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ESTIMATION OF CROSSBREEDING EFFECTS FOR EGG PRODUCTION TRAITS IN A CROSSBREEDING EXPERIMENT INVOLVING TWO LOCAL STRAINS OF CHICKENS

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Abstract: *A crossbreeding experiment was carried out between two Egyptian strains of chickens namely Mandarah (MN) and Matrouh (MA). Numbers of 668 pullets fathered by 71 sires and mothered by 462 dams produced from four genetic groups (the two purebred strains and their reciprocal crosses) were used. The studied traits of egg production were age at sexual maturity (ASM), body weight at sexual maturity (BWSM), weight of the first egg (WFE), egg number at first 90-days (EN90D), egg mass at first 90-days (EM90D), total egg number for 210-days (EN210D) and total egg mass for 210-days (EM210D). While the partial recording of egg production were period for first ten eggs (PF10E), egg mass for first ten eggs (EMF10E), egg number for one week per month (EN1W/M), egg mass for one week per month (EM1W/M), egg number for two days per week (EN2D/M) and egg mass for two days per week (EM2D/M). Multi-trait animal model and multiple-trait Gibbs Sampler were used to analyze the data of egg production traits.*

Results showed that MN strain was favored in all the studied traits compared to MA strain. The differences between the two strains were highly significant ($P \leq 0.01$) for all the traits, except ASM and PF10E. Estimates of direct additive effects were positive (negative for only ASM) and highly significant ($P \leq 0.01$) for all the studied traits (except ASM and PF10E). Most estimates of maternal breed effects were negative and ranged from low (0.24%) to moderate (-4.65%) in magnitude. Estimates of direct heterosis (H^I) were highly significant for all traits and positive for the most ones. Estimates of H^I ranged from -43.81% for PF10E to 36.15% for EN90D. Heritability estimate for

BWSM trait had the highest (0.28), but the other productive traits had low heritability (ranged from 0.08 to 0.16). MA-sired hens were superior in most productive and partial recording for all egg production traits compared to MN-sired hens.

Keywords: Animal model, egg production, direct additive effect, heritability, heterosis, maternal breed effect,.

INTRODUCTION

Some studies (Nawar and Bahie El-Deen, 2000 and Iraqi, 2002) reported that most of the native breeds had high non-additive genetic variance and, therefore, possibility of improvement of these breeds through crossbreeding is evident. Theoretically, the magnitude of heterosis is inversely related to the degree of genetic resemblance between parental populations (Willham and Pollak, 1985) and is expected to be proportional to the degree of heterozygosity of the crosses (Sheridan, 1981), thus heterosis is a result of non-additive genetic effects, but it is often around 10% or greater for egg production traits (Fairfull, 1990).

Egg production is a complex metric trait showing many variations during the period of production of the pullet. The study of egg production and its related traits such as age and body weight at sexual maturity, rate of laying and clutch size attracted the attention of several investigators who found that there were wide variation in these traits between different breeds and/or strains of chickens (EL-Labban et al., 1991; Iraqi et al., 2007). Partial recording of egg production in pullets is used to enhance and to increase the efficiency of genetic selection as well as shorten the generation interval. Results of many investigators showed that more genetic gain could be obtained in egg production when using partial recording (Ezzeldin and Mostageer, 1984; Hanafi and EL-Labban, 1984; EL-Labban et al., 1991).

Genetic estimates (heritability, genetic correlation) of egg production traits in different breeds and/or strains were cited by many investigators, who found that there were a lot of variations in these estimates according to the differences of the genetic make-up (EL-Labban et al., 1991; Khalil et al., 2004; Nurgiartiningsih et al., 2004;

Chih-Feng Chen et al., 2007). Precision of genetic estimates are required for the construction of multi-trait selection indexes to achieve the expected gains. Nowadays, the animal model is widely used allover the world genetic analysis for productive traits in chickens (Mielenz et al., 1994), but till now it seems that not been widely used for egg production traits in Egypt (Iraqi, 2002).

The aims of this work were: (1) to estimate direct additive and maternal effects as well as heterosis in crossbreeding experimental involving Mandarah and Matrouh chickens, (2) to determine the best method of selection for pullets based on partial recording of egg production (3) to estimate the additive genetic variance and heritability for egg production traits in purebreds and crossbreds using multi-trait animal models analyses.

Materials and Methods

This work was carried out in Poultry Breeding Research Station at Inshas, Sharkia Governorate, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt during the period from 2005 to 2007. Two developed local strains of chicken were used in this study (i.e. Matrouh strain, MA), it is a synthetic strain which has been developed in Borg El-Arab Poultry Research Farm, Matrouh Governorate, from a cross between Single Comb White Leghorn males and Dokki-4 females using system of breeding and selection for six generations (Mahmoud et al. 1974). Mandarah strain (MN), it has been developed in Montazah Poultry Research Farm, Alexandria Governorate, from cross between Alexandria males and inbred Dokki-4 females for four generations (Abdel-Gawad 1981).

Breeding plan and management:

Total numbers of 668 pullets fathered by 71 sires and mothered by 462 dams from the two strains. Sires and dams were chosen randomly from 300 cocks and 500 pullets to produce all genetic groups of purebred and crossbred. Each cock mated with 10 hens in each breeding pen. The numbers of sires, dams and their pullets which used in all genetic groups are given in Table (1). Pullets of each of the two strains were divided into two groups, the first group was mated with cocks from the same strain while the second group was mated with cocks from the other strain. Consequently, pedigreed eggs from each individual breeding pen for the four mating group (two purebreds of MN x MN and MA x MA and two crossbreds of MN x MA and MA x MN) were collected daily for ten days and incubated. All chicks of one-day old produced were wing banded and reared on floor brooder, then transferred to the rearing houses at 18 weeks of age. In laying period, the pullets transferred to the individual laying cages. Chicks were feed during rearing, growing and laying periods on diet containing 20.4%, 16% and 16.5% crude protein, 3.2%, 3.9% and 4.4% crude fiber, respectively, and the pullets were exposed to light for 17 hours per day from 22 weeks of age till end of the experimental period. All birds were treated and medicated similarly through out the experimental period under the same managerial and climatic conditions. The first generation of purebreds and their crosses were produced in one hatch.

Data and studied traits:

Data of egg production traits for each hen were daily recorded during the first year of production. Traits of egg production were age at sexual maturity (ASM), body weight at sexual maturity (BWSM), weight of the first egg (WFE), egg number at first 90-days (EN90D), egg mass at first 90-days (EM90D), total egg number for 210-days (EN210D) and total egg mass for 210-days (EM210D). The traits of partial of egg production were period for first ten eggs (PF10E), egg mass for first ten eggs (EMF10E), egg number for one week per month (EN1W/M), egg mass for one week per month (EM1W/M), egg number for two days per week (EN2D/M) and egg mass for two days per week (EM2D/M).

Table 1. Numbers of sires, dams and pullets from different breed groups which used in experimental work.

Breed group	Numbers		
	Sire	Dam	pullets
MN	17	135	190
MA	17	123	199
MN x MA	18	99	140
MA x MN	19	105	139
Total	71	462	668

Statistical analysis:

The statistical analysis was carried out by multi-trait animal model (Boldman et al., 1995) and multiple-trait Gibbs Sampler (Van Tassel and Van Vleck 1995) programs. Firstly, data were analyzed using SAS program (SAS 1996) to estimate starting values of additive and residual variances to be used as gassed values in animal model analysis.

Traits of age (ASM) and body weight (BWSM) at sexual maturity and weight of first egg (WFE) were analyzed using MTAM (the three traits in the model) (Boldman et al. 1995) using the following Model.

$$y = Xb + Zu + e$$

Where:

y= nx1 vector of observed trait of hens; n= number of records; b= px1 vector of fixed effect of breed group; p= 4 levels; X= design matrix of order n x p, which related records to fixed effect of breed group; u= the vector of random additive genetic effect of hen; Z= the incidence matrix relating records to the additive genetic effect of hen; and e= n x 1 vector of random residual effects.

Traits of EN90D, EM90D, EN210D, EM210D, EN1W/M, EM1W/M, EN2D/W and EM2D/W can not be analyzed by MTAM because they were distributed as a binomial distribution. Thus, multiple-trait Gibbs sampler (Van Tassel and Van Vleck, 1995) used to analyses these traits which developed to implement the Gibbs sampling (GS) algorithm for Bayesian analysis of a brood range of animal models. The program of MTGSAM allows analysis of several continuous and categorical variables can have any number of levels (Bennewitz et al., 2007).

All calculations of variances and co-variances for multi-trait animal model were carried out using the **MTDFREML** program (Boldman et al., 1995) adapted to use spare matrix package, **SPARSPAK**, (George et al., 1980; George and Ng, 1984). Convergence was assumed when the variance of the log-likelihood values in the simplex reached $<10^{-9}$. Occurrence of local maxima was checked by repeatedly restarting the analyses until the log-likelihood did not change beyond the first decimal.

Estimation of heritability:

Estimates of heritability were calculated according the following formula:

$$h_a^2 = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_e^2}$$

Where $\boldsymbol{\sigma^2_a}$ and $\boldsymbol{\sigma^2_e}$ are variances due to the effects of additive genetic and random error, respectively.

Estimation of crossbreeding components:

Estimates of direct additive effect, maternal breed effect and direct heterosis for all traits were calculated using the Software Package **CBE** (Wolf, 1996). Estimates of each component were calculated according to Dickerson (1969 & 1973) as follows:

1. Direct additive effect:
   [(MN x MN – MA x MA) – (MA x MN – MN x MA)]/2.
2. Maternal breed genetic:
   [(MA x MN – MN x MA)]/2.
3. Direct heterosis:
   [(MN x MA + MA x MN) – (MN x MN + MA x MA)]/2.

Results and Discussion

Actual means:

Means presented in Table 2 showed that the MN strain was favored in all the studied traits compared to MA strain. This may be due to genetic make up of the two strains. The differences between the two strains were highly significant ($P \leq 0.01$) for all the studied traits, except ASM and PF10E. These differences could be encouraging factor to cross the strains. EL-Labban (2000) and EL-Sisy (2001) found that MN strain had heaver BWSM than MT. Generally, birds having higher BWSM produced more eggs than those having relatively lower body weight (Mitra et al., 1976).

Comparing between purebreds and crossbreds, it is showed that MN x MA cross had superiority in means for most the studied traits. Comparing between the two reciprocal crosses, it is showed that means of MN x MA cross were higher than the reciprocal one (MA x MN) for all the studied traits except BWSM, PF10E and EMF10E. Thus, one would recommended the poultry breeders in Egypt to use the MN x MA cross as egg production type chickens.

Direct Additive effect (G^I):

Estimates of G^I presented in Table 3 indicated that all effects are positive (beyond ASM) and highly significant ($P \leq 0.01$) for all the studied traits (except ASM and PF10E). Percentages of these estimates were low and mostly high, which ranged from -0.40 to 15.22% for productive traits and 0.14 to 17.42 for partial recording of egg production traits. Nawar and Abdou (1999) showed that percentages of G^I were 37.4% for BWSM, –12.5% for EN90D, 15.07% for EM90D and 23.6% for total egg mass when crossed R.I.R sires to Fayoumi dams. Khalil et al. (2004) found that percentages of G^I were negative (-1.9%) for ASM, positive and highly significant effect (36.4%) for BWSM and positive 26.5% for TEN in the cross of White Leghorn x Baldi Saudi. Iraqi et al. (2007) found that Fayoumi and White Leghorn breeds gave the earliest ($P \leq 0.01$) ASM by -16.2% and -15.6%, respectively in 4x4 diallel mating experiment in Egypt. They added that percentage of G^I for BWSM was significantly ($P \leq 0.01$) positive (31.7%) in Rhode Island Red, while it was negative (-28.6%) in Fayoumi chickens.

Estimates of G^I in the present study showed that MA-sired hens were superior in most productive and partial recording for all egg production traits compared to MN-sired hens (Table2). Nawar and Abdou (1990) found that pullets sired by RIR were superior in egg weight than pullets sired by Fayoumi.

Maternal breed additive (G^M):

Estimates of G^M in Table 4 indicated that most effects of G^M were negative and ranged from low to moderate in magnitude for all the studied traits. Percentages of G^M ranged from -4.65 to 2.13% for productive traits and from -3.33 to 0.24% for partial recording for egg production traits. Another point of view, all effects of G^M were non-significant with exception of BWSM (P≤0.05). Also, Nawar and Abdou (**1999**) showed that negative maternal genetic effects for traits of ASM (-1.9%), BWSM (-4.36%) and WFE (-6.8%). While they were positive for traits of EN90D (6.88%), EM90D (0.15%) and TEM (5.3%), when crossed R.I.R sires and Fayoumi dams. Khalil et al. (2004) found that percentages of G^M were 6.5, -16.6 and –9.0% for ASM, EN90D and annual egg number, respectively, in cross of White Leghorn and Baladi Saudi chickens. They added that this effect was highly significant (P≤0.001). Recently, Iraqi et al. (2007) found that negative and highly significant (P≤0.01) effects of maternal ability on traits of ASM (-8.5%) and total egg production (-11.5%) in Dandarawi chickens, BWSM (-6.3%) in R.I.R, EN90D (-11.2%) in Fayoumi breed in 4x4 diallel mating experiment in Egypt.

Estimates of G^M on most egg production traits in this study were in favor of pullets mothered by MA. While, those pullets mothered by MN were superior for only ASM, BWSM and EMP10E traits (Tables 4 and 5). Significant superiority of MN dams for BWSM could be due to a large BWSM (1468.3 gm). Similarly, Nawar and Abdou (1990) concluded that pullets mothered by Fayoumi breed were superior to those mothered by R.I.R.

Heterosis:

Estimates of H^I presented in Table 5 were highly significant for all the studied traits and positive for all productive traits except ASM (-2.45%), WFE (-4.74%), PF10E (-43.81%) and EMF10E (-6.51%) were negative. Positive percentages of H^I ranged from 7.86 to 36.15%. These results indicated that crossing between MN and MA are associated with existence of positive and high percentages of heterotic effects on all the studied traits of egg production. These results fall within results of Bordas et al. (1996), Khalil et al. (2004) and Iraqi et al. (2007) for ASM. They showed that the negative percentages of H^I ranged between -12.74 and -0.5% for ASM. Also, Nawar and Abdou (1999), EL-Soudany (2003) and Iraqi et al. (2007) showed positive percentages of H^I (ranged from 0.4 to 12.8%) for BWSM.

Percentages of H^I indicated that age at sexual maturity and periods of first 10 eggs were significantly decreased by 2.45 and 43.81%, respectively. These indicate that the two traits were improved by crossing. Percentages of H^I ranged from -2.45 to 36.15% for productive traits and from -43.81 to 29.66% for partial recording for egg production traits. Bordas et al. (1996) found a significant ($P\leq0.05$) direct heterosis for egg weight when crossed two lines of R.I.R. Most of these ranges are within the ranges of those compiled by Fairfull (1990) and Nawar and Bahie EL-Deen (2000). Mahmoud et al. (1981), Bordas et al. (1996), Nawar and Abdou (1999) and Iraqi et al. (2007) showed that percentages of H^I ranged from 3.6 to 54.7%, 4.4 to 22.5% for total egg number and total egg mass, respectively.

Variance components and heritabilities:

Estimates of additive (σ_a^2) and residual (σ_e^2) variances for trait of egg production and partial recording are given in Table 6. Results showed that percentages of σ_a^2 were low and moderate in magnitude for all the studied traits and the percentages ranged from 1.3 to 27.6%. It is also showed that BWSM had the highest percentage of σ_a^2 (27.6%), thus, this trait could be improved also by direct selection. In general, percentages of σ_a^2 for most partial recording traits were moderate and higher than those for traits of egg production, therefore, the improvement of egg production traits by selection using partial recording could be possible. Ranges of additive variance percentages in this study are fall within the ranges of 2.1 and 57.6% due to sire components for egg production traits as reported by El-Labban (1984), Wei and Van Der Werf (1995) and El-Labban (2000).

Heritability (h^2) estimates presented in Table 6 indicated that BWSM trait had the highest estimate (0.28), but the other traits had low heritability. While, partial recording for egg production traits had low heritability. Estimates of h^2 were 0.14, 0.16, 0.12, 0.13, 0.08 and 0.10 for traits of PF10E, EMF10E, EN1W/M, EM1W/M, EN2D/W and EM2D/W, respectively. These estimates fall within the ranges obtained by El-Labban (1984), Wei and Van Der Werf (1995), El-Labban (2000) and Kosba et al. (2006) when used sire and/or animal model analyses. From the previous results, one recommends that the traits of egg production can be improved through selection by using partial recording of periods (in days) of first ten eggs and egg mass for first ten eggs. This recommendation is very important to get short generation intervals and then the expected genetic gain is increased.

CONCLUSIONS

- Based on heterosis effects, it could be concluded that crossing between MN and MA are associated with existence of positive and high percentages of heterotic effects on all the studied traits of egg production.
- Estimates of G^I in this study showed that MA-sired hens were superior in most traits of egg production and partial recording of production compared to MN-sired hens.
- Estimates of G^M on most egg production traits were in favor of pullets mothered by MA. While, those pullets mothered by MN were superior for only ASM, BWSM and EMP10E traits.
- From the previous results, one recommends that the traits of egg production can be improved through selection by using partial recording of periods (in days) of first ten eggs and egg mass for first ten eggs, thus the breeders could be short the generation intervals.

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Table 2: Means and standard error for productive and partial recording traits in Mandarah (MN), Matrouh (MA) and their reciprocal crosses in chickens.

Trait[+]	MN		MA		Purebred difference		MN x MA		MA x MN	
	No.	Mean±S.E	No.	Mean±S.E	Mean±S.E	Significance	No.	Mean±S.E	No.	Mean±S.E
Productive traits:										
ASM (in days)	190	165.6±0.40	199	166.2±0.39	-0.64±0.55		137	161.5±0.47	134	162.1±0.47
BWSM (gm)	190	1468.3±15.1	199	1264.5±14.71	203.8±21.1	**	137	1448.0±17.61	134	1506.5±17.7
WFE (gm)	190	38.5±0.29	199	35.9±0.29	2.57±0.41	**	137	35.5±0.35	134	35.4±0.35
EN90D(egg)	190	44.3±1.4	199	36.9±1.36	7.32±1.95	**	137	57.2±1.64	134	53.4±1.67
EM90D (gm)	190	2005.1±60.7	199	1606.7±59.3	398.4±84.8	**	137	2394.7±71.5	134	2255.1±72.2
EN 210D(egg)	189	79.6±2.5	199	65.0±2.41	14.64±3.47	**	137	93.8±2.90	134	88.7±2.93
EM 210D(gm)	189	3810.9±116	199	2986.9±113	824.0±126	**	137	4197.8±136	134	3986.9±138
Partial recording:										
PF10E (in days)	184	27.86±1.10	197	28.52±1.07	-0.66±1.53		128	16.21±1.32	126	15.47±1.33
EMF10E (gm)	184	410.84±1.85	197	389.27±1.78	21.57±2.57	**	128	373.04±2.21	126	374.98±2.23
EN1W/M(egg)	183	20.15±0.57	199	15.52±0.54	4.63±0.79	**	134	22.72±0.66	129	21.57±0.67
EM1W/M (gm)	183	951.57±27.0	199	705.24±25.90	246.33±37.4	**	134	1026.8±31.55	129	984.52±32.2
EN2D/W(egg)	183	21.62±0.67	199	17.42±0.64	4.2±0.93	**	132	25.96±0.79	130	24.66±0.80
EM2D/W (gm)	183	1035.40±31.6	199	808.47±30.32	226.93±43.8	**	132	1162.2±37.23	130	1105.0±37.5

[+] ASM, BWSM, WFE, EN90D, EM90D, EN210D, EM210D, PF10E, EMF10E, EN1W/M, EM1W/M, EN2D/M, EM2D/M= age at sexual maturity, body weight at sexual maturity, weight of the first egg, egg number at first 90-days, egg mass at first 90-days, total egg number for 210-days, total egg mass for 210-days, period for first ten eggs, egg mass for first ten eggs, egg number for one week per month, egg mass for one week per month, egg number for two days per week, egg mass for two days per week, respectively.

**= $P<0.01$.

Table 3: Estimates of direct additive effect (G^I) and their percentages for productive traits and partial recording in chickens.

Trait [+]	G^I±S.D	G^I %	Significant [++]
Productive traits:			
ASM (in days)	-0.65±0.43	-0.40	N.S.
BWSM (gm)	72.65±16.3	4.96	**
WFE (gm)	1.38±032	3.72	**
EN90D(egg)	5.54±1.52	13.67	**
EM90D (gm)	269.0±66.2	14.90	**
EN 210D(egg)	9.85±2.69	13.63	**
EM 210D(gm)	517.5±126.3	15.22	**
Partial recording:			
PF10E (in days)	0.04±1.21	0.14	N.S.
EMF10E (gm)	9.81±2.02	2.45	**
EN1W/M(egg)	2.66±0.61	16.20	**
EM1W/M (gm)	144.3±29.3	17.42	**
EN2D/W(egg)	2.75±0.73	14.09	**
EM2D/W (gm)	142.1±34.3	15.41	**

[+] Traits as defined in Table (2).
[++] **= P<0.01.

Table 4: Estimates of maternal effects (G^M) and its percentage for productive and partial recording traits in chickens.

Trait [+]	(G^M)	G^M %	Significant [++]
Productive traits:			
ASM (in days)	0.33±0.33	0.21	N.S.
BWSM (gm)	29.25±12.5	2.13	N.S.
WFE (gm)	-0.9.5±0.25	-0.29	*
EN90D(egg)	-1.89±1.17	-4.65	N.S.
EM90D (gm)	-69.80±50.8	-3.86	N.S.
EN 210D(egg)	-2.53±2.1	-3.50	N.S.
EM 210D(gm)	-105.5±96. 9	-3.10	N.S.
Partial recording:			
PF10E (in days)	-0.37±0.94	-1.42	N.S.
EMF10E (gm)	0.97±1.57	0.24	N.S.
EN1W/M(egg)	-0.35±0.47	-1.97	N.S.
EM1W/M (gm)	-21.14±22.5	-2.55	N.S.
EN2D/W(egg)	-0.65±0.56	-3.33	N.S.
EM2D/W (gm)	-28.60±26.4	-3.10	N.S.

[+] Traits as defined in Table (2).
*= P< 0.05.

Table 5: Heterosis estimates (H^I) and their percentages for productive traits and partial recording in chickens.

Trait[+]	H^I±S.D	H^I %	Significant [++]
Productive traits:			
ASM (in days)	-4.08±0.43	-2.45	**
BWSM (gm)	110.9±16.3	7.86	**
WFE (gm)	-1.75±0.32	-4.74	**
EN90D(egg)	14.68±1.52	36.15	**
EM90D (gm)	519.0±66.2	28.74	**
EN 210D(egg)	19.0±2.69	26.29	**
EM 210D(gm)	693. 5±126.3	20.40	**
Partial recording:			
PF10E (in days)	-12.35±1.21	-43.81	**
EMF10E (gm)	-26.05±2.03	-6.51	**
EN1W/M(egg)	4.31±0.61	24.16	**
EM1W/M (gm)	177.3±29.3	21.40	**
EN2D/W(egg)	5.79±0.73	29.66	**
EM2D/W (gm)	211.7±34.3	22.96	**

[+] Traits as defined in Table (2).
[++] **= P<0.01.

Table 6: Estimates of additive genetic (σ^2_a), phenotypic (σ^2_p) variances and heritability (h^2) for productive and partial recording traits in chickens.

Trait[+]	σ^2_a	σ^2_a %	σ^2_e	σ^2_e %	σ^2_p	h^2
Productive traits						
ASM (in days)	0.334	1.3	25.239	99.0	25.574	0.01
BWSM (gm)	9548.147	27.6	25031.331	72.0	34602.65	0.28
WFE (gm)	1.248	8.4	13.648	92.0	14.896	0.08
EN90D(egg)	14.06	4.5	296.68	95.5	310.74	0.05
EM90D (gm)	37628.74	6.1	580140.65	93.9	617769.4	0.06
EN 210D(egg)	23.69	2.3	1016.34	97.7	1040.03	0.02
EM 210D(gm)	79892.07	3.4	2262205.53	96.6	2342098	0.03
Partial recording						
PF10E (in days)	26.80	13.9	164.79	86.1	191.59	0.14
EMF10E (gm)	64.48	15.6	346.83	84.4	411.31	0.16
EN1W/M(egg)	6.01	11.5	46.01	88.5	52.02	0.12
EM1W/M (gm)	15978.64	13.3	103987.30	86.7	119965.9	0.13
EN2D/W(egg)	6.16	8.4	67.18	91.6	73.34	0.08
EM2D/W (gm)	16075.47	9.5	152256.52	90.5	168332	0.10

[+] Traits as defined in Table (2).

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الملخص العربى

تقدير تأثيرات التربية بالخلط لصفات انتاج البيض في تجربة خلط لسلالتين من الدجاج المحلي

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أجريت تجربة خلط بين سلالتين من الدجاج المحلي الأولى سلالة المطروح والثانية سلالة المندرة. أخذت البيانات علي ٦٦٨ دجاجة ناتجة من ٧١ أب و ٤٦٢ أم لأربعة مجاميع وراثية (سلالتين نقيتين وخلطانهما العكسية). وكانت صفات إنتاج البيض المدروسة هي العمر والوزن عند النضج الجنسي ، وزن البيضة الأولى ، عدد البيض ووزن كتلة البيض عند ٩٠ يوم الأولى من الإنتاج ، عدد البيض الكلي ووزن كتلة البيض عند ٢١٠ يوم الأولى من بداية الإنتاج. بينما كان التسجيل الجزئي لانتاج البيض هو الفترة التي وضعت فيها أول عشرة بيضات وكذلك وزن كتلة البيض لأول عشرة بيضات ، عدد البيض ووزن كتلة البيض خلال الأسبوع الأول من كل شهر، عدد البيض ووزن كتلة البيض خلال يومين من كل أسبوع، وقد استخدم نموذج الحيوان متعدد الصفة وبرنامج الجبس في تحليل البيانات.

أظهرت أهم النتائج ما يلي: كانت سلالة المندرة هي الأفضل في كل الصفات المدروسة مقارنة بسلالة المطروح ، كما كانت الاختلافات بين السلالتين عالية المعنوية لكل الصفات فيما عدا العمر عند النضج الجنسي و الفترة التي وضعت فيها أول عشرة بيضات . كانت تقديرات الأثر التجمعي ا لمباشر موجبة (سالبة فقط للعمر عند النضج الجنسي) وعالية المعنوية لكل الصفات المدروسة فيما عدا العمر عند النضج الجنسي و الفترة التي وضعت فيها أول عشرة بيضات. كانت معظم تأثيرات الأم سالبة وتراوحت من منخفضة (٠.٢٤%) الي متوسطة (-٤.٦٥%) القيمة. تراوحت قوة الهجين المباشرة من -٤٣.٨١% لصفة الفترة التي وضعت فيها أول عشرة بيضات الي ٣٦.١٥% لصفة عدد البيض خلال ٩٠ يوم الأولى من الإنتاج . كانت قيمة المكافئ الوراثي لصفة وزن الجسم عند النضج الجنسي هي الأعلي (٠.٢٨) ولكن للصفات الإنتاجية الأخرى كانت منخفضة القيمة (تراوحت من ٠.٠٨ – ٠.١٦). كان الدجاج الذي أبوه مطروح متفوق في معظم الصفات الإنتاجية وللتسجيل الجزئي لانتاج البيض مقارنة بالدجاج الذي أبوه مندرة.

وكانت أهم الاستنتاجات أنه يمكن استخدام السجلات الجزئية وخاصة مدة إنتاج العشرة بيضات الأولى وكتلة البيض لها فى الانتخاب لتحسين صفة إنتاج البيض فى الدجاج مما يقلل مدة الجيل وهذا يوفر الوقت والجهد.