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ESTIMATION OF GENETIC PARAMETERS FOR MILK PRODUCTION TRAITS IN A HERD OF HOLSTEIN FRIESIAN CATTLE IN EGYPT

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ABSTRACT

Genetic parameters for some milk production traits were estimated in a herd of Holstein Friesian (HF) cattle in Egypt. A total number of 502 lactation records of 300 HF cows sired by 29 bulls form a herd belonging to Alexandria Copenhagen Company for Dairy and Meat Production was used in the present study. Data were collected during 7 years (2005-2011) and analyzed using SAS and WOMBAT. Means of total milk yield (TMY), 305 day milk yield (305-DMY) and lactation period (LP) were 10718 kg, 8805 kg and 397 days, respectively. Parity had no significant effect on all traits, except for 305-DMY ($P<0.0001$). Season of calving, also, had no significant effect on all traits, except for LP ($P<0.0025$). Heritability estimates of TMY, 305-DMY and LP were 0.19, 0.25 and 0.15, respectively. The moderate estimate of heritability of 305 milk yield indicated that this trait could be made through selection as well as better managemental practices Repeatability of TMY, 305-DMY and LP were 0.48, 0.39 and 0.34, respectively. Positive genetic and phenotypic correlation coefficients were obtained for all traits and ranged from 0.01 to 0.77 and from 0.12 to 0.75, respectively. Results indicated possibility of genetic improvement of milk yield by selection for 305-DMY only due to having higher estimate of heritability compared to TMY, and also because of its reasonably high genetic correlation coefficient with TMY.

Keywords: Holstein Friesian, heritability, repeatability, genetic and phenotypic correlation.

INTRODUCTION

High milk yield has been the primary selection objective in dairy cattle breeding. However, milk production performance of the Egyptian native cattle is very limited. Introduction of exotic dairy breeds into developing countries has been suggested as an option to improve milk production in such situations. Holstein Friesian cattle comprise the highest proportion of the exotic dairy animals in Egypt. In general, high yielding cattle are highly sensitive to diseases and high temperature (Mostageer *et al*., 1987). Therefore, a great effort has been made to provide suitable and comfortable conditions to exotic animals for milk production in large-scale dairy farms in Egypt. During the last two decades, many studies threw the lights on productive and reproductive performance for Friesian (F) and Holstein Friesian (HF) cattle in Egypt (Nigm *et al*., 2003, Fahim, 2004, Alhammad, 2005, Salem *et al*., 2006, Abdel-Moez, 2007, Abdel-Hamid, 2011 and Hammoud, 2013).

Several methods have been suggested for routine genetic evaluation of dairy cattle for economically important traits. With the increase in computing capabilities in the 1980s, animal model (AM) was the method of choice. Early AM-based studies generally included records from multiple parities, but were single-trait or "repeatability" models. That is, genetic correlations of unity between parities were assumed, even though numerous studies have shown that this is not the case for milk production traits (Albuquerque *et al*., 1996). Therefore, a "permanent environmental" factor was included to account for similarities between multiple records of the same animal that were not due to additive genetic factors.

Jamrozik *et al*. (1997) noted that if incomplete evaluations are included in a lactation model analysis, differences in persistency during the lactation can cause the "RIP-dip" (records in progress - dip) phenomenon; the often-observed reduction in the genetic evaluation of elite sires that are returned to general service, based on their genetic evaluations from the first daughter crop. If first and later parities are included in the analysis, RIP-dip could also be caused by incomplete genetic correlations among parities.

Due to limited computing facilities available, most commercial multiparity-multitrait AM evaluations, including animals with incomplete pedigree information, have only involved a maximum of three parities, and a large part of the performance records are excluded. Previous studies have estimated genetic parameters for production and nonproduction traits by multitrait AM (e. g., Albuquerque *et al*., 1996, and Weller and Ezra, 2004). Estimates of genetic parameters for milk yield from F and HF breeds kept in the subtropical and tropical regions were generally lower than those from the same breeds kept in temperate regions.

The objective of this study was to estimate genetic parameters (heritability, repeatability, and genetic and phenotypic correlation coefficients) for total milk yield, 305 day milk yield and lactation period using field data collected from a herd of Holstein Friesian cows reared in Egypt.

MATERIALS AND METHODS

This study was carried out on a HF herd belonging to Alexandria Copenhagen Company for Dairy and Meat Production, located about 45 kilometers south-west Alexandria city, Egypt. The data set was collected through Cattle Information System / Egypt (CISE) of Cairo University, during the period from 2005 to 2011 using lactation records of seven consecutive years. The data comprised a total of 502 lactation records of 300 cows that were sired by 29 bulls. Milk production traits considered in the study were total milk yield, TMY (kg); 305 day milk yield, 305-DMY (kg); and lactation period, LP (day).

Animals involved in this study were housed in well-ventilated sheds all the year round. They were fed on a total mixed ration (TMR) throughout the year. Nutrient requirements of dairy cattle recommended by the National Research Council (NRC, 2001) were offered according to cow's body weight, milk yield and stage of lactation. Fresh water was available all the time. Frozen semen, from the top 100 Total Performance Index (TPI) of Holstein bulls in USA and Canada, was used to artificially inseminate cows and heifers in order to preserve the genetic properties and purity of the breed. Heifers were served for the first time when reached 375 kg of weight. All lactating animals were machine milked three times daily at eight-hour intervals. The cows were dried off about two months prior to their expected calving date. A central recording system, operated by CISE, was practiced by a monthly visit to the farm to collect data in the respective testing periods. The animals were routinely vaccinated against common bacterial and viral diseases.

Data were analysed using SAS (2004) to test the significance of the fixed and random effects on the studied milk production traits using the following model:

$$Y_{ijklm} = \mu + g_i + pe_j + P_k + S_l + (PS)_{kl} + e_{ijklm}$$

Where,

Y = the milk production traits,

μ = overall mean,

g_i = random animal additive genetic effect i, $g_i \sim N(0, \delta_g^2)$,

pe_j = random effect of permanent environment i on the animal j, $pe_j \sim N(0, \delta_{pe}^2)$,

P_k = fixed effect of parity k, (k = 1, 2, 3),

S_l = fixed effect of season of calving l, (l = 1, 2, 3, 4), where 1 = Winter (December, January, February), 2 = Spring (March, April, May), 3 = Summer (June, July, August) and 4 = Autumn (September, October, November),

PS_{kl} = interaction effect between parity and season of calving,

e_{ijklm} = random residual $\sim N(0, \delta_e^2)$.

Genetic parameters including heritability (h^2), repeatability (t), genetic correlation (r_g) and phenotypic correlation (r_p) were estimated by using WOMBAT, a software package for quantitative genetic analyses of continuous variation traits, fitting a linear, mixed model; estimates of covariance components.

RESULTS AND DISCUSSION

Means and standard deviations (SD) of TMY, 305-DMY and LP are given in Table 1. The unadjusted mean of TMY obtained in this study (10718 kg), was higher than corresponding values obtained in Egypt, which ranged between 3063 and 9888 kg as reported by Nigm (1990), Abdel-Salam (2000) and Abdel-Hamid (2011). On the other hand, Alhammad (2005) and Salem *et al*. (2006) recorded higher estimates for TMY than that obtained in the present study (13172 and 12054 kg). These differences are due to genotype, farm and managerial effects.

Table 1. Unadjusted means and standard deviations (SD) of total milk yield (TMY, kg), 305-day milk yield (305-DMY, kg) and lactation period (LP, day).

Trait	Mean	SD
TMY	10718	3175.0
305-DMY	8805	2024.3
LP	397	123.2

In respect to 305-DMY, the value obtained in the present study (8805 kg) was extremely higher than that published by Abdel-Moez (2007, 6118 kg). and was similar to that reported by Abdel-Hamid (2011, 8750 kg).

The value obtained for LP (397 day) was higher than the corresponding values obtained in Egypt (374, 365, 382, 334 and 391 day reported by Nigm, 1990; Sadek *et al*., 1994; Abdel-Salam, 2000; Oudah, 2009; and Hammoud, 2013; respectively). In contrast, Kassab (1995) and Salem *et al*. (2006) indicated higher values compared to LP length obtained in the current study (418 and 407 day, respectively).

Least squares means and analysis of variance (ANOVA) of TMY are presented in Table 2. There was no significant effect of parity on TMY. This result is in agreement with Badawy (1994), Kassab (1995) and Hammoud *et al*. (2013), who reported that the effect of parity was not significant on TMY. Least squares means of TMY in the first, second and third parity were 10832, 11266 and 10603 kg, respectively.

Obviously the differences between second and first lactation was 434 kg, between second and third lactation was 663 kg, while the difference between first and third lactation it was 229 kg. Figure 1 shows that TMY in the second parity was higher than the first and third parity.

Least squares means and ANOVA of 305-DMY are shown in Table 2. There was a significant effect ($P < 0.0001$) of parity on 305-DMY. This result agreed with Mokhtar *et al*. (1993), Fahim (2004) and Alhammad (2005).

The differences between second and first lactation was 1259.16 kg, second and third lactation was 320.41 kg, while the difference between third and first lactation was 938.75 kg. Figure 1 indicates an increase in 305-DMY in parity 2 compared to parity 1, followed by a decrease in parity 3 compared to parity 2. These results may be due to management system and the limited dataset used.

There was no significant effect of parity on LP. This result is similar to that reported by Mokhtar *et al*. (1993). However, Sadek *et al*. (1994) found an opposite result where parity had significant effect on LP in Friesian cattle. Obviously, LP decreased gradually from parity 1 to parity 3, as shown in Figure 2. This result can be attributed to variation in managerial practices in addition to the effect of climatic conditions. The reduction in LP with the advance in parity number could be justified by the failure of HF to adapt to climatic conditions in farm area.

Abdel-Salam (2000) noticed that the longest LP was in the second lactation, and then a gradual decrease was observed from the second to the fourth one. The decline of 305-DMY observed after the second lactation may be attributed to loss of adaptability of the high yielding cows to the prevailing environmental conditions.

Table 2. Least squares means and standard errors (LSM ± SE) and analysis of variance (ANOVA) of total milk yield (TMY, kg), 305-day milk yield (305-DMY, kg) and lactation period (LP, day).

Classification	No. of records	TMY	305-DMY	LP
		LSM ± SE	LSM ± SE	LSM ± SE
Parity				
1	300	10832ab ±187.7	8297.63 a ± 114.1	427.23c ± 6.9
2	152	11266b ±357.1	9556.79 b ± 223.9	397.13b ± 13.2
3	50	10603 a±624.9	9236.38 b ± 399.7	371.52a ± 23.1
Season of calving				
Winter	178	10797a ±307.8	9181.08ab ± 187.7	376.77a ± 11.4
Spring	71	11829b ±826.5	8824.98a± 521.5	477.63 b ± 30.5
Summer	89	10336a ±415.0	8769.84a ± 259.0	377.91 a ± 15.4
Autumn	164	10638a ±297.5	9345.17b ± 182.4	362.20 a ± 11.0

ANOVA

Source of variation	df	TMY		305-DMY		LP	
		MS	*P*	MS	*P*	MS	*P*
Parity	2	12371771	0.1761	4511498	0.0001	10677	0.3340
Season of calving	3	10578905	0.2164	54771	0.9970	47858	0.0025
Parity x Season	6	8693962	0.2919	2029208	0.7115	13248	0.2292
Cow	299	11975648	0.0001	3996727	0.0616	16342	0.0001
Residual	191	7060076		3255551		9680.57	

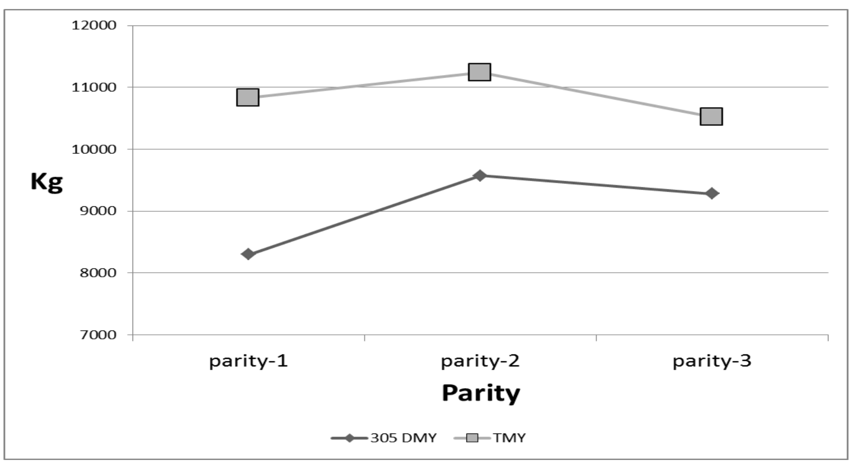

Figure 1. Effect of parity on TMY and 305-DMY.

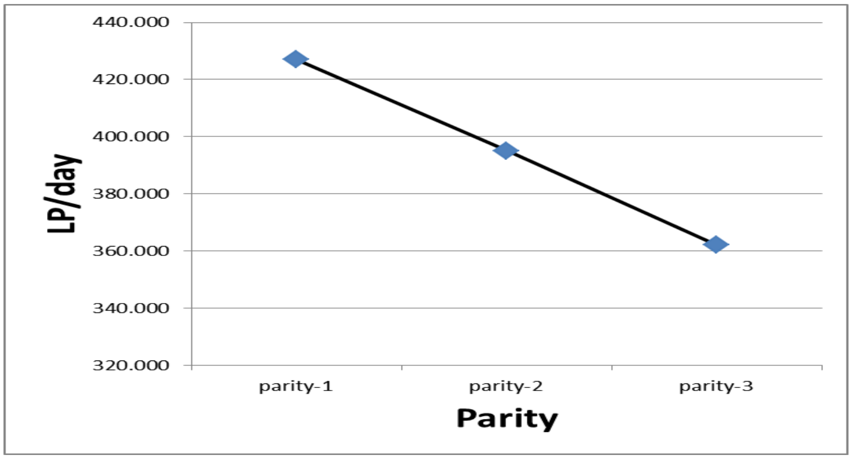

Figure 2. Effect of parity on LP.

The season of calving had no significant effect on TMY, due probably to that the influence of climatic conditions was controlled by using efficient cooling system in summer. This result agreed with the findings of Alhammad (2005) and Salem *et al*. (2006). Contradictory to this, Nigm *et al*. (1994) indicated that season of calving had significant effect on TMY of Friesian cows in United Arab Emirates (UAE). Also, Sadek *et al*. (1994) reported that season of calving had a highly significant effect on TMY of Friesian cows in commercial farms in Egypt. The effect of season of calving on TMY is shown in Figure 3. Spring calvers had the highest TMY, winter and autumn calvers were intermediate, and summer ones produced the lowest yield of milk. The increased milk yield in spring could be attributed to better climatic conditions enhancing feed intake. However, the decreased milk yield in summer may be due to the high temperature degrees causing stress for lactating animals and reduction in feed intake.

In the same trend, season of calving had no significant effect on 305-DMY. A relative control of environmental factors and production situations taken by the farm board may resulted in light differences in 305-DMY from season to season. This result is in parallel with the findings published by Badawy (1994). In contrast, Sadek *et al*. (1994) reported that season of calving had a highly significant effect on 305-DMY of Friesian cows in commercial farms in Egypt. Figure 3 shows that the highest 305-DMY was recorded for autumn followed by winter, spring and summer calvers. The changes in 305-DMY from season of calving to another may be due to the changes in climatic conditions, management and availability of forage resources in different seasons of the year. This finding was also noticed by Khattab and Sultan (1990) on Friesian cows and by Fahim (2004) on Holstein cattle in Egypt, where autumn calvers scored the greatest 305-DMY followed by winter and summer calvers, while the lowest was recorded for Holstein cows calved during spring. Differences could be attributed to the favorable climate conditions and availability of high quality green fodder during autumn and winter months.

With regard to the effect of season of calving on LP, Table 2 indicates that season of calving had a significant effect (P<0.0025) on LP. This result was in agreement with that obtained in Egypt by Alhammad (2005), Abdel-Moez (2007) and Hammoud (2013). On the other hand, non significant effect of season of calving on LP in Friesian cows was reported by Nigm *et al*. (1994) in UAE and Sadek *et al*. (1994) in Egypt. In the present study, spring calvers had the longest LP compared to the other seasons (Figure 4). This may be due to the influence of climatic conditions associated with the availability of green feeds in different seasons of the year.

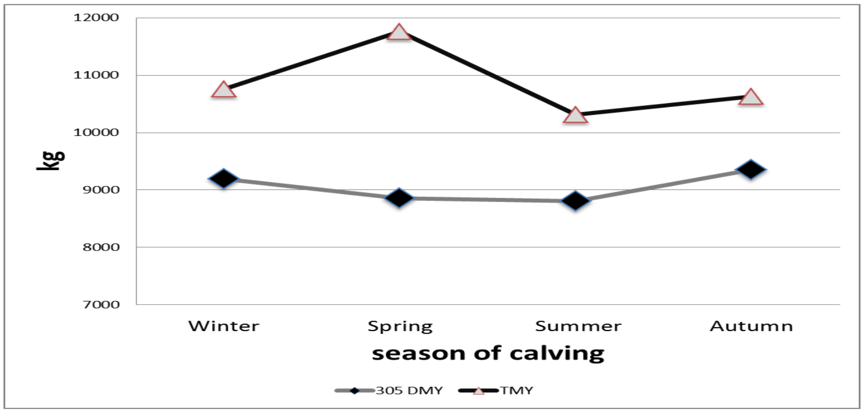

Figure 3. Effect of season of calving on TMY and 305-DMY.

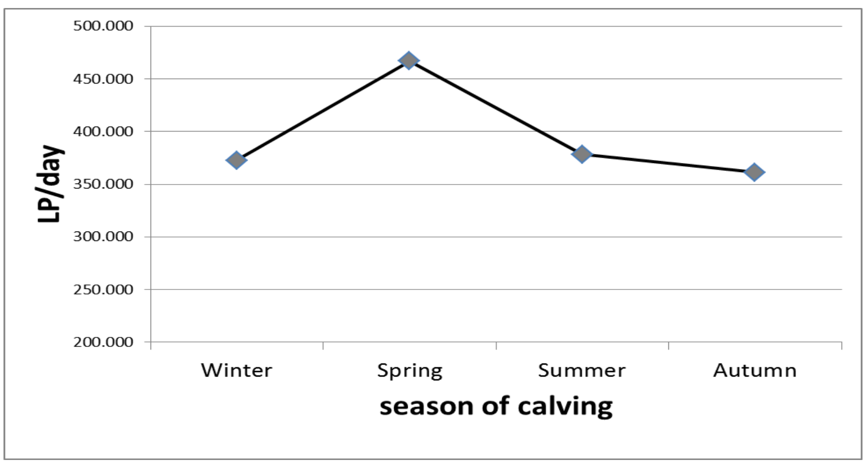

Figure 4. Effect of season of calving on LP.

The interaction between parity and season of calving for TMY, 305-DMY and LP, had no significant effect as illustrated in Table 2. The same results were obtained by Alhammad (2005), who reported no significant effect of interaction of parity and season of calving for LP. These findings contradict the results of Alhammad (2005), who indicated a highly significant interaction of parity and season of calving for both TMY and 305-DMY.

Heritability estimates (h^2) for milk production traits are shown in Table 3. The h^2 for TMY was 0.19. This estimate was higher than those obtained in Egypt by Abdel-Salam (2000) and Alhammad (2005), which were 0.09 and 0.06, respectively. However Abdel-Moez (2007), Abdel-Hamid (2011) and Hammoud (2013) reported greater estimates of h^2 (0.29, 0.29 and 0.44, respectively) in Egypt compared to our estimate. Generally, the h^2 estimate for the TMY obtained in the present study is in agreement with the previous literature despite the differences in data, models and estimation procedures.

Table 3. Heritability (h^2), repeatability (t) and standard errors (SE) of total milk yield (TMY, kg), 305-day milk yield (305-DMY, kg) and lactation period (LP, day).

Trait	h^2	SE	t	SE
TMY	0.19	0.001	0.48	0.001
305-DMY	0.25	0.001	0.39	0.001
LP	0.15	0.048	0.34	0.048

In respect to h^2 for 305-DMY, the estimate obtained in the present study was 0.25. This estimate shows close similarity to the one reported by Abdel-Moez (2007) on HF cattle which was 0.26. The current estimate of h^2 was higher than that indicated by Nigm *et al*. (2003), Alhammad (2005) and Abou-Bakr *et al*. (2006) in Egypt which were 0.06, 0.13 and 0.14, respectively. Whereas El-Arian *et al*. (2003) on HF cattle, Oudah (2009) on F cattle and Hammoud (2013) on H cattle found higher estimates of h^2 for 305-DMY in Egypt (0.31, 0.27 and 0.42, respectively) compared to the estimate of the present study. The moderate estimate of heritability for 305 day milk yield suggested that efforts could be made to improve this trait through selective breeding as well as managemental practices.

The estimate of h^2 for lactation period was 0.15, which was similar to the estimate of 0.14 reported by Kassab *et al*. (2001). On the other hand, other research groups in Egypt reported lower or higher estimates of h^2 for LP compared to our estimate as indicated by El-Arian *et al*. (2003), Alhammad (2005) and Abdel-Hamid (2011), who found 0.07, 0.03 and 0.19, respectively.

The heritability estimates obtained in the present study indicated low genetic to environmental variance ratios for both TMY and LP, while that ratio was medium for 305-DMY, reflecting differences in the response of cows to the existing environmental conditions. Heritability can't be estimated easily with great precision, and most h^2 estimates have rather large standard errors. Different estimates of the same character on the same organism show wide range of variation, some of which may reflect real differences between populations and/or the conditions under which they are studied (Falconer, 1982).

The differences in estimates of heritability are due to the management system and environmental factors, which reflect genotype by environment interactions. The variation between results of the present study and other researchers are due to variation in genotypes, management, number of records and methods of analysis used. Generally, good management can play a major role in improvement of animal performance in TMY and LP.

Repeatability (t) was estimated for milk production traits as shown in Table 3. The repeatability value for TMY was 0.48, which was higher than the estimate of 0.34 reported by Abdel-Salam (2000).

The estimates of repeatability for 305-DMY was 0.39, which is the same to that reported by Abou-Bakr *et al*. (2000) for Holstein Friesian cattle in Egypt. Our estimate was slightly higher than the estimate of 0.35 obtained by Abdel-Salam (2000) on HF cattle. On the contrary, it was lower than the estimate obtained by El-Arian *et al*. (2003) on HF cattle (0.45).

The present estimate of repeatability for LP (0.34) was higher than that obtained by Abou-Bakr *et al*. (2000) on Holstein cattle in Egypt (0.19). However, El-Arian *et al*. (2003) reported largely higher estimate (0.78) compared to the one of our study. Repeatability differs very much according to the nature of the character, the genetic properties of the population, and the environmental conditions under which the individuals are kept (Falconer, 1982).

Estimates of genetic (r_g) and phenotypic (r_p) correlation among the studied traits are presented in Table 4. All correlations were positive ranging from 0.01 to 0.77 for r_g and from 0.12 to 0.75 for r_p. All genetic and phenotypic correlations were highly significant, except those between 305-DMY and LP (r_g = 0.01 and r_p = 0.12). Correlation occurs when one trait is selected for, and another trait is also changed. The highly positive r_g and r_p coefficients between TMY and both of 305-DMY and LP would result in a correlated response when selecting only for TMY. Therefore, selection for TMY only may induce genetic improvement in the other traits.

Table 4. Phenotypic correlations (above the diagonal) and genetic correlations (below the diagonal) among total milk yield (TMY, kg), 305-day milk yield (305-DMY, kg) and lactation period (LP, day).

Trait	TMY	305-DMY	LP
TMY	-	0.70	0.75
305-DMY	0.77	-	0.12
LP	0.65	0.01	-

The correlation estimates obtained in the present (Table 4) study were similar to those reported by Abdel-Moez (2007), who found positive genetic (0.93 and 0.75) and phenotypic (0.83 and 0.67) correlation coefficients for TMY with 305-DMY and LP for Holstein Friesian cattle in Egypt. Similarly, Khattab and Sultan (1990) obtained estimates of genetic correlation of 0.94, 0.68 and 0.44 between TMY and 305-DMY, between TMY and LP, and between 305-DMY and LP, respectively. All values of genetic and phenotypic correlation between TMY and the traits mentioned above are positive. The positive genetic correlation between two traits indicates that if one trait is genetically improved, the other trait(s) will also be improved, and vice versa (indirect selection).

In respect to the genetic correlation between 305-DMY and LP, Abdel-Moez (2007) and Oudah (2009) found positive r_g coefficients (0.49 and 0.18). Considering r_p estimates between the two traits, the same authors reported higher estimates (0.19 and 0.43), compared to our estimate.

CONCLUSION

Present heritability estimates for TMY, 305-DMY and LP indicate the possibility of genetic improvement in the traits under investigation. The moderate estimate of heritability for 305 DMY suggested that efforts could be made, thus , in bringing about the improvement in this trait through selective breeding as well as better managemental practices as a worldwide standard measure of an animal's genetic merit of milk production in routine international genetic evaluations for Holstein-Friesian dairy cattle, due to the positive genetic correlation favorable correlated response with TMY. Such favorable relationships among the traits of economic value would increase the efficiency of dairy enterprise.

REFERENCES

Abdel-Hamid, M. H. M. (2011). Early prediction of some milk characteristics for selection in Friesian cattle in Egypt. M. Sc. Thesis. Fac. Agric., Menoufiya Univ., Shibin Al-Kawm, Egypt.

Abdel-Salam, S. A. M. (2000). Milk production characteristics of a Holstein Friesian herd in Egypt. M. Sc. Thesis, Fac. Agric., Cairo Univ., Giza, Egypt.

Abdel-Moez, K. A. (2007). A genetic study on lactation traits of Holstein cattle and its crosses with European Friesian in a commercial farm in Egypt. Ph. D. Thesis, Fac. Agric., Cairo Univ., Giza, Egypt.

Abou-Bakr, S., U. M. El-Saied, and M. A. M. Ibrahim, (2000). Genetic and phenotypic parameters for milk yield, days open and number of services per conception of Holstein cows of a commercial herd in Egypt. Egypt. J. Anim. Prod., 37(1):9-17.

Abou-Bakr, S., N. Hamdy, A. F. I. El-Kholy, M. A. M. Ibrahim, R. R. Sadek, and A. A. Nigm (2006). Genetic parameters for some milk production traits of Holstein cows in a commercial herd in Egypt. Egypt. J. Anim. Prod. 43(Issue Suppl.):15-20.

Albuquerque, L. G., J. F. Keown, and L. D. VanVleck (1996). Genetic parameters of milk, fat, and protein yields in the first three lactations, using an animal model and restricted maximum likelihood. Brazil. J. Genet. 19:79-86.

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., Giza, Egypt.

Badawy, L. E. A. (1994). Production traits and genetic parameters in Friesian cattle under Egyptian conditions. Ph. D. Thesis, Fac. Agric., Alex. Univ., Alexandria, Egypt.

El-Arian, M. N., H. G. El-Awady, and A. S. Khattab (2003). Genetic analysis for some productive traits of Holstein Friesian cows in Egypt through MTDFREML program. Egypt. J. Anim. Prod. 40(2):99-109.

Fahim, N. H. (2004). A study on milk yield and persistency of a Holstein herd in Egypt. M. Sc. Thesis, Fac. Agric., Cairo Univ. Giza, Egypt.

Falconer, D. S. (1982). Introduction to Quantitative Genetics, 2nd ed., Longman, Harlow, UK.

Hammoud, M. H. (2013). Genetic aspects of some first lactation traits of Holstein cows in Egypt. Alex. J. Agric. Res., 58(3): 295-300.

Jamrozik, J., L. R. Schaeffer, and J. C. M. Dekkers (1997). Genetic evaluation of dairy cattle using test day yields and random regression model. J. Dairy Sci. 80:1217-1226.

Kassab, M. S. (1995). Factors affecting some performance traits in Friesian cattle. Alex. J. Agric. Res. 40(1):65.

Kassab, M. S., A. Y. Salem, S. A. Kassab, and G. A. Salim (2001). Selection indices of some economic traits on Friesian cows. J. Agric. Sci., Mansoura Univ. 26:1889.

Khattab, A. S., and Z. A. Sultan (1990). Estimates of phenotypic and genetic parameters for first lactation performance in Friesian cattle in Egypt. Egypt. J. Anim. Prod. 27:147.

Mokhtar, S. A., A. El-Alamy, and A. Amin (1993). Evaluation of productive and reproductive performance of some dairy cattle breeds in Egypt. Egypt. J. Anim. Prod. 30:161.

Mostageer, A., M. A. Morsy, A. A. Nigm, and R. R. Sadek (1987). The performance of some European cattle breeds in adverse environments. J. Anim. Breed. Genet. 104(1-5):206-212.

Nigm, A. A. (1990). Dairy performance of some exotic breeds at Tahreer province. Vet. Med. J. 38:351.

Nigm, A.A., S. A. Attalah, S. Abou-Bakr, and R. R. Sadek (2003). A study on applying test day model for genetic evaluation of milk yield of Holstein cattle in Egypt. J. Anim. Prod. 40:89.

Nigm, A. A., M. B. Aboul-Ela, R. R. Sadek, and M. A. M. Ibrahim (1994). Milk production characteristics in the first two lactations of Friesian cattle in the United Arab Emirates. Egypt. J. Anim. Prod. 31:235.

NRC (2001). Nutrient requirements of dairy cattle: 7th revised ed. National Academy of Science, National Research Council, Washington, D. C., USA.

Oudah, E. Z. M. (2009). Estimation of genetic parameters and breeding values from single- and multiple-trait animal models analyses for Friesian cattle in Egypt. J. Agric. Sci., Mansoura Univ., 34(8):8687-8700.

Sadek, R. R., E. A. Helali, M. A. Safwat, S. A. M. Ibrahim, and A. Abd El-Fatah (1994). Evaluation of Friesian cattle performance in commercial farms in Egypt. Egypt. J. Anim. Prod. 31(1):43-64.

Salem, M. A., H. M. Ismail, R. R. Sadek, and A. A. Nigm (2006). Phenotypic and genetic parameters of milk production and reproductive performance of Holstein cattle under the intensive production system in Egypt. Egypt. J. Anim. Prod. 43(1):1-10.

SAS (2004). Procedure User's Guide (Version 9). Cary, N.C.: SAS Inst. Inc., U.S.A.

Weller, J. I., and E. Ezra (2004). Genetic analysis of the Israeli Holstein dairy cattle population for production and nonproduction traits with a multitrait animal model. J. Dairy Sci. 87:1519-1527.

WOMBAT (2013). A program for mixed model analyses by restricted maximum likelihood. Univ. New England, Armidale, NSW 2351, Australia.

تقدير المعايير الوراثية لصفات إنتاج اللبن فى قطيع من ماشية الهولشتين فريزيان فى مصر

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قســم الإنتاج الحيوانى - كلية الزراعة - جامعة القاهرة

فى هذه الدراسة تم إستخدام ٥٠٢ سجلاً لعدد ٣٠٠ بقرة هولشتين فريزيان بنات ٢٩ طلوقة من قطيع لشركة إسكندرية كوبنهاجن لإنتاج الألبان واللحوم فى مصر، بهدف تقدير المعايير الوراثية لبعض صفات إنتاج اللبن فى أبقار الهولشتين فريزيان.

تم تجميع البيانات لمدة ٧ سنوات (٢٠٠٥ – ٢٠١١) وتحليلها إحصائياً باستخدام برنامج SAS و WOMBATلتقدير المعايير الوراثية لبعض صفات إنتاج اللبن. كانت المتوسطات لكل من محصول اللبن الكلى، محصول اللبن فى ٣٠٥ يوم، فترة الحلب هو ١٠٧١٨ كجم، ٨٨٠٥ كجم، ٣٩٧ يوماً على التوالى. كان تأثير ترتيب موسم الحليب غير معنوى على جميع الصفات، ما عدا محصول اللبن فى ٣٠٥ يوم (P<٠,٠٠٠١). وكذلك كان تأثير فصل الولادة غير معنوى على كل الصفات، ما عدا فترة الحلب (P<٠,٠٠٢٥). كانت تقديرات العمق الوراثى لمحصول اللبن الكلى، محصول اللبن فى ٣٠٥ يوم, فترة الحلب هى ٠,١٩ ، ٠,٢٥ ، ٠,١٥ (على التوالى). بلغت قيم معامل التكرار لمحصول اللبن الكلى، محصول اللبن فى ٣٠٥ يوم, فترة الحلب ٠,٤٨ ، ٠,٣٩ ، ٠,٣٤ (على التوالى). بينما كانت قيم معاملات الإرتباط الوراثى والمظهرى فى جميع الصفات موجبة وتراوحت بين ٠,٠١ و ٠,٧٧ ومن ٠,١٢ إلى ٠,٧٥ (على التوالى).

يشير التقدير المتوسط لقيمة المكافئ الوراثى لصفة ناتج لبن ٣٠٥ بوم إلى أن تحسين مثل هذه الصفه يكون عن طريق الانتخاب جنبا الى جنب مع تحسن الظروف البيئيه المطبقه فى القطيع٠