القيم التربوية لبعض صفات أنتاج اللبن والصفات التناسلية في قطيع هولشتاين مربي في مصر

Breeding values for some milk production and reproductive traits in a commercial Holstein cattle herd raised in Egypt

إعداد

صفاء صلاح سند

معهد بحوث الانتاج الحيواني ، مركز البحوث الزراعية - مصر

المستخلص:

استخدمت بيانات بعض صفات أنتاج اللبن (أنتاج ٣٠٥ يوم من اللبن – طول فترة الادرار – طول فترة الجفاف) والصفات التناسلية (الفترة بين ولادتين – والعمر عند الولادة) للأبقار لعدد ٥٦٦٢ موسم أدرار طبيعي أنتجتها ١٠٢٩ بقرة هولشتاين خلال تسعة سنوات في قطيع تجاري يعيش في مزرعة الصالحية – بمحافظة الاسماعلية للحصول على مكونات التباين لكل من الصفات الجاري دراستها وأيضا مكونات التغاير بين كل صفتين من هذه الصفات لاستخدامها في التحليل الاحصائي باستخدام نموذج الحيوان متعدد الصفات وتم تقدير القيم التربوية لكل بقرة وأبوها وأمها وتتلخص أهم النتائج فيما يلي :

●كان مدي القيم التربوية للبقرة ٢٥٠٤,١١ كجم لإنتاج ٣٠٥ يوم من اللبن – ١٤,٨٦ يوما لطول فترة الادرار – ١٦,٥٦ يوما لفترة الجفاف – ٩٢,٤٨ يوما لطول الفترة بين الولادتين – ٥,٨٠ شهر للعمر عند أول ولادة .

●تراوحت دقة قيم النهاية الصغرى والكبرى للقيم التربوية للبقرة لجميع الصفات الجاري دراستها بين ٠,٣٥ و ٠,٨٧ بينما كانت نسبة الابقار التي سجلت قيما تربوية موجبة ٤٩,١٧ % لصفة أنتاج ٣٠٥ يوم من اللبن – ٥٢,١٩% لطول فترة الادرار – ٤٨,٠ % لطول فترة الجفاف – ٦٠,٦٤ % لطول الفترة بين الولادتين و ٣٨,٣٩ % للعمر عند أول ولادة على التوالي .

●كان مدي القيم التربوية للاب ١٥٠٢,٨٥ كجم لإنتاج ٣٠٥ يوم من اللبن – ١٢,٢٠ يوما لطول فترة الادرار – ١٣,٧٩ يوما لطول فترة الجفاف –٦٢,٢٠ يوما لطول الفترة بين الولادتين – ٣,٤٤ شهر للعمر عند أول ولادة .

● تراوحت دقة قيم النهاية الصغرى والكبرى للقيم التربوية للاب لجميع الصفات تحت الدراسة بين ٠,٢٤ و ٠,٩٥ بينما كانت نسبة الاباء التي أعطيت قيما تربوية موجبة للاب ٥٣,٢٣ % لصفة للإنتاج ٣٠٥ يوم من اللبن – ٥١,٣٠% يوما لطول فترة الادرار – ٤٨,٩٢ % لطول فترة الجفاف – ٤٧,٥٠ % لطول الفترة بين الولادتين و ٤٨,٩٢ % للعمر عند أول ولادة على التوالي.

● كان مدى القيم التربوية للام ١٤٥١,٠ كجم لإنتاج ٣٠٥ يوم من اللبن – ٦,٨٢ يوما لطول فترة الادرار – ٧,٧٠ يوما لطول فترة الجفاف – ٢٥,٥٤ يوما لطول الفترة بين الولادتين – ٢,٩٠ شهر للعمر عند أول ولادة .

● تراوحت دقة قيم النهاية الصغرى والكبرى للقيم التربوية للام لجميع الصفات تحت الدراسة بين ٠,١٠ و ٠,٤٣ بينما كانت نسبة الامهات التي سجلت قيما تربوية موجبة للام ٥٦,٦٦ % لإنتاج ٣٠٥ يوم من اللبن – ٥٠,٦٣% يوما لطول فترة الادرار – ٤٨,٩٨ % لطول فترة الجفاف – ٤٧,٨٠ % لطول الفترة بين الولادتين و ٤٥,٧٧ % للعمر عند أول ولادة.

● كان مدى القيم التربوية للبقرة بالنسبة للصفات تحت الدراسة أوسع من نظائرها للآب والأم كما أن قيم النهاية الصغرى للقيم التربوية للبقرة أعلى من نظائرها للآب والآم . لذلك يمكن القول بأن انتخاب الأبقار لصفات أنتاج اللبن والصفات التناسلية على أساس القيم التربوية للبقرة أكفأ ويتنبأ بأن يعطي نتائج أعلى عند الانتخاب لتحقيق تحسين وراثي ملموس في الاجيال القادمة .

ABSTRACT:

Data of some milk production traits (305-day milk yield (305d-MY, kg), ; length of lactation period (LP, day) ; duration of dry period (DP)) and reproductive ones (calving interval (CI) and age at first calving (AFC) using records of 5662 normal lactations produced by 1029 Holstein cattle raised in El-Salhia farm, Ismaillia Governorate, Egypt were used in this study. Breeding values of cows, sires and dams were obtained through analyzing the data by Multiple trait Derivative free Restricted Maximum Likelihood (MTDFREML) using the multiple trait Animal model Analysis for all traits of the study. The breeding values were estimated by using data of all the available lactations. The main results of this study could be briefed as follows:

The ranges of cow breeding values, were 2504.11kg for 305d-MY, kg, 14.86days for (LP), 16.56 days for duration of (DP) , 92.48 days for (CI) and 5.80 months for(AFC). The corresponding ranges for top 25% of cow breeding values were 1682.60kg, 9.10days, 5.01 days, 54.88 days and 4.47months. The accuracy of minimum and maximum estimates of cow breeding values, for all traits of the study (ranged from 0.35 to 0.87).The percentage of cows that recorded positive cow breeding values was 49.17, 52.19, 48.00, 60.64 and 38.39% for 305-day milk yield, length of lactation period, duration of DP, CI and AFC, respectively.

The ranges of sire breeding values, were 1502.85kg for 305d-MY, kg, 12.20 LP, 13.79 for duration of DP, 62.20 days for CI and 3.44 month for AFC. The corresponding ranges for top 20% of sire breeding values were 1019.51kg, 7.82days, 8.99days 36.91 days and 2.27 months. The accuracy of minimum and maximum estimates of sire breeding values, for all traits of the study ranged from 0.24 to 0.95. The percentage of sires that gave positive sire breeding values was 53.23, 51.30, 48.92, 47.50 and 48.92% for 305d-MY, kg, LP, duration of DP, CI and AFC , respectively.

The ranges of dam breeding values, were 1451.00kg for 305d-MY, kg, 6.82 days for LP, 7.70 days for duration of DP, 25.54 days for CI and 2.90 month AFC. The corresponding ranges for top 25% of dam breeding values were 892831kg, 3.85days, 5.28days 29.10 days and 2.04 months. The accuracy of minimum and maximum estimates of sire breeding values, for all traits of the study ranged from 0.10 to 0.43. The percentage of dams that   showed positive dam breeding values was 56.66, 50.63, 48.98, 47.80 and 45.77% for 305d-MY, kg, length of LP, duration of DP, CI and AFC, respectively.

The ranges of cow breeding and the magnitudes of the minimum cow breeding values for all traits of the study (when

using data of all lactations) were always higher than their corresponding of either sire or dam breeding values. Therefore, it could be stated that selecting cows for milk production and reproductive traits of the study according to cow breeding values would be more reasonable and efficient than selecting them according to their sires or dams breeding values.

INTRODUCTION

The introduction of improved new standard exotic breeds (Friesian, Brown Swiss, Holstein , ----------etc.) is one of the options for improving dairy cattle production in Egypt . Holstein cattle has been imported to Egypt in large numbers during the last 25 years and maintained in large-scale commercial farms. In these farms , intensive farming and feeding practices in addition to good housing and veterinary care are followed at a high level to provide relatively comfortable conditions for the imported animals to avoid the adverse effect of high climatic temperature , limited feed resources and widespread of the endemic diseases . Also, to enhance the animals adaptability to the new environment and conditions . Since that time and till now several investigators have screened some of the genetic and non-genetic aspects of productive and reproductive potentialities of that breed under the Egyptian conditions (e.g. El-Arian *et al*., 2002; Mousa et al , 2002 ; Afifi et al , 2002 a&b ; Safaa Ibrahim , 2002 ; Shitta et al , 2002 ; Abou-bakr , 2003 ; Attalla , 2003 , El-Arian et al , 2003 ; Nigm et al , 2003 ; Afifi et al , 2004 ; Alhammad , 2005 ; Gad , 2005 ; Hatem Ismail, 2006; Salem et al , 2006; Ayied *et al*., 2011; Amr,2013;Hammoud 2013; Safaa and Afify 2016; El-Awady et al, 2016; Abd-Elhamid, 2018; others) .Spent by those investigators in this respect are deemed to be not sufficient enough to get all information needed to design and plan for appropriate programs for genetic improvement of males

and females of that breed under either pure breeding or crossbreeding system in Egypt . Also, to assess the importance of the non-genetic effects influencing milk production and reproductive traits and formulate the appropriate correct factors to adjust performance records for those non-genetic effects and to establish an appropriate managerial strategy for herds of that breed.

The present work is concerned with estimating cow, sire and Dam breeding values for milk production traits of the study (305-day milk yield; length of lactation period; dry period) and calving interval once when using all available lactations and another time when using data of only the first lactation in addition to cow, sire and dam breeding values of age at first calving.

MATERIAL AND METHODS

This study was carried out in a commercial Holstein cattle herd raised in El-Salhia farm, Ismaillia Governorate (east to the south of the Nile Delta) , Egypt using lactation records of nine consecutive years. El-Salhia farm belongs to the General Cooparative for Developing the Animal Wealth and Products.

Animals of the herd of the study belong to Holstein cattle breed. Females were imported as pregnant heifers from USA. Artificial insemination technique was randomly performed for heifers in USA before importation and for cows after parturition (in Egypt) using random doses of frozen Holstein semen (imported from the U.S.A.) with a restriction to avoid full-sib and sire-daughter inseminations.

The breeding plan in the farm of the study permitted practicing pure breeding through artificial insemination. Animals were housed in open sheds and fed on good quality concentrates ,corn silage and rice straw all year round . Egyptian clover , i .e . Barseem *(Trifolium alexandrinum)* was provided during winter and spring months (from December to May) . While Barseem

hay , Beet or Maize were introduced during summer and autumn months (from June to the end of November) . Feed were supplied to the cows according to their live body weight , milk production and pregnancy status . Free clean water and mineral mixture were available all time .

Pregnancy of all the imported Holstein heifers resulted from their insemination by Holstein semen in USA . For subsequent pregnancies, i.e. in Egypt, cows were artificially inseminated during the first heat period following the 45th day post-partum . Pregnancy was detected by rectal palpation 60 days after the last insemination and those failed to conceive were inseminated during the next heat period .Cows were machine milked twice a day in a parlor at **5 am** and at **5 pm** and milk obtained was recorded to the nearest **0.1 kg** . Milking continued until two months before the expected date of calving or became dry spontaneously. If before that time cows did not go dry they were dried gradually by milking them once a day for some milking's then after once every two days until complete drying. Disposal of cows from the farm of the study if any was done because of injury due to accidents, reproductive failure, udder disorders and disease conditions, i.e. was done involuntary.

Data and Statistical Analyses

Data of the study were collected on milk production and reproductive records of 5662 normal lactations given by 1029 Holstein Friesian cows (sired by 139 Holstein bulls and mothered by 1029 Holstein cows) during nine consecutive years.

Lactations without breeding dates and those of aborted cows or those affected by mastitis or other udder disorders were considered as abnormal lactations and their records were excluded from the original data before the statistical analyses . Also , records of cows sold for production purposes were excluded from the data .

Traits investigated in this work were 305-day milk yield (305MY); lactation period (LP) and dry period (DP) as milk production traits in addition to age at first calving (AFC) and calving interval (CI) as reproductive traits .

Data of milk production and reproductive traits mentioned above were grouped in year of calving subclasses of one year interval (9 subclasses) , season of the year subclasses (4 subclasses being : winter , spring, summer , autumn) , age subclasses of three months interval (29 subclasses)and days open subclasses of 20 days interval (10 subclasses) .

Table 1.Structure of the data used in the analyses for milk production (305-day milk yield, lactation length and dry period length) and reproductive traits (age at first calving, calving interval) of the study is given in table 1.

table 1 Structure of the data used in the analyses of traits of the study

Item	Number
Number of records of whole lactations	5662
Number of records of the first lactation	1029
Number of cows	1029
Number of sires	139
Number of dams	1029
Animals of the relationship matrix	2197

Data of milk production traits (305-day milk yield ; length of lactation period ; duration of dry period) and reproductive ones (calving interval ; age at first calving) were analyzed once more through the Restricted Maximum Likelihood (REML) procedure (SAS , 1996) to obtain additive genetic, permanent

environmental and residual variances for each trait of the study and the covariance's between each pair of these traits to be used as staring values needed for applying the multi-trait animal model analysis .Data of milk production traits across all the available lactations were analyzed through REML procedure by using the following mixed model:

$Y_{ijklm} = \mu + a_i + p_i + r_j + sn_\kappa + g_l + e_{ijklm}$ (Model 1)

where Y_{ijklm} = the ijklth observation , μ general mean , common element to all observations , a_i = random additive genetic effect of the ith cow , p_i = random permanent environmental effect of the ith cow , r_j , sn_κ & g_l are as defined in model 4 ; e_{ijklm} = random error particular to the ijklmth observation assumed to be independently randomly distributed with mean zero and variance 6_2e, i .e , NID (0, 6_2e) . It includes all other effects not specified in the model of analysis.

　　　Data of first calving interval, were reanalyzed for the same effects included in model 1after neglecting days open length:

Data of age at first calving were reanalyzed by using the mixed model (Model 2) .

$Y_{ijkl} = \mu + a_i + r_j + sn_\kappa + (rsn)_{jk} + e_{ijkl}$ (Model 2)

where Y_{ijkl} = the ijklth observation (age at first calving record , μ = general mean , common element to all observations , a_i = random additive genetic effect of the ith cow , r_j = the fixed effect of jth year of birth (r = 1,2,sn_k = the fixed effect of kth season of birth (k = 1,2,3,4) , $(rsn)_{jk}$ = the fixed effect of the interaction between the ith year of birth and kth season of birth and e_{ijkl} = random error particular to the ijklth observation assumed to be independently randomly distributed with mean zero and variance 6_2e, i .e , NID (0, 6_2e) . It includes all other effects not specified in the model of analysis.

Records of traits of the study were analyzed once more by Multiple-trait Derivative Free Restricted Maximum Likelihood (MTDFREML) procedure (Meyer 1998) by adopting repeatability multi-trait animal model when using records of all the available lactations. This was to estimate the breeding values for cows, their sires and dams once when using records of all available lactations the multi-trait repeatability animal model included the effects of the animal, permanent environment and residual (as random effects) in addition to the effects year of calving, season of calving, age at calving and days open length (as fixed) for analyzing milk production traits of the study. While it included the same random effects along with the same fixed effects except days open length for analyzing records of calving interval. The animal model and residual effects (as random) and the effects of year of birth, season of birth and the interaction between the two variables (as fixed) were included in the animal model when analyzing age at first calving.

In matrix notation, the animal model used was:

$y = X b + Z a + W p + e$ Where

y = vector of observation,

X = incidence matrix of the fixed effects,

b = vector of the fixed effects;

Z = incidence matrix of the animal (cow) effect,

a = vector of the animal (cow) direct (additive) genetic effect only,

the non-additive genetic effects were included in P term .

W = incidence matrix of permanent environmental effects,

P = vector of permanent environmental effects in addition to the non-

Additive genetic effects (cow x parity)

e = vector of random residual effect.

It is assumed that the residual effect is independently

Distributed, with mean zero and variance of σ^2_e , respectively ..

Therefore;

var (p) = Ip Ƃ2 pᵢi ;; var(e) = In Ƃ2e = R ,, var(a) = A Ƃ2a ;;

var(y) = ZAZ

Ƃ2 a +W Ƃ2P W + R

Where A is the numerator relationship matrix ,, Ip is an identity matrix with order equal to number of animals (cows) and In is a an identity matrix with order equal to number of records.

The mixed model equation (MME) for the best linear unbiased estimate or (BLUE) of estimable functions of b and for the best linear.

RESULTS AND DISCUSSION

Cow Breeding values

Minimum , maximum , range, standard errors and accuracy of cow breeding values for milk production traits (305d-MY, LP, duration of DP) and CI (when using data of all lactation and AFC (when using data of all lactations and age at first calving AFC are given in table 2.

The ranges of cow breeding values when using data of all lactations are 2504.11 kg for 305-day milk yield, 14.86 days for length of lactation period; 16.56 days for dry period and 92.48 days for calving interval and 5.80 months for age at first calving. (Table2). The wide range in this respect refers to the wide genetic variation and this gives the chance for improving the considered traits through selection according to the superiority of the cow breeding value.

The ranges for top 25 % of cows breeding values were 1682.60kg for 305-day milk yield, 9.10 days for length of lactation period, 5.01 days for duration of dry period, 54.88 days for calving interval and 4.47 for age at first calving (Table 3) These ranges are generally narrower than their corresponding of cow breeding values for all cows presented in Table 2.

The range of cow breeding values for 305-day milk yield obtained in this work (when using data of all lactations) was

2504.11 kg. This range is narrower than 1270kg obtained by Abd-Elhamid (2018) but wider than 2174 , 1314 , 2421 and 195.1 kg obtained by Afifi et al (2002), El-Arian et al (2003) , Hatem Ismail (2006) Safaa and Afify (2016), respectively using all data of all lactations and applying single-and multi-trait animal model. The range of cow breeding values for length of lactation period (when using data of all lactations) being 14.86 days (Table 2) is narrower than 24.2 days reported by Afifi et al (2002) but wider than 7.4 days given by El-Arian et al (2003) and 13.66 days shown by Hatem Ismail (2006).

The range of cow breeding values for dry period obtained in this study (when using data of all lactations) is 16.56 days (Table 2). This range is wider than 12.6 days given for the same trait by Abd-Elhamid (2018) and 10.36 days reached by for calving interval estimated by using data lactation is 92.48days (Table2). This range is wider than 22.69 days estimated by Hatem Ismail (2006).

The accuracy of minimum and maximum estimates of cow breeding values (Table2) for 305-day milk yield , length of lactation period, duration of dry period , calving interval and (age at first calving) ranged from 0.35 to 0.87 . Hatem Ismail (2006) showed that the accuracy of those traits ranged from 0.43 to 0.80.

Table 2 Ranges of predicted breeding values for cows when using data of all available lactations in the Holstein herd of the study* .

Traits	Mini	Maxi	Rang	SE		Accuracy	
				Mini	Maxi	Mini Maxi	
1-Milk production traits.							
305-day milk yield(kg)	-1160.05	1344.06	2504.11	227.06	355.70	0.63	0.87

Lactation period(days)	-7.44	7.42	14.86	2.92	3.62	0.36	0.66
Dry period (days)	-8.12	8.44	16.56	3.40	4.18	0.35	0.65
2-Reproductive traits.						
Calving interval(days)	-46.76	45.72	92.48	11.14	16.47	0.56	0.83
Age at first calving(months)	-2.20	3.60	5.80	0.80	0.79	0.65	0.71

+ Data of all available lactation were used.
++Data of only the first lactation were used.
* Total number of breeding values for cows = 1029.
Table 3. Ranges of predicted breeding values for top 25% of
        cows when using data of all lactations in the Holstein
        herd of the study* .

Traits	Mini	Maxi	Rang	SE		Accuracy	
				Mini	Maxi	Mini	Maxi
1-Milk production traits.							
305-day milk yield(kg)	338.6	1344	1682.6	2276	331.8	0.64	0.87
Lactation period(days)	1.67	7.43	9.10	2.93	3.59	0.38	0.66
Dry period (days)	1.57	3.44	5.01	3.45	4.18	0.35	0.63
2-Reproductive traits.							
Calving interval(days)	9.16	45.72	54.88	13.6	16.47	0.64	0.83
Age at first calving(months)	0.87	3.60	4.47	0.74	0.79	0.66	0.71

+ Data of all available lactation were used.
++Data of only the first lactation were used.

* Total number of breeding values for cows = 1029.

Table 4 shows that the percentage of positive cow breeding values was 49.17 % for 305-day milk yield, 52.19 % for length of lactation period; 48.00 for dry period and 60.64 % for duration of calving interval (when using data of all lactations) and 48.92% for age at first calving. These percentages for cow breeding values were 38.68, 56.07, 41.59, 50.83 and 38.39% for 305-day milk yield, length of lactation period, duration of dry period, calving interval and age at first calving, respectively).

Table 4 Percentages of positive breeding values of cows, sires and dams when using records of all available lactations.

Traits	Cows		sires			Dams
	Number	percent	Number	percent	Number	percent
1-Milk production traits.						
305-day milk yield(kg)[+]	506	49.17%	74	53.23%	583	56.66%
Lactation period(days)[+]	537	52.19%	72	51.30%	521	50.63%
Dry period (days)[+]	494	48.00%	68	48.92%	504	48.98%
2-Reproductive traits.						
Calving interval(days)[+]	624	60.64%	66	47.50%	492	47.80%
Age at first calving(months)[++]	395	38.39%	68	48.92%	471	45.77%

+ Data of all available lactation were used.

++Data of only the first lactation were used.

* Total number of breeding values for cows = 1029, for sires= 139 and for dams= 1029.

Sire Breeding values

minimum, maximum, range, standard errors and accuracy of cow breeding values for milk production traits (305-day milk yield , length lactation period , duration of dry period) and calving interval (when using data of all lactation and age at first calving (when using data of all lactations and age at first calving are presented in table 5. The ranges of sire breeding values (when using data of all lactations) are 1502.85kg for 305-day milk yield , 12.20 days for length of lactation period , 13.79 days for duration of dry period 62.20 days for calving interval and 3.44 months for age at first calving when using data of the first lactation (Table 5).

The ranges for top 20% of sire breeding values were 1019.51kg for 305-day milk yield, 7.82 days for length of lactation period, 8.99 days for duration of dry period, 36.91 days for calving interval and 2.27 months for age at first calving. These were narrower than their corresponding of all sires breeding value.(Table 6).

The range of sire breeding values obtained in the present study for 305-day milk yield (1502.85kg) is higher than the ranges obtained by Safaa and Afify 2016, Afifi et al (2002) and Hatem Ismail (2006). The range of sire breeding values for length of lactation period (when using data of all lactations) was 12.20 days which is lower than 17 days given by Afifi et al (2002) and higher than 6.5and 8.3 days reported by El-Arian et al (2003) and Hatem Ismail (2006) in Holstein cattle.

It was found in the present study that the range of sire breeding values for duration of dry period (when using data of all lactations) was 13.79 days. This range is greater than 8.7 and

5.21 days reported by El-Arian et al (2003) and Hatem Ismail (2006), respectively. Also, the range of sire breeding values for calving interval was 62.20 days when using data of all lactations. This range is greater than 7.13 days obtained for the same trait, when using data of all of all lactations of all lactations by Abd-Elhamid (2018).

The accuracy of minimum, maximum of sire breeding values for (305-day milk yield , length lactation period , duration of dry period) and calving interval (when using data of all lactation and age at first calving (when using data of all lactations) and age at first calving ranged from 0.24 to 0.95. The accuracy of minimum, maximum sire breeding values for same traits in the same breed given by Hatem Ismail (2006) were reported to range from 0.21 to 0.89.

The range of sire breeding values for age at first calving is 3.44 months (Table 5)which is higher than 2.15 months reached by Hatem Ismail (2006).

The percentage of positive sire breeding values (Table 4) was 53.23% for (305-day milk yield, 51.30% for duration of length of lactation period, 48.92% for dry period and 47.50% for calving interval when using data of all lactations) and 48.92 for age at first calving.

Table 5. Range of predicted breeding values for sires when using records of all available lactations except age at first calving.

Traits	Mini	Maxi	Rang	SE		Accuracy	
				Mini-	Maxi-	Mini-	Maxi-
1-Milk production traits.							
305-day milk yield(kg)[+]	-707.31	795.54	1502.85	143.80	423.11	0.39	0.95

Trait							
Lactation period(days)[+]	-6.17	6.03	12.20	1.87	3.76	0.25	0.88
Dry period (days)[+]	-6.73	7.06	13.79	2.17	4.33	0.24	0.87
2-Reproductive traits.							
Calving interval(days)[+]	-33.36	28.84	62.20	6.11	18.59	0.36	0.94
Age at first calving(months)[++]	-1.58	1.86	3.44	0.44	1.00	0.44	0.91

+ Data of all available lactation were used.

++Data of only the first lactation were used.

* Total number of breeding values for sires = 139.

Table 6 Ranges of predicted breeding values for top 20% of sires
when using records of all lactations in the Holstein herd
of the study except age at first calving .

Traits	Mini	Maxi	Rang	SE		Accuracy	
				Mini	Maxi	Mini Maxi	
1-Milk production traits.							
305-day milk yield(kg)[+]	223.97	795.54	1019.51	196.11	389.75	0.70	0.89
Lactation period(days)[+]	1.79	6.03	7.82	2.40	3.68	0.32	0.79
Dry period (days)[+]	1.93	7.06	8.99	2.85	4.21	0.33	0.77
2-Reproductive traits.							
Calving interval(days)	8.0	28.84	36.9	7.33		0.50	0.93
Age at first calving(months)[++]	0.41	1.86	2.27	0.59	1.00	0.44	0.83

+ Data of all available lactation were used.

++Data of only the first lactation were used.

* Total number of breeding values for sires = 139.

Dam breeding values

   Minimum, maximum, range, standard errors and accuracy of dam breeding values for some milk production and reproductive traits (when using data of all lactation) in addition to those of age at first calving are 1451.00kg for 305-day milk yield, 6.82 days for length lactation period, 7.70 days for duration of dry period, 25.54 days of calving interval and 2.90 months for age at first calving (table7).

   The ranges for top 25% of dam breeding values were 892.83kg for 305-day milk yield, 3.85 days for length lactation period, 5.28 days for duration of dry period, days, 29.10 days calving interval and 2.04 months for age at first calving (Table8).These ranges are narrower than their corresponding of breeding values for all dams except the range of breeding values for calving interval which proved to be wider (Tables 7&8).

   When using of all lactations the range of dam breeding values obtained in this study was 1451.0 kg for 305-day milk yield. This range is greater than 911 kg reported by Abd-Elhamid (2018) and 213 by El-Shalmani (2011), respectively. While,   this range is lower than 2103.00kg obtained by Hatem Ismail (2006), 119 kg ,Safaa and Afify 2016 and 510 kg, El-Awady et al., (2016) .

   Also, the range of dam breeding values for length of lactation period was 6.82 days. This range is lower than 22.9 and 23 days obtained by El-Shalmani (2011) and Hammoud (2013), respectively. In addition, the range of dam breeding values obtained for duration of dry period in this work was 7.07 days (Table7).This range is lower than 22.6 days but greater than 5.3 days reported by Safaa (2016) and Hatem Ismail (2006) respectively. The range of dam breeding values obtained in this

study when using data of all lactations) for calving interval was 25.54 days (Table 7) In this concern, Abd-Elhamid (2018) found that the range of dam breeding values for calving interval was 10.75 which is lower than that observed in this work.

The accuracy of minimum, maximum of dam breeding values (Table 7)for 305-day milk yield , length lactation period , duration of dry period and calving interval (when using data of all lactation) in addition to age at first calving ranged from 0.10 to 0.43%. The accuracy for the same traits were found by Hatem Ismail (2006) to range from 0.21 to 0.52.

The range of dam breeding values for age at first calving was 2.90 months (Table 7) which seems to be higher than corresponding range calculated by Hatem Ismail (2006).

Table 7 Ranges of predicted breeding values for dams when using records of all lactations records except age at first calving.

Traits	Mini	Maxi	Rang	SE		Accuracy	
				Mini-	Maxi-	Mini-	Maxi-
1-Milk production traits.							
305-day milk yield(kg)[+]	-691.00	760.00	1451.00	405.5	436.50	0.13	0.43
Lactation period(days)[+]	-3.83	2.99	6.82	3.69	3.82	0.18	0.31
Dry period (days)[+]	-3.35	4.35	7.70	4.25	4.40	0.10	0.30
2-Reproductive traits.							
Calving interval(days)[+]	-23.79	1.75	25.54	0.98	0.98	0.32	0.34
Age at first calving(months)[++]	-1.05	1.85	2.90	0.99	1.00	0.33	0.35

+ Data of all available lactation were used.

++Data of only the first lactation were used.

* Total number of breeding values for dams = 1029.

Table 8. Ranges of predicted breeding values for top 20% of dams.

Traits	Mini	Maxi	Rang	SE		Accuracy	
				Mini	Maxi	Mini Maxi	
1-Milk production traits.							
305-day milk yield(kg)[+]	132.89	759.94	892.83	405.55	434.4	0.33	0.47
Lactation period(days)[+]	0.86	2.99	3.85	3.76	3.82	0.18	0.31
Dry period (days)[+]	0.93	4.35	5.28	4.33	4.40	0.27	0.30
2-Reproductive traits.							
Calving interval(days)[+]	5.11	23.99	29.10	18.55	19.15	0.40	0.44
Age at first calving(months)[++]	0.19	1.85	2.04	0.9	1.00	0.3	0.35

+ Data of all available lactation were used.

++Data of only the first lactation were used.

* Total number of breeding values for dams = 1029.

The percentages of positive dam breeding values were 56.66, 50.63, 48.98, 47.80 and 48.92% for 305-day milk yield, length lactation period, length of lactation period, duration of dry period calving interval and age at first calving, respectively.

When using data of all lactation, results in tables 2.5 and 7 gave evidence that cows showed the widest ranges for breeding values for all traits of the study 305-day milk yield; length

lactation period; length of lactation period; dry period; calving interval and age at first calving then followed in a descending order by ranges of sire breeding values and dam breeding values, i.e. the range of dam breeding values were the lowest for all traits.

When considering the top 25% of cows, 25% of dam and 20% of sire breeding values, results of all lactations showed in general, that cows recorded for most traits of the study the highest ranges for breeding values then followed in a descending order by sire and dam breeding values.

Also, results of cow, sire and dam breeding values in tables 2, 3, 5, 6, 7 and 8 showed that the ranges of accuracy of minimum and maximum breeding values were the highest for sire breeding values then followed in a descending order of the cow and the dam breeding values.

All these results indicate that the ranges of cow breeding values for all the studied traits were generally higher than their corresponding of either the sire or the dam breeding values. This leads to state that selecting cows for milk production and reproductive traits of the study according to the cow breeding values would be more reasonable and efficient than selecting them according to their sires or dams breeding values.

When considering data of all lactations, the results showed that cow breeding values with positive magnitudes accounted for 52.19 and 60.64% for length of lactation period, and calving interval, respectively (Table 4).

Also, sire breeding values with positive magnitudes accounted for 53.23 and 51.30% for 305-day milk yield, length lactation period, respectively; but it accounted for 48.92 and 47.50% for duration of dry period and calving interval, respectively (Table 4) In addition , dam breeding values with positive magnitudes accounted for 56.66 and 50.63 % for 305-day milk yield and length lactation period, respectively;   but

accounted for 48.98 and 47.80% for duration of dry period and calving interval, respectively (Table 4).

REFERENCES

Abou-Bakr (2003) . Estimation of heritability and breeding values using single test days records of first lactation milk yield of Holstein cows. Egyptian .J.Anim . Prod . (2003) 40 (2):121-128.

Abd-Elhamid (2018) Evaluation of reproductive and productive performance for Friesian, crosses and local cows under Egyptian condition. Thesis PhD Faculty of Agriculture Kafr el sheikh University.

Afifi .,E.A.,AbdelGlil, M.F. ; Salem.M.A; A. Arafa and Safaa . S.S. I (2004) Genetic Aspects of age at first calving and longevity traits in a commercial Holstein herd raised under Egyptian condition. Annals of Agric .Sci ., Moshtohor, 42 (3); 1027-1038 .

Afifi, E.A., Khalil, M.H., Arafa Samira A. and M.A. Salem (2002). Estimation of transmitting abilities for lactation traits using the animal model for Holstein cattle raised under a commercial farm in Egypt. J. Agric. Sci., Mans. Univ., 27 (1): 89– 97.

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.

Amr .M . A. (2013) Evaluation of performance of some dairy herds in Egypt PhD .Thesis Face .Agaric . Alexandria Universe . Egypt.

Attalla, S.A. (2003). Use of test day model to estimate the first lactation parameters of a commercial Holstein herd. M.Sc. Thesis Fac. Agric., Cairo Univ. Cairo., Egypt.

Ayied, A.Y; Jadoa A. J. and Abdulrada, A.J. (2011). Heritabilities and breeding values of production and reproduction traits of Holstein cattle in Iraq. Journal Basrah Research Science, 37: 66-70.

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

El-Awady, H.G, A.E. Abdel-Khalek and M. Abo Elreesh (2016). Genetic evaluation for some productive and reproductive traits by using animal model in a commercial Friesian herd in Egypt. J.Anim. Poul. Prod., Mans. Univ., 7 (7): 279-285.

El-Shalmani, A.F. (2011). Evaluation of production performance in relation to genetic structure of some economical traits in Friesian cows (Thesis). [Alexandria (Egypt)]: Saba Basha, Alex. Univ.

Gad , M. E. (2005) Evaluation of different methodse of estimating correction factors for milk production records in dairy cattle . Ph.D. Thesis , Fac . Agric . at Moshtohor Banha University , Egypt .

Hammoud, M.H. and M.M.I. Salem (2013). The genetic evaluation of some first lactation traits of Holstein cows in Egypt. Alex. J. Agric. Res., 58 (1): 1-8.

Hatem Ismail, L.M. (2006). Phenotypic and genetic parameters of milk production and reproductive performance of Holstein cattle under the intensive production system in Egypt. M.Sc. Thesis, Fac. Agric., Cairo Univ., Egypt.

Meyer , K . (1998). DF-REML (Derivative-Free Restricted Maximum Likelihood) . Package Version 3.0 6th World Cong Genetic Appl . Lived . Prod . Armidal , New South Wales , Australia .

Mousa , E., Abdelharith , H., and El-Sayed , M .(2002) . Genetic and phenotypic parameters of number of service per conception as a threshold traits and 305 milk yield as

continuous trait using Gibbs sampling and MTDREML Egyptian J . Anim . Prod . 39 : 95 .

Nigm A . A ., Attallah . S. A., Abou-Bakr S. and Sadek R. R . (2003)A Study on Applying test day Model for genetic evaluation of milk yield of Holstein cattle in Egypt . Egyptian . Anim . Prod .(2003) 40 (2) : 89-98 .

Sanad,S.S. (2016) Genetic improvement using the selection indices for some productive and reproductive traits in Friesian cattle raised in Egypt J. Anim. and poultry Prod ., Mansoura Univ., Vol .7 (12) : 475-482 .

Safaa . Ibrahim .S.S. (2002) . Life time productive traits of Holstein Friesian cattle Raised in Egypt . M . Sc . Thesis , Fac . Agric ., Moshtohor , Zagazig Univ ., Banaha Branch , Egypt .

Safaa,S.S.I and Afify, A.A (2016) Comparing genetic parameters of Friesian milk production traits in commercial and state farms in Egypt .J .Agricultural Research Center. No. 4. Under publication.

Salem, M.A., Esmail H.M., Sadek R.R. 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., 43:1-10.

Shitta, A.A., Tag El-Dien, M.A. and S.S. Awad (2002). A study on production and reproduction traits of Friesian cattle in Egypt. J. Agric. Sci., Mans. Univ., 27: 7281-7289.

SAS (1996) . Procedures Guide , Version 6.12 , 1996 . SAS Jnst .ns .,Car , NC ., U.S.A.