±0.24	4.48±0.17
	Overall mean of females		450.5±7.3	6.87±0.09	6.19±0.10	4.44±0.05
Overall mean of 8 weeks			471.7±8.5[b]	6.88±0.09[b]	6.19±0.09[b]	4.50±0.06
		M	937.4±29.2	7.97±0.19	7.58±0.22	4.77±0.15
	7/8SMx1/8Bj	F	783.2±18.8	7.90±0.13	7.43±0.11	4.85±0.16
	Average		832.1±18.2	7.92±0.10	7.48±0.10	4.82±0.08
12	Selected L.	M	983.5±62.5	7.42±0.24	7.08±0.24	4.50±0.32
wk		F	765.3±24.9	7.44±0.14	7.04±0.15	4.90±0.15
	Overall mean of Bj.Selected L.		807.5±27.8	7.44±0.12	7.05±0.13	4.82±0.14
	BjxBj	M	880.9±128.4	7.38±0.40	7.13±0.52	4.90±0.56
		F	726.4±65.3	7.08±0.17	6.75±0.25	4.93±0.34
	Average		803.6±72.8	7.23±0.21	6.94±0.27	4.91±0.30
	Overall mean of males		939.1±27.8	7.78±0.15	7.42±0.17	4..73±0.14
	Overall mean of females		773.8±14.5	7.70±0.09	7.26±0.09	4.87±0.03
Overall mean of 12 weeks			822.4±15.0[a]	7.72±0.08[a]	7.30±0.08[a]	483±0.07

SM: Silver Montazah, Bj: Baheij strains, Bj.Selected L.: Baheij selected line, M: Male, F: Female,
- Means having different letters in every column and within every main factor of treatments are significantly different (p<0.05),
- Genotype had no significant effect on all traits studied except that for body weight where it affected significantly (p<0.01), and the interactions of Age x Genotype, Age x Sex, and Genotype x Sex had no significant effects on all traits studied.

Cont. Table (3).

Genotype	Sex	Live body weight	Shank length	Keel length	Breast width
7/8SMx1/8Bj	M	711.7±33.8	7.40±0.19	6.87±0.22	4.57±0.13
	F	617.3±21.0	7.36±0.11	6.76±0.12	4.62±0.07
Overall mean of 7/8SMx1/8Bj		663.3±18.8[a]	7.37±0.10	6.79±0.10	4.61±0.06
Selected L.	M	858.3±94.0	6.99±0.34	6.56±0.39	4.24±0.29
	F	634.9±28.6	7.12±0.12	6.70±0.16	4.63±0.11
Overall mean of Bj.Selected L.		670.0±30.1[b]	7.10±0.12	6.68±0.14	4.57±0.10
BjxBj	M	626.3±68.0	7.42±0.24	6.88±0.31	4.97±0.23
	F	465.6±14.4	6.99±0.13	6.28±0.14	4.59±0.08
Overall mean of BjxBj		494.4±18.3[b]	7.06±0.12	6.390±0.13	4.65±0.08
Overall mean of Males		750.1±30.0	7.35±0.14	6.83±0.16	4.61±0.11
Overall mean of Females		576.3±13.7	7.19±0.07	6.60±0.08	4.61±0.05
Overall mean		618.3±13.5	7.23±0.06	6.66±0.07	4.61±0.04
Significant of :					
Age		**	**	**	**
Genotype		*	*	NS	NS
Sex		**	NS	NS	NS
Age x Genotype		*	NS	NS	NS

SM: Silver Montazah, Bj: Baheij strains, Bj.Selected L.**:** Baheij selected line, M: Male, F: Female,

- Means having different letters in every column and within every main factor of treatments are significantly different (p<0.05).

- Genotype had no significant effect on all traits studied except that for body weight where it affected significantly (p<0.01), and the interactions of Age x Genotype, Age x Sex, and Genotype x Sex had no significant effects on all traits studied.

* Significant at p<0.05, ** Significant at p<0.01, NS: non significant.

Upgrading- Selection- Growth and carcass traits- Body conformation- chicks viability.

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Table (4): Effect of genotype and generation on least squares means of viability of male and female birds at different periods studied

Generation	Genotype	Chicks viability (week)				
		0-4	4-8			0-8
		Non sexed	Males	Females	Average	Non sexed
1	1/2SMx1/2Bj	89.42$\pm$2.39	98.89$\pm$1.65	100.00$\pm$0.89	99.44$\pm$0.63	88.91$\pm$2.32
	Bj.Selected L1	88.84$\pm$2.56	100.0$\pm$0.87	00.0$\pm$0.89	100.0$\pm$0.62	87.83$\pm$2.61
	BjxBj	95.56$\pm$5.35	100.00$\pm$2.61	100.00$\pm$1.7	100.00$\pm$1.33	97.15$\pm$6.03
Overall mean		91.26$\pm$2.31[b]	99.63$\pm$0.79	100.$\pm$0.72	99.81$\pm$0.53[a]	91.30$\pm$2.31
2	3/4SMx1/4Bj	94.07$\pm$2.32	95.28$\pm$0.87	97.32$\pm$0.87	96.30$\pm$0.61	90.20$\pm$2.61
	Bj.Selected L2	95.87$\pm$2.63	99.09$\pm$0.89	96.70$\pm$0.90	96.89$\pm$0.63	93.82$\pm$2.69
	BjxBj	95.97$\pm$4.63	98.21$\pm$1.20	95.39$\pm$1.74	96.80$\pm$1.23	92.98$\pm$5.22
Overall mean		95.31$\pm$2.10[a]	97.53$\pm$.72	96.47$\pm$0.72	96.99$\pm$0.50[b]	92.33$\pm$2.09
3	7/8SMx1/8Bj	94.22$\pm$2.39	100.00$\pm$2.85	98.84$\pm$0.89	99.42$\pm$0.63	93.83$\pm$2.69
	Bj.Selected L3	91.27$\pm$2.34	100.0$\pm$0.80	99.52$\pm$0.80	99.76$\pm$0.57	89.97$\pm$2.40
	BjxBj	97.92$\pm$4.63	100.00$\pm$1.74	100.00$\pm$2.01	100.00$\pm$1.33	95.99$\pm$5.22
Overall mean		94.47$\pm$2.0A[b]	100.0$\pm$0.71	99.45$\pm$0.78	99.73$\pm$0.53[a]	93.26$\pm$2.06
Crossbred overall mean		92.57$\pm$1.37	98.06$\pm$0.94	98.72$\pm$0.94	98.39$\pm$0.36	90.98$\pm$1.50
Bj.Selected line overall mean		91.99$\pm$1.45	99.70$\pm$0.49	98.74$\pm$0.50	99.22$\pm$0.35	90.54$\pm$1.44
Baheij overall mean		96.48$\pm$2.82	99.40$\pm$1.76	98.46$\pm$1.94	98.93$\pm$0.74	95.38$\pm$3.10
Genotypes overall mean		92.67	99.05$\pm$0.70	98.64$\pm$0.78	98.83	91.15

- Means having different letters in every column and within every factor of treatments are significantly different (p<0.05),

- All main factors studied and all interactions between them were not significant except generation which affected (p<0.01) viability at 4-8 period.

Table (5): Effect of genotype and generation on least squares means of live body weight (g), and initial weights (g) and percentages of carcass traits at 16 and 20 weeks age at the 2nd and 3rd generations

Gener-ation	Genotype	Age, wk	Live body wt	Carcass		Gizzard		Liver		Heart	
				Wt.	%	Wt.	%	Wt.	%	Wt.	%
	3/4SMx1/4Bj	16	1014$\pm$13	711.7$\pm$22	70.1$\pm$2.1	38.5$\pm$2.3	3.8$\pm$0.2	28.2$\pm$1.5	2.8$\pm$0.1	8.8$\pm$0.9	0.87$\pm$0.6
		20	1336$\pm$15	1055$\pm$24	78.9$\pm$2.5	43.1$\pm$2.3	3.2$\pm$0.2	30.8$\pm$1.6	2.3$\pm$0.1	10.1$\pm$0.9	0.75$\pm$0.7
	Average		1175$\pm$10	883$\pm$16	74.5$\pm$1.5	40.8$\pm$1.7	3.5$\pm$0.2	29.5$\pm$1.1	2.5$\pm$0.1	9.4$\pm$0.6	0.81$\pm$0.4
	Bj.Selected L.	16	980$\pm$11	718.1$\pm$21	73.3$\pm$1.8	32.9$\pm$1.9	3.36$\pm$0.2	25.25$\pm$1.2	2.58$\pm$0.1	7.59$\pm$0.6	0.77$\pm$.05
		20	1305$\pm$10	982$\pm$27	75.3$\pm$2.3	33.6$\pm$2.5	2.57$\pm$0.1	29.08$\pm$1.5	2.24$\pm$0.1	8.18$\pm$0.7	0.60$\pm$.07
	Average		1143$\pm$10	850$\pm$17	74.3$\pm$1.4	33.3$\pm$1.6	2.96$\pm$.13	27.17$\pm$1.0	2.41$\pm$.08	7.88$\pm$0.5	0.69$\pm$.04
2	Bahej	16	945$\pm$15	655$\pm$27	69.3$\pm$2.3	30.6$\pm$2.7	3.2$\pm$0.2	24.6$\pm$1.6	2.6$\pm$0.1	7.04$\pm$0.9	0.75$\pm$0.1
		20	1181$\pm$15	895$\pm$27	75.8$\pm$2.3	31.5$\pm$2.7	2.7$\pm$0.2	33.2$\pm$1.6	2.8$\pm$0.1	10.4$\pm$0.9	0.88$\pm$0.1
	Average		1063$\pm$11	775$\pm$19	72.6$\pm$1.6	31.0$\pm$1.9	3.0$\pm$0.2	28.9$\pm$1.1	2.7$\pm$0.1	8.7$\pm$0.6	0.82$\pm$0.1
	Overall mean at 16 wk		980$\pm$10	695$\pm$14	70.9$\pm$1.2	34.0$\pm$1.3	3.47$\pm$.1	26.0$\pm$0.8	2.65$\pm$0.07	7.8$\pm$0.4	0.80$\pm$.03
	Overall mean at 20 wk		1274$\pm$9	977$\pm$15	76.7$\pm$1.3	36.1$\pm$1.4	2.82$\pm$0.1	31.04$\pm$0.8	2.46$\pm$.07	9.55$\pm$0.4	0.75$\pm$.04
Overall mean of generation 2			1127$\pm$6 [b]	836$\pm$10 [b]	73.8$\pm$0.8	35.0$\pm$0.9 [b]	3.1$\pm$0.8	29.0$\pm$0.8	2.55$\pm$0.04	8.68$\pm$0.3	0.77$\pm$0.07
	7/8SMx1/8Bj	16	1348$\pm$15	1109$\pm$27	82.3$\pm$2.3	44.1$\pm$2.5	3.3$\pm$0.2	27.0$\pm$1.6	2.0$\pm$0.1	9.6$\pm$0.9	0.71$\pm$0.1
		20	1102$\pm$12	1302$\pm$25	81.3$\pm$1.3	42.0$\pm$2.1	2.6$\pm$0.2	26.6$\pm$1.4	1.7$\pm$0.1	15.9$\pm$0.7	0.99$\pm$0.05
	Average		1475$\pm$10	1206$\pm$1	81.8$\pm$1.1	43.0$\pm$1.9	2.9$\pm$0.2	26.8$\pm$1.1	1.8$\pm$0.1	12.7$\pm$0.6	0.85$\pm$0.5
	Bj.Selected L.	16	1294.8$\pm$15	1012$\pm$27	78.1$\pm$2.2	39.8$\pm$2.5	3.06$\pm$0.2	25.14$\pm$1.5	1.94$\pm$0.1	7.70$\pm$0.8	0.59$\pm$.07
		20	1584$\pm$15	1292$\pm$27	81.5$\pm$2.2	40.6$\pm$2.5	2.56$\pm$0.2	25.80$\pm$1.5	2.63$\pm$0.1	15.8$\pm$0.8	1.0$\pm$.07
	Average		1439.8$\pm$11	1152$\pm$.19	79.8$\pm$1.4	40.1$\pm$1.7	2.81$\pm$.14	25.47$\pm$1.0	1.79$\pm$.59	11.75$\pm$0.5	0.80$\pm$.04
3	Bahej	16	974$\pm$15	670$\pm$27	68.8$\pm$2.3	32.0$\pm$2.5	3.3$\pm$0.2	22.1$\pm$1.6	2.3$\pm$0.1	7.1$\pm$0.9	0.73$\pm$0.07
		20	1186$\pm$15	882$\pm$27	74.4$\pm$2.2	42.4$\pm$2.6	3.6$\pm$0.2	36.0$\pm$1.6	3.0$\pm$0.1	12.2$\pm$0.9	1.03$\pm$0.7
	Average		1080$\pm$11	776$\pm$17	71.6$\pm$1.6	37.2$\pm$1.8	3.4$\pm$1.2	29.1$\pm$1.1	2.7$\pm$0.1	9.7$\pm$0.6	0.88$\pm$0.4
	Overall mean at 16 wk		1206$\pm$8.0	930$\pm$15	76.4$\pm$1.2	38.6$\pm$1.4	3.21$\pm$0.11	24.77$\pm$0.8	2.07$\pm$.07	8.13$\pm$0.5	0.68$\pm$.04
	Overall mean at 20 wk		1458$\pm$8.0	1159$\pm$15	79.1$\pm$1.2	41.7$\pm$1.4	2.92$\pm$0.11	29.46$\pm$0.8	2.11$\pm$.06	14.63$\pm$0.5	1.00$\pm$.03
Overall mean of generation 3			1331.6$\pm$6.0 [a]	1044.6$\pm$11 [a]	77.8$\pm$0.9	40.14$\pm$1.0 [a]	3.06$\pm$0.08	27.11$\pm$0.6	2.09$\pm$.05	11.38$\pm$0.3	0.84$\pm$.02

Cont. Table (5).

Generation	Genotype	Age, wk	Live body wt	Carcass		Gizzard		Liver		Heart	
				Wt.	%	Wt.	%	Wt.	%	Wt.	%
Overall mean of 16 wks of age			1092.7 ± 5.9^y	812.6 ± 10^y	73.7 ± 0.9	36.31 ± 1.0^y	$3.34\pm.08$	25.39 ± 0.6^y	$2.36\pm.04$	7.97 ± 0.3^y	$0.74\pm.02$
Overall mean of 20 wks of age			1365.8 ± 6.0^x	1068 ± 11^x	77.9 ± 0.9	38.9 ± 1.0^x	$2.87\pm.08$	30.29 ± 0.6^X	$2.28\pm.05$	12.09 ± 0.5^x	$0.88\pm.02$
Overall mean of upgrading group			1325 ± 7^a	1045 ± 11^a	78.2 ± 0.8	41.9 ± 1.3^a	3.2 ± 0.10	28.1 ± 0.75^b	2.2 ± 0.10	11.10 ± 0.4^a	0.83 ± 0.0
Overall mean of Bj.Selected line			1291.2 ± 7.2^b	1001 ± 1.3^b	77.1 ± 1.1	36.70 ± 1.2^b	$2.89\pm.09$	$26.31\pm.7^c$	$2.10\pm.06$	9.82 ± 0.4^b	$0.83\pm.03$
Overall mean of Bahej strain			1072 ± 7^c	775 ± 12^c	72.1 ± 0.8	34.1 ± 1.3^b	3.2 ± 0.10	29.1 ± 0.8^a	2.7 ± 0.10	9.20 ± 0.5^b	0.84 ± 0.0
Overall mean			1226	938	75.74	37.52	3.11	27.67	2.32	10.07	0.81
Significance of:											
Generation (Gen)			**	**	-	**	-	NS	-	**	-
Genotype (Get)			**	**	NS	**	NS	**	NS	**	NS
Age			**	**	NS	*	NS	**	NS	**	NS

- Means having different letters in every column and within every main factor of treatments are significantly different (p<0.05),
- The interaction between the different main factors for most of the studied traits were not significant at (p<0.05),
-* Significant at p<0.05, ** Significant at p<0.01, NS: non significant.

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الملخص العربى
تحسين الصفات الإنتاجية لدجاج بهيج من خلال التزاوج الرجعى والإنتخاب لوزن الجسم عند 8 أسابيع من العمر
أ. صفات النمو وتناسق أعضاء الجسم وحيوية الكتكوت وصفات الذبيحة

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تم إجراء مقارنة بين ثلاث تراكيب وراثية من نوع بهيج وهى بهيج (مجموعة مقارنة)، خط بهيج منتخب لزيادة وزن الجسم عند 8 أسابيع من العمر والخليط الرجعى (upgraded). وكانت النتائج كما يلى :-

1- كانت طيور الجيل الثالث الأثقل وزناً (p<0.001) مقارنة بطيور كل من الجيلين الأول والثانى، كما اختلفت التراكيب الوراثية (p<0.001) معنوياً حيث تفوقت طيور الخليط الرجعى فى وزن الجسم عن طيور الخط المنتخب وطيور المجموعة المقارنة كما تفوقت المجموعة المنتخبة عن مجموعة المقارنة فى أغلب الفترات من العمر التى تم دراستها.

2- كان لكل من الثلاث عوامل التى تم دراستها تأثيراً معنوياً (p<0.001) على سرعة النمو فى معظم الفترات ما عدا البعض منها حيث كانت طيور الجيل الثالث الأسرع نمواً (p<0.001) فى معظم فترات النمو المختلفة مقارنة بطيور كل من الجيلين الأول والثانى، كما كانت سرعة النمو فى طيور مجموعة الخليط الرجعى الأعلى معنوياً (p<0.001) خلال الفترة من 12-16 أسبوع من العمر بينما تساوى كلا الخطين تقريباً فى سرعة النمو بالفترات 0-12، 12-20 و0-16 أسبوع من عمر الطيور مقارنة بطيور المجموعة المقارنة، بينما تفوقت كل من مجموعة الخليط والمجموعة المقارنة عن طيور الخط المنتخب عند 12-16أسبوع من العمر.

3- كانت قيم كل من وزن الجسم وطول الساق وطول عظمة القص وعرض الصدر الأعلى معنوياً (p<0.01) عند عمر 12 أسبوعاً عنها عند عمر 8 أسابيع ، كما تفوقت طيور الخط المنتخب معنوياً فى وزن الجسم بينما تفوقت طيور مجموعة الخليط فى طول الساق. كذلك كانت الطيور الذكور الأعلى (p<0.01) فى وزن الجسم مقارنة بالإناث.

4- كانت طيور الجيل الثانى الأكثر حيوية معنوياً خلال الفترة 0-4 أسبوع من العمر بينما تساوت تقريباً حيوية طيور كلاً من الجيلين الأول والثالث وتفوقت معنوياً عنها بالجيل الثانى خلال الفترة 4-8 أسبوع.

5- إختلف وزن الجسم الحى ووزن الذبيحة ووزن القلب معنوياً (p<0.01) فى طيور الجيل الثالث عنها فى الجيل الثانى عند 16 و 20 أسبوع من العمر، من جانب آخر تفوقت مجموعة الخليط الرجعى بالنسبة لصفات وزن الجسم الحى ومعظم صفات الذبيحة مقارنة بطيور الخط المنتخب ومجموعة المقارنة. بينما كانت مجموعة المقارنة الأعلى (p<0.01) معنوياً بالنسبة لوزن الكبد.

يمكن القول بأن خط الخليط الرجعى (الناتج عن خلط ذكور منتخبة عند الوزن الناضج من سلالة المنتزه الفضى بإناث من نوع البهيج) قد تفوق فى تحسين صفات النمو عند معظم الأعمار التى تم دراستها و كذلك أهم صفات تكوين الجسم وحيوية الكتاكيت وأيضاً معظم صفات الذبيحة على الخط المنتخب لوزن الجسم عند 8 أسابيع من العمر من سلالة بهيج لثلاث أجيال، وكذلك على طيور المجموعة المقارنة.