*J. Animal and Poultry Prod., Mansoura Univ., Vol.8 (12): 477- 482 , 2017*

# Estimate of Direct and Maternal Genetic Parameters for some Production and Reproduction Traits in Friesian COWS through Sire and Animal Models

**El-Awady, H. G.[1] and I. A. M. Abu El-Naser[2]**

**[1] Animal Production Department, Faculty of Agriculture, Kafrelsheikh University, PC: 33516, Kafrelsheikh, Egypt, E-Mail: hassanelawady63@yahoo.com**

**[2] Animal Production Department, Faculty of Agriculture, Damietta University, Egypt. E-Mail: Atta19812000@yahoo.com**

## ABSTRACT

This research papper was carried out to assessment variance components, genetic parameters and breeding value for some productive traits such as: milk yield (MY), lacation period (LP) and dry period ( DP), and reproductive traits such as: days open (DO) and calving interval (CI), for a herd of Friesian cows, belong to Shobratana Animal Production Society, Tanta city in Egypt. Data were covered the period from 1985 to 2003. A total records were 2302 of 755 cows were sired by 45 bulls were analyzed using LSMLMW and MTDFREML programes. Unadjusted means of MY, LP, DP, DO and CI were 4875 kg, 333 d, 72 d, 119 d and 405d, respectively. Sire heritability were 0.43, 0.28, 0.30, 0.26 and 0.24 for MY, LP, DP, DO and CI, respectively. In this respect, direct and maternal heritabilities for the same traits were 0.34, 0.17, 0.13, 0.15 and 0.17, and 0.11, 0.15, 0.14 0.23 and 0.10, respectively. For sire model, genetic correlations among productive traits ranged from -0.30 (LP and DP) to 0.76 (MY and LP), while between reproductive and productive traits were postive and high (0.86 to 0.93) except DP and each of DO and CI were low and positive (0.13 and 0.09), respectively. The same trend as in the sire model was obtained also in the direct genetic correlations (ra1a2) among the same previous traits. Likewise estimates of maternal genetic correlations (rm1m2) were the similar the direct genetic correlations. Accuracy of decled breeding value, ranged from 35 to 88, 72 to 89 and 37 to 87 for sires, cows and dams, respectively, for different studied traits. This indicte that genetic improvement should be preferable realized through cows which the minimum of acurrecy was highest comparing to sires or dams. The present high estimates of genetic correlations between MY, LP and reproductive traits (DO and CI) that offer the possibility genetic improvement if selection for MY avaiable. Also the actual estimate of maternal heritability suggested that the maternal effects take into account in the analysis models and selection for productive and reproductive traits in Friesian cows cows in Egypt.

**Keywords:** Sire model, animal model, genetic parameters, breeding values and Friasian cows.

## INTRODUCTION

Friesian cows are the most dairy cattle and source of red meat. Numbers of cow's nearly about 4.8 Million cows (MARL, 2015) in Egypt. Milk yields consider most important trait in dairy cattle, increased profitable in dairy farm cattle when improvement milk production (Zafar *et al*., 2008). Milk production for Holstein–Friesian cattle inflected by genetic and management (Epaphras *et al*., 2004). Aziz *et al*., (2014) found the heritability for milk yield (0.26), lactation period (0.10), dry period (0.06), open days (0.03) and calving interval (0.07). And showed the genetic and phenotypic correlations were positive between milk yield and fertility traits, while was negative between LP and DP. Abubakar *et al*., (1987) noticed that sire selection used to improve repardactive traits. Falconer and Mackay, (1996) estimate heritability for different traits can be calculated by sire model and animal model. Paul *et al*., (2003) improve genetic merit of milk production a goal of dairy cattle breeder to determine the effectiveness of breeding programs. Gutierrez *et al*., (1995) unite with between sire and animal model, found that a sire model based on estimating procedure for genetic parameters may be cleared, when a small number of individuals, little pedigree information and highly unbalanced apportionment of effects. And shown most expensive terms of computing costs were based on animal model comparing to sire model. El-Awady *et al*., (2016) on Friesian cattle indicated that, accuracy of predicted breeding sires, cows and dams convergent. Consequently, genetic merit animal could be attained through each sires, cows and dams. Choudhary *et al*., (2003) on dairy cattle, cleared that the genetic improvement, due to careful and appreciable knowledge of genetic parameters are of make great importance for breeding strategies and selection. Estimation breeding valuesrely on statistical model, which is able to clarification the consequence environment effects (Stranden, 2009). Osman *et al*., (2013) cleared that height the correlation between genotype and phenotype in individual give rise to increased heritability on dairy cow using sire model for milk traits, consequently, selection on the depending on the individual's own phenotype be appropriate was effective. The main objectives of current investigation were to estimate of direct and maternal genetic parameters for MY, LP, DO, DP and CI throught sire and animal models and to estimate breeding values for these traits by using animal model in Friesian cows.

## MATERIALS AND METHODS

### Data and managements

Data of 2302 records of 755 cows were sired by 45 bulls were collected from a herd of Friesian cows, belong to Shobratana Animal Production Society, Tanta city in Egypt, Data covered the period from 1985 to 2003. Animals were housed free in shaded open covered with roof on height 4 meters. Cows were kept under a similar system of feeding and management practiced on the farm. During Winter and Spring months (December to May), animals were fed with Egyptian clover (Trifolium Alexandrinum), rice straw and concentrates feed mixture, which requirement of mature cows of calculated on base daily milk production, live body weight and pregnancy status. Concentrates formulation of cotton seed cakes, rice bran and barley wheat (18% protein),While from during dry season (June to November), animals were fed rice straw and concentrates feed mixture. Rice straw and water were offered adlibitum. Limited assessor clover hay when available. Mineral mixture bricks were offered adlibtium as lick salt in front animals. Cows were artificially inseminated during heat after 60 days postpartum using frozen semen from United States of America. Heifers were artificially inseminated when attained 350 kg of live body weight or 18-24 months of age. The dairy cows were milked three times at day.

**Statistical analysis:**

Data were analyzed using two methods, firstly, Linear Mixed Model Least Squares and Maximum Likelihood (LSMLMW) computer program of Harvey, (1990). To estimates genetic parameters for studied traits, i.e., milk yield (MY, kg), lactation period (LP, day), dry period (DP, day), days open (DO, day) and calving interval (CI, day).

1- Heritability was calculated based on half-sib method Backer, (1984) as follows:

$$h^2 s = \frac{4\sigma^2 s}{\sigma^2 s + \sigma^2 e}$$

**Where:**

$h^2 s$ = sire heritability, $\sigma^2 s$ = *sire genetic variance* and $\sigma^2 e$ = *residual*

2- Genetic correlation ($r_g$) is defined as correlation between breeding values of two traits ($g_1$ and $g_2$), can be estimated by according to Legates and Warwick, (1990) as follows:

$$r_g = \frac{Cov\, g_1 g_2}{\sqrt{\sigma^2 g_1}\ \sqrt{\sigma^2 g_2}}$$

**where:**

$Cov\ g_1 g_2$ = genetic covariance between $(g_1 g_2)$

$\sqrt{\sigma^2 g_1}$ and $\sqrt{\sigma^2 g_2}$ = genetic variance for $g_1\ g_2$

3- Phenotypic correlation (rp) is defined that contain each genetic and environmental effects can be calculated between two traits ($p_1$ and $p_2$) according to Turner and Young, (1969) as follows:

$$r_p = \frac{Cov(p_1 p_2)}{\sqrt{\sigma^2 p_1}\ \sqrt{\sigma^2 p_2}}$$

**where:**

$Cov\, p_1 p_2$ = phenotypic covariance between $(p_1 p_2)$

$\sqrt{\sigma^2 p_1}$ and $\sqrt{\sigma^2 p_2}$ = phenotypicvariance for $p_1\ p_2$

Second method, using MTDFREML program of Boldman *et al*., (1995) to estimate covariance components for studied traits with the multiple model included that the fixed effects of month and year of calving and parity of cow, random effects were animal, additive direct genetic effects, maternal genetic effects and maternal permanent environmental effects, the following model was uesd:

$$Y = X\beta + Za + Mm + Wpe + e$$

**Where:**

Y = a vector of observations, β = a vector of fixed effects, a= a vector of direct additive genetic effect, m = a vector of maternal genetic effect, pe = a vector of permanent environmental effect, e = a vector of residual effect. X, Z, M and W = are incidence matrices relating records to fixed, direct genetic, maternal genetic and permanent environmental effects.

To estimate direct hereditability ($h^2a$) and maternal heritability ($h^2m$) from, the following:

$$h^2 a = \frac{\sigma^2 a}{(\sigma^2 a + \sigma^2 m + \sigma am + \sigma^2 pe + \sigma^2 e)} \quad \text{and}$$

$$h^2 m = \frac{\sigma^2 m}{(\sigma^2 a + \sigma^2 m + \sigma am + \sigma^2 pe + \sigma^2 e)}$$

MTDFREML program using for calculated best linear unbiased perdition (BLUP) of estimated breeding values for all animals pedigree file for multi-traits analysis.

## RESULTS AND DISCUSSION

**Unadjusted means**

Unadjusted means, standard deviations, coefficients of variation (CV %) and for the different traits in the present study in Table (1). Coefficients of variation for different traits in investigation ranged from 21.38% to 53.92%, the large CV % value for DO (53.92 %), shown a great variation between individual cows in such an important reproductive trait. The current results similar results were found by EI-Awady *et al*., ( 2011 and 2016) on dairy cows raised in Egypt. The present mean for milk yield (MY), was higher than those found in Friesian cows in Egypt by Oudah and Zainab, (2010) being 2655kg, El-Awady and Oudah, (2011) being 3936kg and El-Awady *et al*., (2016) was 3557.5 kg. While lower than noticed by Khattab *et al*., (2000) being 5076kg, Shalaby *et al*., (2013) being 5387kg and Hammoud, (2013) being 8455kg on Holstein Friesian cows in Egypt.

The present mean of LP (333 days) was close to noticed by Shalaby *et al*., (2013), being 327 days on Friesian cows. Sattar *et al*., (2005) stated that the mean of LP was nearly 292 days. The estimate of mean for DP (72 days) was shorter than found by Oudah *et al*., (2001) being 79.3 days, Shalaby *et al*., (2013) being 72.9 and Hammoud *et al*., (2013) (117 days) in Friesian cattle in Egypt. While this estimate was longer than obtained by Khattab and Atil, (1999) (65 days). The present means of DO and Cl were119 and 405, respectively, and lower than the estimated by EI-Awady *et al*., (2011) and Hammoud *et al*., (2013) (141 and 415 days) and (117 and 427 days), respectively in Friesian cows in Egypt.

**Table 1. Unadjusted means, standard deviation (SD) and coefficient of variation (CV %) for milk yield (MY), lactation period (LP), dry period (DP), days open (DO) and calving interval (CI) in a herd of Friesian cows in Egypt.**

| Trait | Mean | SD | CV% |
|---|---|---|---|
| MY, kg | 4875 | 1536 | 31.51 |
| LP, d | 333 | 71.20 | 21.38 |
| DP, d | 72 | 22.84 | 31.72 |
| DO, d | 119 | 64.17 | 53.92 |
| CI, d | 405 | 93.15 | 23.00 |

**Variances and heritabilities**

Estimates sire genetic variance and covariance components and heritability for studied traits are presented in Table 2. Sire heritability for MY, LP, DP, DO and CI, were moderate (0.43, 0.28, 30, 0.26 and 0.24), respectively.

**Table 2. Estimates of variance components and heritabilities for studied traits via sire model.**

| Estimate | Traits | | | | |
|---|---|---|---|---|---|
| | MY | LP | DP | DO | CI |
| $\sigma^2_s$ | 2982.4 | 8.63 | 1.085 | 7.6225 | 10.7025 |
| $\sigma^2_e$ | 24760.9 | 114.66 | 13.375 | 109.658 | 167.658 |
| $\sigma^2_p$ | 27743.3 | 123.29 | 14.46 | 117.28 | 178.36 |
| $h^2_s$ | 0.43 | 0.28 | 0.30 | 0.26 | 0.24 |

**$\sigma^2$s= sire genetic variance $\sigma^2$e = residual;**
**$\sigma^2$p= phenotypic variance and $h^2$S= sire heritability;**

On Friesian cows raised in Egypt estimates of sire heritability by, Shalaby *et al*., (2013) for MY, LP, DP, DO and Cl were 0.14, 0.04, 0.109, 0.104 and 0.20, respectively and Osman *et al*., (2013) for MY and DO on first and second lactation being (0.29 and 0.31), and (0.49 and 0.117), respectively. Estimates of variance components and heritabilities (direct and maternal) for studied traits using animal model are presented in Table 3. Direct heritability for MY was moderate (0.34), while LP, DP, DO and CI were slights (0.17, 0.13, 0.15 and 0.17), respectively. The current estimates of direct heritability for MY, LP and DP higher than noticed by Alhammad, (2005) were 0.12, 0.03 and 0.0003, and Safaa Ibrahim, (2006) were 0.31, 0.07 and 0.09, respectively on Friesian cows in Egypt.

**Table 3. Estimates of variance components and heritabilities (direct and maternal) for studied traits in a herd of Friesian via animal model.**

| Estimate | Traits | | | | |
|---|---|---|---|---|---|
| | MY | LP | DP | DO | CI |
| $\sigma^2_a$ | 57.54 | 12.62 | 14.09 | 7.50 | 17.30 |
| $\sigma^2_m$ | 17.89 | 10.65 | 15.50 | 11.83 | 10.73 |
| $\sigma^2_{pe}$ | 38.53 | 15.30 | 6.18 | 14.29 | 7.98 |
| $\sigma^2_e$ | 54.78 | 34.50 | 76.44 | 17.79 | 67.44 |
| $\sigma_{am}$ | -0.76 | -0.34 | -0.31 | -0.24 | -0.32 |
| $\sigma^2_p$ | 167.98 | 72.73 | 111.90 | 51.17 | 103.13 |
| $r_{am}$ | -0.02 | -0.03 | -0.02 | -0.03 | -0.02 |
| $h^2_a$ | 0.34 | 0.17 | 0.13 | 0.15 | 0.17 |
| $h^2_m$ | 0.11 | 0.15 | 0.14 | 0.23 | 0.10 |
| $c^2$ | 0.23 | 0.21 | 0.06 | 0.28 | 0.08 |
| $e^2$ | 0.33 | 0.47 | 0.68 | 0.35 | 0.65 |

**$\sigma^2_a$=direct additive genetic variance; $\sigma^2_m$=maternal variance; $\sigma^2_{pe}$= permanent environmental; $\sigma^2_e$ = residual (temporary environmental variance); $\sigma_{am}$=direct maternal genetic covariance; $\sigma^2_p$ = phenotypic variance; $r_{am}$= direct maternal genetic correlation; $h^2_a$= direct heritability; $h^2_m$= maternal heritability; $c^2$ = fraction phenotypic variance to permanent environmental and $e^2$= fraction phenotypic variance due to residual effects.**

Also, Faid-Allah, (2015) found direct heritabilty estimates for MY, LP and DO were 0.18, 0.112 and 0.105, respectively in Friesian–Holsteins. In addition, El-Awady *et al*., (2011) found the direct hertability for MY, LP, DO and Cl were 0.17, 0.15, 0.02 and 0.03, respectively. While, Hammoud, (2013) estimated direct heritability for LP and DO were 0.48 and 0.54, respectively and higher than the present estimated. The estimates of maternal heritability for studied traits as in Table (3), were slights (0.11, 0.15, 0.14, 0.23 and 0.10). El-Awady *et al*., (2016) noticed that the maternal heritability for same studied traits on Friesian cows were 0.16, 0.13, 0.18, 0.14, 0.23 and 0.21, respectively. The present estimates of correlations between direct and maternal genetic effects were negative for all studied traits, the same trend noticed by (El-Awady, 2003 and El-Awady *et al*., 2014).

**Genetic and phenotypic correlations**

Different correlations and residual ratios among different studied traits via sire model as in Table 4. The estimation of genetic correlations between MY and each of LP, DO and CI were high and positive (0.76, 0.86 and 0.88), respectively, also genetic correlations between LP and every of DO and Cl were positive and high, being 0.93 and 0.89, respectively.

**Table 4. Estimates of genetic and phenotypic correlations and residual ratios among different studied traits via sire model.**

| $Trait_1$ | $Trait_2$ | $r_{g1g2}$ | $r_{p1p2}$ | $r_{e1e2}$ |
|---|---|---|---|---|
| MY | LP | 0.76 | 0.54 | 0.44 |
| | DP | -0.24 | -0.29 | 0.32 |
| | DO | 0.86 | 0.62 | 0.52 |
| | CI | 0.88 | 0.58 | 0.45 |
| LP | DP | -0.30 | -0.21 | 0.18 |
| | DO | 0.93 | 0.22 | 0.64 |
| | CI | 0.89 | 0.72 | 0.66 |
| DP | DO | 0.13 | 0.20 | 0.23 |
| | CI | 0.09 | 0.47 | 0.61 |
| DO | CI | 0.13 | 0.71 | 0.65 |

**$r_{p1p2}$= Phenotypic correlation; $r_{g1g2}$= genetic correlation; $r_{e1e2}$= residual environmental ratio between traits 1, 2**

In contrast, the estimation of genetic correlations between DP and each of MY and LP were negative (-0.24 and -0.30), respectively. Lower Genetic correlations among DP, DO and CI were ranged from (0.09 to 0.13). Shalaby *et al*., (2013) on Friesian cows calculated genetic correlations between MY and both of DP and LP, being -0.55 and 0.52, respectively, while genetic correlations between LP and DP was -0.37 and between DO and Cl was 0.046. The present estimation of phenotypic correlations via sire model among MY, LP, DO and CI ranged from (0.22 to 0.72), and between DP and each of MY, LP, DO and CI were -0.29, -0.21, 0.20 and 0.47, respectively are give in Table 4. The present results were the same trend with those stated by (Tag El-Dien, 1997) phenotypic correlations among the same studied traits were ranged from (-0.095 to 0.76) for all lactation on Friesian cows. Different correlations and ratios among different traits investigated using animal model are presented in Table 5. This table shown the genetic correlations among MY, LP, DP, DO and CI were ranged from (-0.65 to 0.94), and the highest value was between MY and DO (0.94). Safaa Ibrahim, (2006) estimated the genetic correlations among MY, LP, DP and CI being from -0.06 to 0.92, which highest value was between LP and CI (0.92) for first lactation in Holstein cows in Egypt. Also, Faid-Allah, (2015) reported that the genetic correlation between LP and CI was high (0.894).

**Table 5. Estimates of different correlations and ratios among different studied traits in a herd of Friesian using animal model**

| Trait | | Correlations and ratios between and among different traits | | | | |
|---|---|---|---|---|---|---|
| $Trait_1$ | $Trait_2$ | $r_{a1a2}$ | $r_{p1p2}$ | $r_{e1e2}$ | $r_{pe1pe2}$ | $r_{m1m2}$ |
| MY | LP | 0.78 | 0.40 | 0.06 | 0.06 | 0.53 |
| | DP | -0.08 | -0.19 | -0.09 | -0.17 | -0.60 |
| | DO | 0.94 | 0.53 | 0.15 | -0.43 | 0.59 |
| | CI | 0.83 | 0.27 | 0.22 | 0.17 | 0.74 |
| LP | DP | -0.65 | 0.31 | 0.07 | 0.37 | -0.09 |
| | DO | 0.93 | -0.06 | 0.03 | 0.05 | 0.31 |
| | CI | 0.89 | 0.39 | 0.49 | 0.03 | 0.46 |
| DP | DO | 0.09 | -0.35 | -0.10 | -0.41 | -0.33 |
| | CI | 0.13 | -0.10 | 0.02 | 0.17 | -0.57 |
| DO | CI | 0.10 | 0.22 | 0.15 | 0.47 | 0.66 |

**$r_{a1a2}$ = genetic correlation between trait1, 2 and so on, $r_{p1p2}$ = phenotypic correlation between traits 1, 2 and so on, $r_{e1e2}$ = residual environmental ratio between traits 1, 2 and so on and $r_{pe1pe2}$ = ratio of permanent environmental between traits 1, 2. and so on $r_{m1m2}$= maternal genetic correlation between traits1,2.**

The residual ratios among studied traits via sire model were ranged from (0.18 to 0.66) in Table 4. The highest ratio was between LP and CI, and lowest ratio was between LP and DP.The maternal correlations among studied traits in the present investigation were ranged from (-0.60 to 0.74). The maternal correlations among all traits were positive except the relation between DP and another studied traits. The estimates of permanent environmental ratios ranged from (-0.43 to 0.47), while the estimates of residual ratios ranged from (-0.10 to 0.47) in Table 5. Comparisons between them will help researchers to select model for their needs. Hussein, (2004) sugested that the improvement the environmental conditions for increase milk production as well as genetic merit on Holstein Friesian.

**Breeding values**

Predicted, breeding values through sires, cows and dams for MY, LP, DP, DO and CI in Table 6. Breeding values may be better measurement able to appreciate the genotype best animals. The breeding values for MY, LP, DP, DO, and CI of sires ranged from -292 to 171kg, -0.55 to 0.49d, -0.089 to 0.172d, -2.46 to 3.49d and -0.9 to 1.38 d, respectively. The corresponding value for cows ranged between -476 – 646kg , -1.2 –1.72d, -1.29 – 0.439d, -3.13 – 4. 28d and -0.98 – 2.11d, respectively. In this respect breeding values for the same studied traits for dams were between -279 and 235kg, -0.79 and 0.81 d, -0.52 and 0.38 d, -2.57 and 3.58 d and between -0.87 and 2.08d, respectively. The ranges breeding values of cows were higher than those for sires and dams for different current traits. The same results noticed by Hammoud, (2013) on Friesian in Egypt. El-shalmani, (2011) estimated Predicted breeding values of sires on Friesian cows being from -806.2 to 776.4 kg, -14.2 to 14.4 d and -23.7 to 38.9 d, for TMY, LP and DO, respectively.. Shalaby *et al.*, (2012) calculated breeding values of sires on Friesian cows ranging from -299 to 386 kg, -3.35 to 4.80d and -26.6 and 21.6d for TMY, LP and DO, respectively. Accuracy of breeding value, ranged from 35 to 88, 72 to 89 and 37 to 87 for sires, cows and dams, respectively in Table 6, suggested that genetic improvement should be preferable realized through cows which the minimum of acurrecy was highest comparing to sires or dams. Estimated accuracy for CI was high and ranged between 82 and 89.

**Table 6. Range of breeding values (BV'S) through sires, cows and dams and accuracies%, for milk yield (MY), lactation period (LP), dry period (DP), days open (DO) and calving interval (CI) in a herd of Friesian cows in Egypt**

| Traits | Breeding values (BV'S) | | | |
|---|---|---|---|---|
| | Minimum | Maximum | Accuracy, % | Range |
| | Breeding values of sires (BVS's) | | | |
| MY (Kg) | -292±117 | 171±153 | 71-75 | 463 |
| LP (day) | -0.55±1.41 | 0.49±1.71 | 35-51 | 104 |
| DP (day) | -0.089±1.59 | 0.172±2.42 | 50-78 | 0.261 |
| DO (day) | -2.46±0.81 | 3.49±1.02 | 79-82 | 5.95 |
| CI (day) | -0.9±1.01 | 1.38±1.24 | 82-88 | 2.28 |
| | Breeding values of cows (BVC's) | | | |
| MY(Kg) | -476±125 | 646±178 | 73-78 | 1122 |
| LP (day) | -1.2±1.03 | 1.72±1.08 | 72-78 | 2.92 |
| DP (day) | -1.29±1.59 | 0.439±1.67 | 80-85 | 1.73 |
| DO (day) | -3.13±0.91 | 4.28±0.97 | 79-82 | 7.41 |
| CI (day) | -0.98±1.21 | 2.11±1.18 | 87-89 | 3.09 |
| | Breeding values of dams (BVD's) | | | |
| MY(Kg) | -279±193 | 235±176 | 40-59 | 514 |
| LP (day) | -0.79±1.72 | 0.81±1.69 | 37-40 | 1.6 |
| DP (day) | -0.52±2.34 | 0.38±2.39 | 46-49 | 0.832 |
| DO (day) | -2.57±0.98 | 3.58±1.02 | 78-81 | 6.14 |
| CI (day) | -0.87±1.01 | 2.08±1.41 | 83-87 | 2.98 |

The present results were agree with El-Awady *et al*., ( 2011) and disagree with Radwan *et al*., (2015) on Friesian cows. High accuracy levels of breeding values help animal breeders to genetic improvement in herds.

## CONCLUSION

The present results defined that the Freisian dairy cows have a good productive and repoductive traits under the better of mangement and environment conditions and natural range of the means for traits under investigation. Sire hertabilities for all traits were moderate. In this respect, direct heritabilty for milk yield was moderate. The genetic variance obtained from animal model divided to direct additive genetice, maternal genetic and covariance additive and maternal genetic. In addition the environmental aslo divided to maternal permanent and resudual, thereby genetic paramters for animal model more relative efficiency than sire model. The influence of the maternal genetic effects on traits were relative efficiency for improvement. The high positive genetic correlations between milk yield and each lactation period, days open and calving interval, consequently these traits could be improved at the same time via breeding programs and better mangment and environment. genetic improvement should be preferable realized through cows which the minimum of acurrecy of breeding value was highest comparing to sires or dams. Higher ranges, standard errors and accuracies of estimated breeding values cleared the being of more genetic variation among individuals, therefore genetic could be achaived.

## REFERENCES

Abubakar, B. Y.; R. E. Mc Dowell; L. D. Van Vleck and E. Cabello (1987). Phenotypic and genotype parameters for Holsteins in Mexico. Trop. Agric.

Alhammad, H. O. A. (2005). Phenotypic and genetic parameters of some milk production traits of Holstein cattle in Egypt. M. Sc. Thesis Fac. Agric. Cairo Univ., Egypt.

Aziz, S.; Z. Ulutaş; A. Y. Adkinson; R. W. Adkinson (2014). Genetic parameters of first lactation milk yield and fertility traits in Brown Swiss cattle. Ann. Anim. Sci., 14:545–557.

Backer, W. A. (1984). A manual of quantitative genetics. 4th Edition. Mc Naughton and Gunn, inc., Ann Arbor, Michigan.

Boldman, K. G.; L. A. Kriese; L. D. Van Vleck and S. D. Kachman (1995). Amanual for use of MTDFREML. A set for programs to obtain estimates of variances and covariance (DRAFT). U.S. Department of Agriculture, Agriculture Research Service, Clay Center, NE, USA.

Choudhary, V.; M. D. Kothekar; K. L. Raheja; N.N. Kasturiwale; D.W. Khire and P. Kumar (2003). Genetic evaluation of first lactation traits in Sahiwal cattle using restricted maximum likelihood technique. Asian-Australian J. Anim. Sci., 16: 639-643.

El-Awady, H. G. (2003). Maternal components as related to direct components for some growth traits of Friesian calves in Egypt. J. Agric. Sci., Mansoura Univ., 28:3393.

El-Awady, H. G. and E. Z. M. Oudah (2011). Genetic and economic analysis for the relationship between udder health and milk production traits in Friesian cows. Asian-Aust. J. Anim. Sci., 24:1514-1524.

El-Awady, H. G.; A. E. Abd El-Khalek and M. Abo Elreesh (2016). Genetic evaluation for some productive and reproductive traits by using animal model in acommercial Friesian herd in Egypt. J. Animal and Poultry Prod., Mansoura Univ.,7:279-285.

El-Awady, H. G.; A. S. Khattab; and J. Tozser (2011).Comparison between single and multiple traits animal model for some fertility and milk production traits in Friesian cows in Egypt. Animal Welfare, ethology and housing systems, 7:111-118

El-Awady, H. G; A. Y. Salem; K. A Mourad; and. I. A. M. Abu El-Naser (2014). Inclusion the udder health in the Selection indices traits for improving milk production in Egyptian buffaloes. J. Agric. Sci., Kafrelsheikh Univ., 40: 474-489.

El-shalmani, A. F. (2011). Evaluation of production performance in relation to genetic structure of some economical traits in Friesian cows. Ph.D. Thesis, Fac. of Agric. Saba Basha, Alex. Univ., Egypt.

Epaphras, A., E. D. Karimuribo and S. N. Msellem (2004). Effect of season and parity on lactation of crossbred Ayrshire cows reared under coastal tropical climate in Tanzania. Livest. Res. Rural. Dev. 6 (16) Online: URL: http://www.cipav.org.co/lrrd/lrrd16/6/epap16042.

Faid-Allah, E. (2015). Genetic and non-genetic analysis for milk production and reproductive traits in Holstein cattle in Egypt. JITV20:10-17.DOI http://dx. doi. org/ 10.14334/jitv.v20i1.1111:

Falconer and Mackay, (1996). Introduction to quantitative genetics Fourth edition, longman.

Gutierrez, J. P.; J. Canon; M. Rico (1995). Comparison of two models for estimation of variance components in a sample of Spanish Holstein Friesian. J. Anim. Breed. Genet. 111:169-174.

Hammoud, M. H. (2013). Genetic aspects of some first lactation traits of Holstein cows in Egypt. Alex. J. Agric. Res., 58:295-300.

Harvey, W. R. (1990). User's guide for LSMLMW, mixed model least squares and maximum likelihood computer program. PC-2 version 2, Ohio state Univ., Columbus (Mimeograph), USA.

Hussein, A. M. (2004). Genetic and phenotypic studies for Friesian cows in Egypt. Ph. D. Thesis Faculty of Agric., Mansoura Univ., Egypt.

Khattab, A. S. and H. Atil (1999). Genetic study of fertility traits and productive in a local born Friesian cattle in Egypt. Pakistan J. Biol. Sci., 2:1178–1183.

Khattab, A. S.; M. N. El-Arian and H. Atil (2000). Estimation of producing ability of Holstein Friesian cattle in a commercial herd in Egypt. Pakistan J. Biology. Sci., 3:1076.

Legates, J. E. and E. J. Warwick (1990). Breeding and improvement of farm animals. 8th ed., Cm (Mc Graw-Hill publications in the agricultural sciences).

MARL, (2015). Ministry of Agriculture and land reclamation.

Osman, M. M.; K. M. El-Bayomi and Sh. A. Moawed (2013). Estimation of heritabilities, genetic correlations, phenotypic correlations and genetic trends for production and reproduction traits of Holstein-Friesian dairy cattle using sire model. SCVMJ, XVIII 1:115-128

Oudah, E. Z. M. and Zainab A. Khalefa (2010). Genetic evaluation for Friesian Cattle in Egypt using single-trait animal models. J. Animal and Poultry Production, Mansoura Univ., 1:371-381

Oudah, E. Z. M.; N. A. Shalaby and M. A Mustafa. (2001). Genetic and non- genetic factors affecting days open, number of service per conception and age at first calving in a herd of Holstein-Friesian cattle. Pakistan J. Biological Sci., 4: 740-744.

Paul, A. K.; I. Singh; V. K. Bhatia (2003). A note on estimation of heritabilities of different dairy characteristics by different methods. Indian J. Anim. Res. 37:153-154.

Radwan H. A. A; E. A. Abo Elfadl and A. M. Fardos (2015). Estimates of population parameters of some economic traits in Holstein Friesian cows by using statistical program. Global Veterinaria 14: 129-135.

Safaa, S. S. Ibrahim (2006). Genetic analyses for some productive and reproductive traits in dairy cattle. Ph.D. Thesis, Fac. Agric. Moshtohor Banha Univ. Egypt.

Sattar, A. R. H; A. A. K. Mirza; Niazi and M. Latif (2005). Productive and reproductive performance of Holstein Friesian cows in Pakistan. Pakistan Vet. J., 25:75-81.

Shalaby, N. A.; A. S. A. El-Barbary; E. Z. M. Oudah and M. Helmy (2012). Genetic parameters and breeding values of some productive and reproductive traits Friesian cattle in Egypt. Procedings of the 15 th AAAP Anim. Sci. Congress 26-30 November 2012, Thummassat Univ., Rangift, Thiland.

Shalaby, N. A; A. S. A. El-Barbary; E. Z. M. Oudah and M. Helmy (2013). Genetic analysis of some productive and reproductive traits of first lactation of Friesian cattle raised in Egypt. J. Animal and Poultry Prod., Mansoura Univ., 4:97-106.

Stranden, I. (2009). Test day model in evaluation of dairy cattle. MTT research project database, Agrifood Researsh Finland.

Tag El-Dein, M. A. (1997). Phenotypic and genetic parameters of some performance traits in Friesian cattle. Ph.D. Thesis, Faculty of Agriculture, Alexandria University, Egypt.

Turner, H. N. and S. S. Y. Young (1969). Quantitative Genetics in Sheep Breeding. Macmillan Melbourne, Australia, (C.F. Abd El-Raoof, 1993).

Zafar, A. H; M. Ahmad and S. U. Rehman (2008). Study of some performance traits in Sahiwal cows during different periods. Pakistan Vet. J., 28: 84-88.

## تقدير المعالم الوراثية المباشرة والأمية لبعض الصفات الإنتاجية والتناسلية فى أبقار الفريزيان بواسطة نموذج الأب والحيوان

**حسن غازى العوضى[1] و إبراهيم عطا محمد أبو النصر[2]**
**[1] قسم الإنتاج الحيواني -كلية الزراعة – جامعة كفر الشيخ - مصر**
**[2] قسم إنتاج الحيوان – كلية الزراعة – جامعة دمياط - مصر**

اجريت هذه الدراسة لتقدير التباين الوراثى والمعالم الوراثية والقيم التربوية لبعض الصفات الإنتاجية (كمية اللبن وفترة الحليب وفترة الجفاف) والصفات التناسلية (فترة التلقيخ المخصب والفترة بين ولادتين) على قطيع من أبقار الفريزيان التابع لجمعية الثروة الحيوانية بشبراتانا - طنطا فى الفترة من 1985 وحتى 2003م لعدد 2302 سجل لـ 755 بقرة فريزيان والملقحة بواسطة 45 طلوقة. تم تحليل البيانات بإستخدام برنامج الـ LSMLMW والـ MTDFREML. كانت المتوسطات لكمية اللبن و فترة الحليب وفترة الجفاف وفترة التلقيخ المخصب والفترة بين ولادتين هى 4875 كجم و 333 و72 و119 و405 يوم على التوالى. كانت تقديرات المكافئ الوراثى الأبوى لكمية اللبن وموسم الحليب وفترة الجفاف وفترة التلقيخ المخصب والفترة بين ولادتين 0.43 و 0.28 و 0.30 و 0.26 و 0.24 على التوالى. و كانت تقديرات المكافئ الوراثى المباشر هو 0.34 و 0.17 و 0.13 و 0.15 و 0.17 والمكافئ الوراثى الأمى 0.11 و0.15 و 0.14 و 0.23 و 10 على التوالى لنفس الصفات السابقة. تراوحت قيم الارتباطات الوراثية بإستخدام نموذج الأب بين الصفات الإنتاجية المدروسة وتروواحت من – 0.30 (بين فترة الحليب وفترة الجفاف) إلى 0.76 (بين كمية اللبن وفترة الحليب). بينما كانت الارتباطات الوراثية بين الصفات الإنتاجية والتناسلية المدروسة موجبة وعالية (0.86 إلى 0.93) ماعدا الارتباطات بين فترة الجفاف وكلا من فترة التلقيح المخصب والفترة بين ولادتين (0.13 و0.09) على التوالى. بالمثل أخذت الارتباطات الوراثية المباشرة نفس اتجاة نموذج الأب بين هذه الصفات المدروسة. وكذلك الارتباطات الوراثية الأمية. تراوحت دقة التقديرات للقيمة التربوية بين 35 إلى 88 و 72 إلى 89 و 37 إلى87 % لكل من الطلائق والأبقار والأمهات على التوالى للصفات المدروسة. ولذا تقترح الدراسة بأن يتم التحسين الوراثى من خلال الأبقار حيث الحد الادنى لدقة تقديرات القيمة التربوية أعلى بالمقارنة بكل من الأباء والأمهات. إرتفاع تقديرات الارتباطات الوراثية بين الصفات الإنتاجية (كمية اللبن وطول فترة الحليب) وبين الصفات التناسلية (فترة التلقيح المخصب والفترة بين ولادتين) تبين إمكانية التحسين الوراثى بالانتخاب لكمية اللبن. وأيضا من خلال التقديرات الحالية للمكافئ الوراثى الأمى فإنه يوصى بأخذ التاثيرات الأمية فى الاعتبار عند عمل موديل التحليل أو خطه للانتخاب للصفات الإنتاجية والتناسلية فى أبقار الفريزيان فى مصر.