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THE EFFECT OF CROSSBREEDING ON TRAITS RELATED TO MEAT AND EGG PRODUCTION

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ABSTRACT

A crossbreeding experiment using Alexandria chicken (local synthetic strain) and Nichols (broiler strain) was carried out in the Poultry Research Center, Faculty of Agriculture, Alexandria University. The aim of this study was to compare the performance of Alexandria, Nichols and their F1, F2 and backcrosses, connected with meat and egg production. Results obtained indicated that Alexandria birds were higher in fertility, hatchability, egg production and were earlier at sexual maturity by 9.5%, 7.2%, 5.7% and 3.8%, respectively, than Nichols birds; which showed heavier 8-week body weight by (4.5% for males and 3.3% for females), heavier egg by (25.5%) and better dressing percentage by (11.2%), than Alexandria ones.

First cross birds exceeded the better parent in 8-week body weight, age at sexual maturity and egg number. Heterosis estimated as a superiority of first cross progeny over the mean of the two parental strains varied from 3.06% for fertility to 9.41% for egg weight. The F populations were superior to the backcross populations for fertility, hatchability, 8-week body weight, age at sexual maturity, egg number and egg weight, indicating that, for these traits individual heterosis is more important than maternal heterosis. Due to former results obtained, which indicated the superiority of crosses over both parents and backcrosses in most of productive traits, it could be recommended to produce F1's from good parents to reach the best income.

Keywords: Crosses, heterosis, fertility, hatchability, body weight, egg traits, dressing percentage.

INTRODUCTION

Crossbreeding for improvement of the economic traits, has been recognized as a breeding practing of considerable merit in chicken. Several investigators confirmed the superiority of crossbreeds over the purebreds in fertility and/or hatchability (Abd El-Gawad *et al.*, 1977; El-Turky, 1981; Abou El-Ella, 1982; Nawar and Bahie El-Deen, 2000), 8-week body weight (Jain and Chaudhry, 1986; Saleh and Farghaly, 1988), age at sexual maturity (Costantini and Panella, 1985; Hagger, 1985; Nawar and Bahie El-Deen, 2000), egg number during different intervals of laying (El-Turky, 1981 and Mahmoud, 1987; Flock *et al.*, 1991), egg weight (Aplanalp *et al.*, 1984, Mahmoud, 1987; Flock *et al.*, 1991) and dressing percentage (Ali, 1979; Singh, 1981; Stino *et al.*, 1981; Abou El-Ella, 1982).

On the other hand, numerous workers reported that the crossbreds were no better than the purebreds in hatchability (Abd-Alla, 1978), 8-week body weight (Abou El-Ella, 1982 and Mahmoud, 1987), age at sexual maturity (Mahmoud, 1987), egg number in the first 90 days of laying (Shawer *et al.*, 1981) and dressing percentage (Sah *et al.*, 1985). In addition, heterosis effects for highly heritable traits such as egg weight were not statistically significant as reported by Flock (1980).

The present investigation was undertaken to study the effects of crossing Alexandria and Nichols chickens on traits related to meat and egg production.

MATERIALS AND METHODS

The present study was carried out at the Poultry Research Center, Faculty of Agriculture, University of Alexandria. Two populations of chickens were used, the Nichols (N) a broiler stock which was introduced to the above Center in 1971 from General Poultry Company in Cairo and the Alexandria cross (A) which was estibilished at the same Center. Details of the development of Alexandria strain are given by Kosba (1972) and Farghaly (1979).

This work lasted for two seasons, in the first season, the two mentioned populations were crossed to produce the Alexandria x Nichols cross (A x N) and its reciprocal (N x A) as well as the parental population (A) and (N). In the second season, the pullets and cockerels which had been produced in the previous season were crossed in different combinations to produce parental stocks, F1, F2 and backcrosses to parental stocks.

All birds were received similar flock management. Feed and water were provided ad libitum. Conventional standard ration was given to each age within populations. Eggs were identified as to through trapnesting. The eggs were stored at room temperature and set weekly in an electric forced draft incubator. Four hatches were secured during each season. Eggs were collected for 10 days for each hatch. Fertility was determined by egg candling on the seven th day of incubation. On the 18th day of incubation, the eggs were transferred to pedigree boxes which were placed in the hatching section of the incubator.

On the day of hatching, all chicks were wing-banded and floor-brooded with electrically heated hovers. At eight weeks of age, they were debeaked, sexed and weighed to the nearest gram. When any female laid its first egg, it was transferred to individual laying cages and age at first egg was recorded in days. For each hen, egg number was estimated by the number of eggs laid in the first 90 days of laying. From each hen, five eggs after the first 90 days of laying were collected and, on each egg, weight was recorded in grams. At 12 weeks of age, from 13 to 18 cockerels of each population were weighed individually. The birds were slaughtered, separating the head, feathers, shanks and viscera were removed. The weight of the warm eviscerated carcass was recoded without giblets. This carcass weight was expressed in percent of the live weight as the dressing percentage.

All percentage data were transformed to the arcsine percentage scale given by Snedecor and Cochran (1967). One-way analysis of variance using orthogonal contrast for comparisons between population means for the significant test. For the different crosses, heterosis was estimated as the deviation of the cross or backcross mean from that of the parental strains according to the following equation:

$$\text{Percent heterosis} = \frac{AN - \frac{1}{2}(A+N)}{\frac{1}{2}(A+N)} \times 100$$

Maternal heterosis, which refers to heterosis in a population attributable to using crossbred dams, was estimated as the deviation of the backcross mean from that of the constituent parental populations according to the following equation

$$\text{Percent maternal heterosis} = \frac{A.AN - \frac{1}{2}(A+AN)}{\frac{1}{2}(A + AN)} \times 100$$

RESULTS AND DISCUSSION

1- Fertility and hatchability:

The birds of Alexandria strain had higher fertility and hatchability than those of the Nichols (Tables 1 and 2). The analysis of variance of the transformed data (Table 3) shows that the difference between them was significant ($P<0.01$ for fertility and $P<0.05$ for hatchability). The F1 birds resulted from the A x N mating had higher fertility and hatchability than those from the reciprocal mating. Statistical analysis showed no significant differences in hatchability between F1 crosses while fertility was significantly different ($P<0.05$). There were no significant differences between fertility and hatchability means due to parent versus cross birds. The F1 birds had higher percent heterosis in hatchability than those of the other crosses (Table 4). The birds of the backcrosses to Nichols strain males, had higher means for fertility and hatchability compared to the birds of Nichols strain. Many workers confirmed the superiority of crossbreds over purebreds in fertility and hatchability (El-Turky, 1981; Abou El-Ella, 1982; Nawar and Bahie El-Deen, 2000). However, Khalil (1960) reported no heterosis in these two traits.

2- Eight-week body weight:

The males and females of the Nichols strain weighed slightly more than those of the Alexandria strain (Table 1). None of the differences were statistically significant (Table 3). The F1 progeny (males or females) exceeded the average weight of the larger (Nichols) parent. The F1 from reciprocal mating did not differ significantly. The males of F2 crosses were intermediate in 8-week body weight between the F1 and parental strains. The females of F2 crosses weighed less than the parental strains. Among the crosses, those which were sired by Nichols males had heavier 8-week body weight for females than those sired by Aleaxandria males (Table 1). Mohammed (1980) reported that the average means of 8-week body weight of the F1 crosses between strains of Fayoumi breed exceeded that of their midparents for both sexes. On the other hand, Abou El-Ella (1982) and Mahmoud (1987) reported that crossbreds were no better than the purebreds in 8-week body weight.

Table (5) shows that males had higher heterosis in 8-week body weight than females in all crosses except backcrosses to Nichols strain, which indicated sex-linked heterosis. Percent heterosis was 7.98 and 5.75 for F1 and 5.37 and -11.90 for F2 males and females, respectively. Percentage heterosis which reported by Saleh and Farghaly (1988) was 15.33% for cross between Rhode Island Red and Dikki-4.

3- Age at sexual maturity:

Comparing the parental strains, Alexandria birds reached age at sexual maturity of (194.7 days), 7.7 days earlier than those of the Nichols strain being (202.4 days). Considerable genetic diversity among parent strains was indicated by highly significant differences among parents and significant over-all heterosis as estimated by the parents versus crosses component of variance (Table 3). The over-all means of age at sexual maturity for the parental strains and crosses were 198.6 and 194.5 days, respectively. Obviously this difference is due to the difference in body size. As it was found previously, Alexandria has lighter 8-week body weight than Nichols (Table 1). Negative phenotypic correlation between 8-week body weight and age at sexual maturity was established by Sheble (1986) and Mahmoud (1987), in Alexandria strain. The pullets of the F1 crosses showed earlier age at sexual maturity than the parental strains (Table 2). Moreover, from Table (3) it is obvious that the difference between F1 crosses was significant ($P<0.05$).

The largest amount of heterosis (-7.70 %) was obtained from the cross NxA. From the 8 crosses studied, 6 crosses (75.0%) reached age at sexual maturity earlier than the mid-parent. The birds of backcross A x AN had higher heterosis (-2.77%) than the other backcrosses (Table 5).

Several investigators reported that crossbreds usually reach age at sexual maturity earlier than purebreds (Lund, 1972, and Mohammed, 1980). On the other hand, Mahmoud *et al.* (1974) found no significant differences in age at sexual maturity between crossbreds and purebreds involving White Leghorn and Dokki-4. Nawar and Bahie El-Deen (2000) reported that percent heterosis for the different crosses they used were -1.47, -1.60 and -2.41.

4- Egg number:

Comparing egg number laid in the first 90 days of laying of parental strains (Table 2) it was obvious that Alexandria females laid at a rate higher than those of Nichols, though the difference was not significant (Table 3). Among the F1's the mean egg number was insignificantly slightly higher for the N x A cross than its reciprocal A x N. The over-all heterosis as estimated by the parents vs. crosses was significant ($P<0.05$). The average of percent heterosis of F1's (7.87%) was insignificantly lower than the value of F2's (8.51%) and the average of percent heterosis was insignificantly higher for the backcross to Alexandria strain (8.90%) than the backcross to Nichols strain (7.85%). However, Table (5) showed that the F2 cross AN x AN gave the highest percent heterosis (13.87%) followed by the backcross to Alexandria A x AN (10.76%). Therefore, it was evident that maternal heterosis affected egg number traits, but heterosis of mid-parent values were higher than maternal heterosis.

The results obtained herein, agree in general with some previously reported data on heterosis expression. Average estimate of 7.87% of the F1's value could be somehow close to this 5.64% obtained by Mahmoud (1987) and Flock *et al.* (1991). In contrast, Shawer *et al.* (1981) reported that the crossbred showed a lower mean of egg number in the first 90 days of laying than their purebreds.

5- Egg weight:

The means and standard errors of egg weight are shown in Table (2). Nichols strain had significantly larger eggs than Alexandria. The over-all heterosis as estimated by the parents versus crosses was highly significant (Table 3). The F1's mean was intermediate between those of the parental strains and the A x N crosses had significantly higher egg weight than its reciprocal.

From the 8 crosses studied, 5 crosses were higher than the mid-parent, and one cross exceed the higher parent. Among the crosses, those which were sired by Nichols males had heavier egg weight than those sired by Alexandria males.

From Table (5) it was clear that positive percent heterosis was found in egg weight in the F1 crosses (9.41%) and the backcrosses to Nichols strain (4.62%), indicating that, heterosis affecting this trait. These results are in agreement with that reported by El-Turky (1982), who found that percent heterosis was 7% for the F1 crosses between Alexandria and Silver Montazha. On the other hand, Mahmoud (1987) obtained lower estimate of 3.22% for the F1 crosses between LSL and Alexandria. Moreover, Nawar and Bahie El-Deen (2000) found that percent heterosis for the F1 crosses between Brown Nick H&N (Hn) x Gimmizah (G), R x (Hn:G) and Mandarah (M) x Rohde Island Red (R), Mandarah (M) x Hn were 2.10, 3.00 and 2.83, respectively.

6- Dressing percentage:

Nichols had significantly higher percent dressing weight (71.0%) than Alexandria (61.4%) because of the first strain is a commercial broiler strain while the second one is a dual purpose (egg and meat) local strains. The F1 progeny were in all cases intermediate between the parental strains and there were no differences between the F1 progeny from reciprocal crosses (Tables 3, 4). Among the crosses, those which were sired by Nichols males had higher dressing percentages than those sired by Alexandria males.

Heterosis was higher in N x A (4.83%) than in the reciprocal cross (1.66%). Negative heterosis estimates of -3.17% and -9.67% were found in F2 and backcrosses to Alexandria, respectively. Stino *et al.* (1981) found that the average heterosis was 0.26% for the F1 crosses between two strains of the Fayoumi chickens.

In conclusion and due to former results obtained, which indicated the superiority of crosses over both parents and backcrosses in most of productive traits, it could be recommended to produce F1's from good parents to reach the best income.

Table (1): Mean±standard error of fertility, hatchability and 8-week body weight

Trait / Breeding group[2]	Fertility[3] N	Fertility[3] X̄+SE	Hatchability[4] N	Hatchability[4] X̄+SE	8-week body weight,g Males N	Males X̄+SE	Females N	Females X̄+SE
Parental strains								
Alexandria, A	148	76.9+1.1	143	57.8+2.0	94	431.4+11.9	96	369.0+6.8
Nichols, N	59	70.2+1.6	56	53.9+1.8	48	450.8+12.1	58	381.3+7.9
Average		73.6		55.9		441.1[bc]		375.2[b]
F_1 crosses								
A x N	86	74.3+1.2	81	57.5+1.4	58	462.4+13.5	52	392.0+8.9
N x A	124	78.9+1.3	119	60.6+1.5	97	490.2+14.2	142	401.5+3.7
Average[1]		76.6		59.1		476.3[a]		396.8[a]
F_2 crosses								
AN x AN	110	79.1+1.4	107	58.9+1.1	50	462.2+11.8	69	304.2+9.3
NA x NA	129	73.7+1.4	121	55.8+1.2	81	467.4+8.7	75	356.9+7.5
Average		76.4		57.4		464.8[ab]		330.6[d]
Backcrosses to A								
A x AN	115	75.7+1.3	110	58.6+1.9	61	[illegible]6.3+10.1	55	365.9+7.6
A x NA	120	74.8+1.4	118	57.0+1.4	70	426.1+11.2	73	355.3+10.1
Average		75.3		57.8		441.2[bc]		360.6[c]
Backcrosses to N								
N x AN	83	79.1+1.0	79	58.4+1.7	61	441.5+10.9	104	389.4+5.1
N x NA	96	74.3+1.6	88	56.7+1.8	61	434.6+10.3	107	378.8+5.7
Average		76.7		57.6		438.1[c]		384.1[ab]

[1] Within columns, mating means having no superscripts in common are significantly different.

[2] Male parent listed first in cross.

[3,4] Values which adjusted to Arcsine values prior to statistical analysis.

Table (2): Means±standard error of age at sexual maturity, egg number, egg weight and dressing percentage

Breeding group[2]	Age at sexual maturity, day		Egg number		Egg weight g.		Dressing	
	N	$\bar{X}$+SE	N	$\bar{X}$+SE	N	$\bar{X}$+SE	N	$\bar{X}$+SE
Parental strains								
Alexandria, A	21	194.7+1.8	21	39.2+2.4	105	48.3+0.4	18	51.6+1.0
Nichols, N	21	202.4+1.1	21	37.1+2.0	105	60.0+0.5	13	57.4+0.7
Average		198.6^{a}		38.2		54.2^{c}		54.5^{b}
F_1 crosses								
A x N	20	188.1+1.2	20	40.4+1.1	105	62.1+0.5	15	55.1+0.7
N x A	21	183.3+1.0	21	41.9+1.2	105	56.5+0.5	14	56.4+0.6
Average[1]		185.7^{b}		41.2		59.3^{a}		55.8^{a}
F_2 crosses								
AN x AN	20	196.2+1.0	20	43.5+1.1	105	54.5+0.5	15	52.6+0.6
NA x NA	22	201.1+1.7	22	39.4+2.8	105	52.7+0.4	14	53.8+0.9
Average		198.7^{a}		41.5		53.6^{c}		53.2^{c}
Backcrosses to A								
A x AN	21	193.3+0.9	21	42.2+1.7	105	51.6+0.5	16	50.0+0.7
A x NA	21	199.7+1.2	21	41.0+1.9	105	50.4+0.4	15	51.3+0.4
Average		196.5^{a}		41.6		51.0^{d}		50.7^{d}
Backcrosses to N								
N x AN	21	196.1+1.8	21	41.7+1.5	105	57.5+0.5	15	55.6+1.0
N x NA	21	198.2+1.8	21	40.7+1.7	105	55.9+0.5	14	56.4+0.5
Average		197.2^{a}		41.2		56.7^{b}		56.0^{a}

[1] Within columns, mating means having no superscripts in common are significantly different.

[2] Male parent listed first in cross.

[3] Values which adjusted to Arcsine values prior to statistical analysis.

Table (3): Analysis of variance of studied traits

Source of variance	d.f	Fertility	Hatchability	8-week B.W. Males	8-week B.W. Female	Age at sexual maturity	Egg number	Egg weight	Dressing percent-age
Between populations	9	709.7**	298.0*	31606.1*	60315.2**	724.0**	67.8	1944.6**	107.5*
Between type of mating	4	153.7	204.2	53113.9**	106183.1**	1237.5**	85.9	2086.3**	143.9*
Parents vs crosses	1	228.5	269.3	41680.1*	135.4	532.9**	339.5*	177.8**	0.9
F_1 & F_2 vs AxF_1 & NxF_1[1]	1	131.4	64.0	155808.0**	3610.4	871.3**	0.8	1388.6**	47.1
F_1 vs F_2	1	85.4	474.6	14683.7	3744[illegible]**	3536.4**	0.6	3485.9**	96.2**
F_1 vs NxF_1	1	169.7	8.9	283.7	46550.3**	9.3	2.7	3292.8**	431.4**
Within type of mating	5	1154.4**	373.0*	14399.9	23620.8*	313.2**	53.4	1831.2**	78.3*
Parents	1	1933.6**	595.8*	11943.1	5463.8	617.2**	46.1	7134.2**	250.9**
F_1 crosses	1	1069.8*	451.4	28050.2	3435.1	232.8*	23.2	1652.0**	12.3
F_2 crosses	1	1718.6**	542.1	834.4	99772.6**	251.1*	171.1	173.7**	10.4
Backcrosses to A	1	50.8	144.0	29718.7	3517.5	421.2**	16.1	61.9	14.1
Backcrosses to N	1	999.8*	131.9	1452.8	5915.2	44.0	10.5	134.4*	3.9
Error		248.7	124.2	10382.8	3879.5	41.9	66.5	21.8	12.1
d.f of error		1060	1012	671	821	199	199	1040	139

* Significant at $P< 0.05$, ** Significant at $P< 0.01$

[1] $A \times F_1$ = Backcrosses to Alexandria strain,
$N \times F_1$= Backcrosses to Nichols strain

Table (4): Mean percentages and percent of heterosis for fertility, hatchability and dressing percentage

Breeding group[2]	Mean percentage			Percentage heterosis		
	Fertility	Hatchability	Dressing percentage	Fertility	Hatchability	Dressing percentage
Parental strains						
Alexandria, A	94.9	71.6	61.4			
Nichols , N	88.5	65.3	71.0			
Average	91.7	68.5	66.2			
F_1 crosses						
A x N	92.7	71.2	67.3	1.09	3.94	1.66
N x A	96.3	75.9	69.4	5.02	10.80	4.83
Average	94.5	73.6	68.4	3.06	7.37	3.25
F_2 crosses						
AN x AN	96.5	73.3	63.1	5.23	7.01	-4.68
NA x NA	92.2	68.4	65.1	0.55	-0.15	-1.66
Average	94.4	70.9	64.1	2.89	3.43	-3.17
Backcrosses to A						
A x AN	93.9	72.9	58.7	2.40 (0.11)[1]	6.42 (2.10)	-11.33 (-8.85)
A x NA	93.1	70.4	60.9	1.53 (-2.62)	2.77 (-4.61)	-8.01 (-6.88)
Average	93.5	71.7	59.8	1.97 (-1.26)	4.60 (-1.26)	-9.67 (-7.87)
Backcrosses to N						
N x AN	96.4	72.6	68.1	5.13 (6.40)	5.99 (6.30)	2.87 (-1.59)
N x NA	92.8	69.9	69.3	1.20 (-0.43)	2.04 (-0.99)	4.68 (-1.28)
Average	94.6	71.3	68.7	3.17 (2.99)	4.02 (2.66)	3.78 (-1.44)

[1] Values in parenthesis indicate percentage maternal heterosis.

[2] Male parent listed first in cross.

Table (5): Percentages of heterosis for 8-week body weight (BW), age at sexual maturity, egg number and egg weight

Breeding group[2]	Heterosis percentages				
	8-week BW males	8-week BW Females	Age at sexual maturity	Egg number	Egg weight
F_1 crosses					
A x N	4.83	4.48	-5.29	6.04	14.58
N x A	11.13	7.01	-7.70	9.69	4.24
Average	7.98	5.75	-6.49	7.87	9.41
F_2 crosses					
AN x AN	4.78	-18.92	-1.21	13.87	0.55
Na x NA	5.96	-4.88	1.26	3.14	-2.77
Average	5.37	-11.90	0.03	8.51	-1.11
Backcrosses to A					
A x AN	3.45 (2.10)	-2.48 (-3.84)	-2.77 (0.99)	10.76 (6.03)	-4.80 (-6.52)
A x NA	-3.40 (-7.53)	-5.30 (-7.79)	0.55 (5.66)	7.33 (0.98)	-7.01 (-3.82)
Average	0.03 (-2.72)	-3.89 (-5.82)	-1.11 (3.33)	8.90 (3.50)	-5.91 (-5.17)
Backcrosses to N					
N x AN	0.09 (-3.30)	3.78 (0.70)	-1.26 (0.46)	9.16 (7.47)	6.09 (-5.89)
N x NA	-1.47 (-7.63)	0.96 (-3.22)	-0.20 (2.75)	6.54 (3.04)	3.14 (-4.12)
Average	-0.69 (-5.47)	2.37 (-1.26)	-0.73 (1.58)	7.85 (5.26)	4.62 (-5.01)

[1] Values in parenthesis indicate percentage maternal heterosis.

[2] Male parent listed first in cross.

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تأثير الخلط على الصفات المتعلقة بإنتاج اللحم والبيض

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أجريت هذه التجربة فى مركز بحوث الدواجن بكلية الزراعة جامعة الإسكندرية حيث استخدم فيها سلالة دجاج الإسكندرية (سلالة مستنبطة محليا) وسلالة النيوكلز (هجين تجارى اللحم) ، وكان الهدف من هذه الدراسة معرفة تأثير الخلط على بعض صفات إنتاج اللحم والبيض وأظهرت النتائج ما يلى:

١- تفوقت طيور سلالة الاسكندرية على مثيلاتها من سلالة النيوكلز بنسبة ٩,٥ % فى صفة الخصوبة و ٧,٢ % فى صفة التفريخ و ٥,٧ % فى صفة عدد البيض الموضوع خلال التسعون يوما الأولى من بدء الوضع وكانت أيضا مبكرة فى صفة عمر النضج الجنسى بحوالى ٧.٧ يوما عن سلالة النيكولز بينما تفوقت طيور سلالة النيوكلز على مثيلتها من سلالة الاسكندرية بنسبة ٤,٥ % فى صفة وزن الجسم للذكور وللإناث بنسبة ٣.٣ % فى صفة وزن الجسم عند عمر ثمانية أسابيع و ١١,٢ % فى صفة نسبة التصافى.

٢- تفوق طيور الجيل الأول على السلالة الأبوية النيكولز والتى كانت الأفضل فى كل من صفات وزن الجسم عند عمر ثمانية اسابيع وعمر النضج الجنسى وعدد البيض الموضوع خلال التسعون يوما الأولى من بدء وضع البيض.

٣- تراوحت قوة الخلط المقدرة على أساس تفوق أفراد الجيل الأول عن متوسط السلالتين الأبويتين من ٣,٠٦% لصفة الخصوبة إلى ٩,٤١ % لصفة وزن البيض.

٤- تفوقت عشائر الجيل الأول على عشائر الخلطات الرجعية بالنسبة لصفات نسبة الخصوبة ونسبة التفريخ ووزن الجسم عند عمر ثمانية اسابيع وعدد البيض ووزن البيض مما يدل على أن قوة الخلط المقدرة لهذه الصفات كانحراف عن متوسط السلالتين الأبويتين أكثر أهمية من قوة الخلط الأموية.

وعليه وبناءا على هذه النتائج التى تحصل عليها من هذه الدراسة يمكن القول بأنه نظرا لتفوق طيور الجيل الأول فى معظم الصفات التى تم دراستها فى هذا البحث والمتعلقة بانتاج البض أو اللحم على سلالات الآباء وعلى طيور الخلطات الرجعية فيمكن أن نوصى بالإعتماد على خلط أباء ذات صفات جيدة والحصول على الجيل الأول لتربيته لتحقيق أكبر عائد من التربية.