Egypt. J. Agric. Res., 81 (2), 2003.

PERFORMANCE OF THE 2 ND GENERATION CHICKENS PRODUCED FROM CROSSING DANDARAWI WITH COMMERCIAL EGG TYPE CHICKENS

ABDEL GALIL M.A.

Animal Production Research Institute, Agricultural Research Centre, Ministry of Agriculture, Dokki, Giza-Egypt

(Manuscript received 10 Decembre 2002)

Abstract

This study was carried out in Sids poultry Research Station, Animal and Poultry Production Research Institute, Agricultural Research Centre, to evaluate the performance of second generation of three genotypes chickens, cross,(produced from dam Dandarawi x sire shaver) and its reciprocal from sire Dandarawi x dam shaver and Dandarawi from dam Dandarawi and sire Dandarawi, when producing first generation chicks (Abdel-Galel 1999). During production second generation chicks, males from each genotype were mating with females of the same genotype. The data obtained can be summarized from the study as follows:

1-cross hens had heavier body weight than both their reciprocal (at hatch and 40 weeks old) or Dandarawi hens (at hatch, 20 and 40 weeks old), also reciprocal cross had heavier weight than Dandarawi hens.

2- cross hens laid first egg and reached 50% production later than both their reciprocal or Dandarawi hens, the reciprocal hens reached to age of first egg and 50% production later than Dandarawi hens.

3-Dandarawi chickens were more viable than cross or their reciprocal chickens during growing period, but there were no significant differences during laying period in respect to viability of different genotypes.

4- cross hens had heavier egg weight, more egg number during first 150 days, more egg mass than both their reciprocal cross or Dandarwei hens, also reciprocal hens had significant superiority in this traits than Dandarawi hens.

5-Although,cross hens consumed more feeds during laying period than their reciprocal or Dandarawi hens, but, they were more efficient in conversion of feeds to eggs than their reciprocal or Dandarwi hens. Moreover, the reciprocal cross hens were more efficient in conversion of feed to eggs than Dandarawei hens.

6-Dandarawei hens had higher fertility and hatchability percentages than both cross and reciprocal cross, but, there were no significant differences between cross and its reciprocal in this traits. Moreover, fertility and hatchability were higher in winter than summer and there were significant interaction between genotype and season in this trait.

7- Dandarawi eggs had best shell quality and yolk weight % than eggs of cross and its reciprocal; the egg quality measurements were best in winter season than summer season.

8- when we assumed that Dandarawi performance were 100% in first and second generations, it could be observed that cross and reciprocal cross had superiority performance during first and second generation than Dandarawi. Also, the performance of first generation chicks were somewhat better than the second generation. It could be concluded that the productive performance of the cross and its reciprocal during second generation were better than Dandarawi hens.

INTRODUCTION

Poultry crosses is considered an effective method to improve poultry production (Crowford, 1991). Mandour *et al.* (1996) found that cross breed had higher body weight than pure breed . Many attempts were made to improve the local breed of chickens by crossing with other exotic chicken. Kader *et al.* (1986) concluded that crossing the two selected Fayoumi strains with egg production strain(White leghorn) would be useful to improve egg production and increase egg number. Fargaly and Saleh (1988) found slightly effect of native breed crossed with foreign strains for improving productivity traits. Similar results were obtained by El Huassari and Dorgahm (1993) and El Houssari *et al.* (1997). Abdel-Latif (1977) stated that Dandarawi chickens are a local breed raised under hot weather and widely distributed in southern part of Egypt and are considered the most resistant breed to the stress condition although it had lower productivity values. Also, Mohamed (1997) stated that crossing Dandarawi with exotic (Hi-Sex) breed caused reasonable improvement in egg production.

At the same manner, Abdel-Galil (1999) crossed Dandarawi with the parent of commercial egg breeder (shaver) and found superiority of the performance of crosses during the first generation than Dandarawi. This study was carried out to evaluate the performance of the second generation compared to first generation and Dandarawi chicks performance.

MATERIALS AND METHODS

Two strains of chickens were used for producing first generation chicks (1)the Dandarawi (D) as a native breed and (2) the shaver(S) as egg production strain. The method of crosses carried out was as follows: cross (D x S) ,reciprocal cross (S xD). The genotypes were pronounced DS, SD and DD (as control). The different three genotypes produced in the first generation were reared separately for each genotype, fertile eggs produced from different three genotypes, (males from each genotype were mating with females of the same genotype), were incubated. 250 chicks from each

genotype (second generation) were reared separately for each genotype from one day up to 20 weeks old, then, hens were transported to wire cages for first five months. At the end of laying period, the hens were housed in breeding pens (10 hens + one sire) to produce fertile eggs which were incubated in automatic incubator to calculate the fertility and hatchability percentages for different genotypes during summer and winter seasons. At 18 days of incubation period, eggs were candled to the fertile eggs and determined fertility percentages.

All chicks were fed *ad libitum* on starter ration containing 19 % crude protein / 2900 kcal/kg from hatch to 8 weeks old. After this, they were fed grower feed containing 15% crude protein, 2700 kcal/kg until 20 weeks and laying ration containing 16% crud protein, 2800 kcal/kg during laying period. All chicks were vaccinated against Mareks, Newcastle, Gumboro, Ib, ILt,... Some measurements were estimated during the experiment, body weight, feed consumption, feed conversion, viability, daily egg number, and egg weight. The egg mass was calculated by multiplying the number of eggs per pullet by the mean of egg weight. Fertility percentages were estimated by the number of fertile eggs in percent of total number of eggs set in the incubator, hatchability % was also estimated by number of healthy chicks in percent of total number of eggs set in the incubator. Some egg quality measurements were determined as follows:-

- shell weight %(weight of shell / weight of egg) x 100 , yolk height was measured with a tripole micrometer and the width diameter with a slide ruler, yolk index was determined in percentage according to the formula: yolk index = yolk height/yolk width x100 , albumen height was also determined by using a tripol micrometer (Ames), the measuring was taken twice in the middle between the edge of the yolk and the thick albumin away from chalaza , Haugh units were determined on the basis of the individual egg weight and the albumin height using the formula: haugh unit = 100 log ($h+7.57 - 1.7\ w^{.37}$)(Neshein *et al.* 1979),

Where h, = albumin height (mm), w = egg weight (gm).

Data obtained from the study were analyzed using analysis of variance (ANOVA) with Mstat.c procedures (Mstat.c 1988) under windows, and the statistical model for the experiment was:

$Yij = M + Ti + Eij$

Where, M = overall mean. Ti = effect of Jth (genotype) , Eij = random error, Yij is the I observation in j th genotype. Differences between means were compared by Duncans New multiple Range test Duncans (1955).

RESULTS AND DISCUSSION

Body weight: Table 1 shows that cross chicks (D.S)had significant higher body-weight than both reciprocal cross or Dandarawi chicks at different ages (at hatch, 20 and 40 weeks old), but the differences between cross and its reciprocal at 20 weeks old were not significant. Moreover, reciprocal chicks had heavier weight than dandarawi chicks for the different ages. These results are in agreement with the findings of Mandour *et al.* (1996) who found higher body weight for cross than pure breeds.

Age at different levels of egg production

There were significant differences between different genotypes in this traits (Table 1). The cross hens had later age at first egg and at 50% egg production (158 and 240 days respectively) than both their reciprocal or dandarawi hens. Also the reciprocal cross hens laid the first egg and reached to 50% production (154,228 days) later than Dandarawi hens (150,222 days).Similar results were obtained by Abdel-Galil (1999) who found that cross and their reciprocal hens laid first egg and reached 50% egg production later than Dandarawi hens .

Viability %

As shown in Table 1, Dandaraw chicks had more viability % during growing period than both cross and thir reciprocal cross chicks. Also, reciprocal cross chicks had more viable chicks than the cross chicks. These results may be attributed to the fact that, Dandaraw chicks are more adapted to local condition than other genotypes (Abdel-Galil,1993), but ,on the other hand ,there were no significant differences between the different genotypes in respect to viability of laying hens.

Egg production traits

Table 2 represents the means of egg weight , egg number for different genotypes during first five months of production. It was shown that cross hens laid significant more number and heavier eggs (114.3 eggs/hen ,50 g/egg) than both their reciprocal cross or Dandarawi. Also, reciprocal cross hens had significant more number 108.72 eggs/hen) and heavier eggs(46.g/egg) than Dandarawi hens (101.82 eggs/hen, 39g/egg).At the same manner ,cross hens had higher percentages of hen housed

egg production (76.2%) and egg mass production (5715 g/hen) than both reciprocal cross hens (72.48 % ,5001g eggs/hen)or than Dandarawi hens (67.18 % ,3397 g eggs/ hen).

Feed consumption and conversion

As shown in Table 2, it was observed that, although cross hens consumed significant more feed 114 g / hen than both their reciprocal hen 106 g feed /hen or Dandarawi 100 g feed/hen , but, on the other hand, the cross hens were more efficient in respect to conversion of feed to eggs 2.94 g feed / g eggs than both reciprocal hens 3.24 g feed /g egg or Dandarawi hens 3.89 g feed / g egg.

Fertility and hatchability percentages

As shown in Table 3, it can be resulted that, Dandarawi hens had significantly higher fertility and hatchability percentages (93%, 82.1%) than both cross hens or its reciprocal cross hens. There were no significant differences in respect of this traits between the cross or their reciprocal. Moreover, although, there were no significant effect of season (winter or summer) on fertility and hatchability in dandarawi hens, but, the season had significant effect in this trait for cross and its reciprocal cross eggs, where the fertility and hatchability during winter were significantly better for cross and their reciprocal eggs than in summer season. This may be attributed to the fact of more tolerance and acclimatization of Dandarawi hens to summer condition than both cross and its reciprocal cross. Moreover, there were significant interaction between season and genotypes in these traits.

Egg quality measurements

Means of some egg quality parameters for different genotypes during summer and winter seasons are presented in Table 3. It can be concluded that, eggs produced from Dandarawi hens had higher shell weight % than both cross or their reciprocal cross eggs. Although there were no significant differences in shell weight % of Dandarawi eggs during winter or summer season, cross and their reciprocal eggs laid during winter had significant higher shell weight %than those laid during summer season. Cross and their reciprocal cross eggs had higher albumin weight than Dandarawi eggs. Moreover, as environmental temperature was higher, the albumen weight of the three genotypes eggs was higher. There were no significant differences in respect to H.U. between different genotypes. As shown in Table 3, it was observed that eggs laid during winter had better yolk weight % and yolk index than those laid during summer season for different genotypes.

Table 1. means ± S.E of average body weight , age of sexual maturity and viability for different genotypes.

Item	Geno-type			Means
	Cross D S	Reciprocal S D	Dandarawi D D	
	a	b	c	
B.W.1	34.167±0.145	32.40 ±0.231	28.50±0.231	31.689
	A	a	b	
20.B.W.	1150 ± 28.868	1136 ±20.785	973.33±31.798	1086
	B	b	c	
40.B.W.	1250 ±28.868	1190.667± 46.193	1053 ±30.60	1164.556
	A	B	c	
Age of F.E.	158 ±1.155	154±1.155	150 ±1.155	154
	a	B	c	
Age of S.M.	240 ±1.155	228 ±1.555	222 ±1.155	230
	C	b	a	
G.V. %	88.00 ±0.577	90.00 ± 1.155	93.1 ±1.155	90.36
	A	A	a	
L.V.%	94.0 ±0.577	95.0 ± 1.155	95.0± 1.155	94.66

Means having different litters within each raw are significantly differences (p0.05)

B.W.1= average body weight at one day old (g/bird)

20B.W. =average body weight at 20 weeks old (g/ bird)

40 B.W.= average body weight at 40 weeks old (g/ bird)

Age of F.E.= average age at first egg (days/bird)

Age S.M.= age at sexual maturity (days/ bird)

G.V.= viability of birds during growing period %

L.V.= viability of birds during laying period %

Table 2. means ± S.E of averages, egg weight, egg number ,total egg yield, feed consumption and conversion for different geno-types.

Item	Genotype			Mean
	Cross D S	Reciprocal cross S D	Dandarawi D D	
	A	b	C	
E.W1.	36.20±0.577	33.70±0.577	28.40±0.577	32.77
	a	b	C	
E.W.	50.00±1.155	46.00±1.55	39.00±1.155	45.67
	a	b	C	
E.N.	114.30±0.577	108.72±0.577	101.82±0.577	108.28
	A	b	c	
H.H.	76.2±0.932	72.48±0.512	67.18±0.621	72.18
	a	b	C	
E.M.	5.715±0.050	5.001±0.029	33.970±0.231	4.895
	a	b	C	
F.S.	112.30±0.577	108.30±0.346	103.00±0.289	107.87
	a	b	C	
F.CV.	2.94±0.009	3.24±0.012	3.89±0.260	3.35

Means having different litters within each raw are significantly differences (p0.05)

E.W1=average of first egg weight (g/egg)

E.W= average of egg weight (g/egg)

E.N= average of egg number during first five month(egg/hen)

H.H= average hen housed egg production %

E.M= average egg mass (kgm/hen)

F.S= average feed consumption (g/hen/day)

F.V= average feed conversion (g feed/gm egg)

Table 3. means ± S.E of averages fertility ,hatchability percentages and some egg quality measurements for different genotypes.

Item	Geno-type						Means	
	Cross (D S)		Reciprocal cross (S D)		Dandarawi (D D)			
	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
F%	A 93.0±0.577	b 90.0±0.577	a 94.0 ±1.155	b 88.0±1.155	a 93.0±1.155	a 93.0±0.577	93.33	90.33
H%	A 82.0±1.155	b 74.0±1.155	a 83.0±0.577	b 73.0±0.577	a 83.0±0.577	a 81.0±0.577	82.66	76
SH.W%	B 12.5±0.289	c 11.70±0.115	ab 13.0±0.115	c 11.5±0.173	a 13.1±0.058	ab 12.7±0.115	12.87	11.97
AL.W%	De 54.7±0.656	b 58.0±0.289	cd 56.0±0.643	a 60.7±0.569	e 54.2±0.153	c 56.4±0.306	54.97	58.37
Y.W%	A 32.8±0.462	b 30.3±0.173	b 31.0±0.577	c 27.8±0.462	a 32.7±0.115	b 30.9±0.231	32.17	29.67
Y.IND.	A 48.3±0.137	c 44.2±0.115	d 43.2±0.115	b 44.9±0.231	a 48.4±0.231	d 43.93±0.260	46.63	44.34
H.U.	A 85.40±0.182	a 85.83±0.382	a 85.83±0.067	a 85.64±0.209	a 85.37±0.038	a 84.94±0.052	85.53	85.47

Means having different litters within each raw are significantly differences (p0.05 %

F%= fertility %

H%= hatchability %

SH.W= shell weight %

AL.W= albumen weight %

Y.W.= yolk weight %

Y.IN.= yolk index

H.U.= hauh unit

Tabel 4. Percentages of some production traits of different geno-types during first and second generations when we assumed Dandarawi hens as 100%

Item	Generation	Geno-type		
		Cross (D S)	Reciprocal cross (SD)	Dandarawi (D D)
E.W.1	F1	141.9	136.0	100
	F2	127.4	118.6	100
E.W.	F1	130.7	123.0	100
	F2	128.2	117.9	100
E.N.	F1	113.2	109.0	100
	F2	112.18	106.77	100
H.H.	F1	116.4	112.9	100
	F2	112.2	106.7	100
E.M.	F1	147.9	127.5	100
	F2	143.9	125.9	100
F.S.	F1	109.0	105.1	100
	F2	109.0	105.1	100
F.V.	F1	129.6	125.0	100
	F2	124.4	116.7	100

F1 = first generation

F2= second generation

E.W1= E.W1=average of first egg weight (g/egg)

E.W= average of egg weight (g/egg)

E.N= average of egg number during first five month(egg/hen)

H.H. = average hen housed egg production %

E.M= average egg mass (kgm/hen)

F.S.= average feed consumption (g/hen/day)

F.V= average feed conversion (g feed/gm egg)

Comparison between the performance of first and second generation chicks

To compare between the performance of the first and second generation chicks, we assumed that, the performance of Dandarawi hens as 100% and calculated the performance of cross and its reciprocal as a percentage of Dandarawi performance (Table 4), it can be observed that, although, both cross and its reciprocal had superiority performance than Dandarawi in respect to some productive performance (egg weight, egg number, egg mass and feed conversion), the performance of first generation chicks better than the second generation chicks, it may be related to the negative recombination effect of genes in second generation chicks.

It can be concluded that, the productive performance of the cross and its reciprocal during second generation was better than Dandarawi hens.

REFERENCES

1. Abdel Galil M.A. 1993. Evaluating the performance of some local breeds of chicken under certain plans of nutrition. Ph.D.el Minia University.

2. Abdel Galil M.A. 1999. Effect of crossing Dandarawi chicken with egg-type commercial breeder on some productive traits. Egypt.J.Appl.Sci., 14 (5) 13-24.

3. Abdel Latif M.A. 1977. Studies on some productive traits in dandarawi chickens. Under Upper Egypt. conditions. Faculty M. Sc. Thesis, Agric., Assuit University.

4. Crawford,R.D. 1991. Poultry breeding and genetics. Animal and vet. scie. elsevier sci. pup, b. v. amesterdam oxford.

5. Duncan,D.B. 1955. Multiple range and multiple f tests. Biometrics,11:1-42

6. El-Hossari M.A.,A.and S.A.Dorgham. 1993. Testing heterotic effects of fayoumi crossbreds under commercial production condition. Egypt. Amer. Conf. Physiol. Anim. prod. el-Fayoum.

7. El-Hossari M.A.,A. Abdel-Warth and H.M. Sabri. 1997.Hetrotic effects on phenotypic and genetic correlations of some economice traits when two lines of fayoumi chickens. 2nd Hungarian-Egypt. poult. Conf. Godollo, Hungary, pp. 295-306.

8. Farghaly M. and K.Saleh. 1988. The effect of cross breeding on egg traits in laying hens. Egypt. poult. Scie., 8:342-376.

9. Kader Y.M.A., M.A. El-Hossari, A. A. Abdel-Warth and Fadia Nossier. 1986. Effect of crossing two fayoumi strains with new hamp shire and white leghorn chickens on some economic traits. Agric. Res. Rev., 64(6)947-954.

10. Mandour M.A., G.A. Abd-Allah and M. M. Sharaf. 1996. Effect of cross breedingon some carcass traits of native and standared breeds of chickens. Egypt. Poult. Sci., 16(1): 171-185.

11. Mohamed K.A. 1997. Improvement of some egyptian strains of chicken by crossing with egg-type commercial breeders. 2nd Hungarian-egypt. Poult. Conf., 16-19 sept., Godollo, Hungary, pp. 171

12. Mstat. c. 1988. Russel D.Feed,Mstat Director Crop and Soil Sciences. Departement Michigan Srate University Version 2.00.

13. Neshein, M.C.,R.E.Austic and L.E. Cord. 1979. Poultry production, 12 th E.D., & Febiger, Philadelphia.

14. Snedecor, G.W. and W.G. Cochran. 1981. Statistical methods. 7th ed. Iowa State Coll. Press, Ames Iowa, U.S.A.

الأداء الأنتاجى لدجاج الجيل الثانى من خلط دجاج الدندراوى مع سلالة متخصصة فى إنتاج البيض

محمد عبد العزيز عبد الجليل

معهد بحوث الإنتاج الحيوانى - مركز البحوث الزراعية - وزارة الزراعة - الدقى - جيزه - مصر

أجريت الدراسة بمحطة بحوث الدواجن بسدس التابعة لمعهد بحوث الإنتاج الحيوانى مركز البحوث الزراعية بالدقى وذلك بغرض تقييم الصفات الإنتاجية لدجاج الجيل الثانى للتراكيب الوراثية الناتجة من خلط الدجاج الدندراوى مع أمهات دجاج الشيفر المتخصصة فى إنتاج البيض وذلك بمقارنة صفاتها الإنتاجية بكل من دجاج الجيل الأول الذى يحتوى على التراكيب الوراثية الآتية ١ - دجاج الخليط (إناث شيفرز مع ديوك دندراوى) ٢ - خليط تبادلى (ديوك شيفرز مع إمهات دندارى) ٣ - الدجاج الدندراوى (ديوك دندارى مع إناث دنزاوى) وبعد الحصول على الجيل الأول تم فى نهاية عمر إنتاج البيض تزاوج إناث كل تركيب وراثى مع ذكور نفس التركيب الوراثى للحصول على دجاج الجيل الثانى الذى تم تربيته من عمر الفقس حتى عمر نهاية إنتاج البيض . وأمكن تلخيص النتائج المتحصل عليها كالآتى :

١ - تفوق دجاج الخليط فى وزن الجسم عن كل من خليطه التبادلى بصورة معنوية عند أعمار الفقس و ٤٠ أسبوع وكان التفوق معنوياً عن الدجاج الدندراوى عند الفقس و ٢٠ و ٤٠ أسبوعاً بينما كان تفوق الدجاج الخليط التبادلى معنوياً عن الدجاج الدندارى عند كل الأعمار .

٢ - تأخر الدجاج الخليط فى عمر بيضة وعمر النضج الجنسى (٥٠٪) إنتاج بصورة معنوية عن كل من خليطه التبادلى والدجاج الدندراوى كما تأخر دجاج الخليط التبادلى عن الدجاج الدنداروى حيث كانت ١٥٨ و ١٥٤ و ١٥٠ يوماً عند عمر أول بيضه بينما كانت ٢٤٠ و ٢٢٨ و ٢٢٢ يوم عند ٥٠٪ إنتاج لكل من الدجاج الخليط والخليط التبادلى والدنداروى على الترتيب .

٣ - تفوق الدجاج الدنداروى بصورة معنوية فى صفة الحيوية عن كل من الدجاج الخليط والخليط التبادلى كما كان الخليط التبادلى أكثر حيوية عن الدجاج الخليط وذلك خلال فترة النمو بينما لم تكن هناك فروقاً معنوية فى صفة الحيوية خلال فترة إنتاج البيض بين التركيب الوراثية الثلاثة .

٤ - تفوق الدجاج الخليط عن كل من خليطه التبادلى أو الدجاج الدندراوى فى كل صفات وزن أول بيضة متوسط وزن البيضة - عدد البيض الناتج خلال أول ١٥٠ يوم إنتاجية وكتلة البيض المنتجة لكل طائر خلال تلك الفترة كما تفوق دجاج الخليط التبادلى بصورة معنوية فى تلك الصفات عن الدجاج الدندراوى .

٥ - على الرغم من إرتفاع معدل إستهلاك العلف للدجاج الخليط بصورة معنوية عن خليطه التبادلى أو الدجاج الدنداروي إلا أنه تفوق فى كفاءة تحويل العلف الى بيض ١٢٢ و ١٠٨ و ١٠٣ جم عليقة / طائر و ٣,٩٤ و ٣,٢٤ و ٣,٨٩ جم بيض منتج لكل من الدجاج الخليط وخليطه التبادلى والدجاج الدنداروى على الترتيب .

٦ – تقدمت سلالة الدندراوى فى كل من صفتى نسبة الخصب والفقس بصورة معنوية عن كل من الخليط والخليط التبادلى بينما لم تكن هناك فروقاً معنوية بين الخليط وخليطه التبادلى فى تلك الصفات .

٧ – كانت نسبة الفقس والخصب أفضل معنوياً فى فصل الشتاء عنها فى فصل الصيف بصفة عامة وكانت هذه الفروق بين الصيف والشتاء موجودة أيضاً داخل الدجاج الخليط وخليطه التبادلى .

٨ – حققت سلالة الدندراوى تفوقاً فى صفات القشرة ونسبة وزن الصفار عن بيض الدجاج وخليطه التبادلى بينما لم تكن هناك فروقاً معنوية فى باقى صفات البيضه بين التراكيب الوراثية المختلفة .

٩ – كانت صفات القشرة ومتوسط وزن الصفار ومعامل الصفار فى فصل الشتاء أفضل عنها في فصل الصيف بينما لم تكن هناك فروقاً معنوية لمعامل هو داخل التراكيب الوراثية بين الصيف والشتاء .

١٠ – إذا إعتبرنا أن الصفات الإنتاجية لسلالة الدراوى هى ١٠٠٪ فى كل من دجاج الجيل الأول والثانى فإنه يتضح تفوق دجاج الخليط فى جميع الصفات الإنتاجية عن كل من خليطه التبادلى والدجاج الدنراوى وكذلك تفوق الخليط التبادلى عن الدجاج الدنراوى وذلك فى كل من الجيل الأول والثانى . إلا أن الصفات الإنتاجية للجيل الثانى قد إنخفضت عن الجيل الأول لجميع التراكيب الوراثية وذلك فى كل من صفات وزن البيضة وعدد البيض ومعامل التحويل خلال فترة ١٥٠ يوم الأولى من إنتاج البيض البيض .

من تلك الدراسة يتضح أن الصفات الإنتاجية للدجاج الخليط وخليطه التبادلى للجيل الثانى قد تفوقت عن الدجاج الدندراوى بصورة معنوية .