Estimating Breeding Values for Milk Production and Mastitis Traits for Holstein Cattle in Egypt

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ABSTRAK

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Penelitian ini dilakukan untuk mengevaluasi sapi pejantan dan induk betina secara genetis untuk sifat-sifat produksi susu dan mastitis pada 12 kelompok ternak sapi Holstein Mesir menggunakan Best Linear Unbiased Prediction melalui program MTDFREML. Data diperoleh dari sebuah peternakan komersial bernama Dena, yang terletak di Kairo-Alex Desert Road (80 Km), Menofia, Mesir. Data termasuk 4791 sapi betina, 4227 sapi induk dan 248 sapi pejantan yang mewakili periode 2007-2014. Estimasi nilai pemuliaan untuk sifat produksi susu yang berasal dari produksi susu kumulatif 90 hari (90-DM), produksi susu kumulatif selama 180 hari (180-DM), produksi susu kumulatif 270 hari (270-DM), produksi susu kumulatif pada 305 hari (305-DM), dan jumlah infeksi mastitis sekitar musim laktasi (MAST).Rata-rata dari 90-DM, 180-DM, 270-DM, 305-DM dan MAST adalah 3026,3±655,1 kg, 5873,3±1081,1 kg, 7891,1±2692,2 kg, 9611,2±1897,9 kg, dan 0,712±1,2 kali/paritas, secara berturut-turut. Estimasi heritabilitas untuk sifat tersebut adalah 0,11±0,016, 0,15±0,014, 0,18±0,012, 0,22±0,015 dan 0,09±0,029, secara berturut-turut; keragaman genetik 47206,2 kg, 175300,6 kg, 1304654,4 kg, 792411,6 kg dan 0,12 waktu/paritas, masing-masing; dan varians fenotipik adalah 429147.6 kg, 1168670.6 kg, 7248079.9 kg, 3601870.9 kg, dan 1.35 kali/paritas, secara beruturut-turut untuk masing-masing sifat. Nilai EBV sebagai rata-rata, SD, (Min: Max) untuk pejantan adalah 0,0±0,179 (-0,4: 0,66) untuk MAST, 0,0±86,176 (-263,1: 245,4) untuk 90-DM, 0,0±227,523 (-600,3: 800,3) untuk 180-DM, 0,0±413,48 (-323,3: 1277,7) untuk 270-DM dan 0,0±440,26 (-1280,9: 1565,1) untuk 305-DM. Juga, EBV untuk sapi induk adalah 0,0±0,055 (-0,14: 0,45) untuk MAST, 0,033±26,24 (-142,8: 103,0) untuk 90-DM, 0,074±76,81 (-360,2: 289,6) untuk 180-DM, -0,045±139.66 (-591.9: 529.2) untuk 270-DM dan 0.266±154.1 (-666.3: 617.6) untuk 305-DM. Hasil ini menunjukkan bahwa pemilihan sapi pejantan dan sapi induk akan meningkatkan sifat produksi dan mastitis susu dalam kawanan ini karena perbedaan yang luas dalam potensi genetik antara sapi pejantan dan sapi induk.

Kata Kunci: Heritabilitas, Nilai Pemuliaan, BLUP, Produksi Susu, Mastitis, Sapi Holstein

ABSTRACT

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This study was carried out to evaluate the sires and dams genetically for milk production and mastitis traits in Egyptian 12 herds of Holstein cattle using Best Linear Unbiased Prediction via MTDFREML program. The data was obtained from a commercial farm called Dena, located in Cairo-Alex Desert Road (80 Km), Menofia, Egypt. Data included 4791 cows, 4227 dams and 248 sires that represented the period from 2007 to 2014. Estimating breeding values for milk production traits as cumulative milk yield at 90 days (90-DM), cumulative milk yield at 180 days (180-DM), cumulative milk yield at 270 days (270-DM), cumulative milk yield at 305 days (305-DM), and number of mastitis infection around the season of lactation (MAST). The averages of the 90-DM, 180-DM, 270-DM, 305-DM and MAST were 3026.3±655.1 kg, 5873.3±1081.1 kg, 7891.1±2692.2 kg, 9611.2±1897.9 kg, and 0.712±1.2 time/parity, respectively. Estimates of heritability for the previous traits were 0.11±0.016, 0.15±0.014, 0.18±0.012, 0.22±0.015, and 0.09±0.029, respectively; genetic variance were 47206.2 kg, 175300.6 kg, 1304654.4 kg, 792411.6 kg and 0.12 time/parity, respectively; and phenotypic variance were 429147.6 kg, 1168670.6 kg, 7248079.9 kg, 3601870.9 kg, and 1.35 time/parity, respectively. The EBV values as average, SD, (Min: Max) for sires were 0.0±0.179 (-0.4: 0.66) for MAST, 0.0±86.176 (-263.1: 245.4) for 90-DM, 0.0±227.523 (-600.3: 800.3) for 180-DM, 0.0±413.48 (-323.3: 1277.7) for 270-DM and 0.0±440.26 (-1280.9: 1565.1) for 305-DM. Also, The EBVs for dams were 0.0±0.055 (-0.14: 0.45) for MAST, 0.033±26.24 (-142.8: 103.0) for 90-DM, 0.074±76.81 (-360.2: 289.6) for 180-DM, -0.045±139.66 (-591.9: 529.2) for 270-DM and 0.266±154.1 (-666.3: 617.6) for 305-DM. These results provide that the selection of sires and dams will improve the traits of milk production and mastitis in this herd because of the wide differences in genetic potential among sires and dams.

Key Words: Heritability, Breeding Value, BLUP, Milk Production, Mastitis, Holstein Cattle

INTRODUCTION

Egypt imports semen of foreign bulls via many companies around the world under the supervision of the Agricultural Ministry, Egypt. But, the final decisions were taken via farm managers in the order of selected bulls to inseminate the cow populations almost without real breeding consultancy. There is no real scientific genetic evaluation and follow up for these bulls and its effects of the genetic pool in cow populations in Egypt. There are many different trials of sire breeding value estimated by different researchers, under Egyptian conditions but almost not for application in the field. The estimating of BV's for sires for different economic traits (i.e., Milk production, milk quality, health, reproduction, durability, milking speed) is the main goal to successful breeding programs for cattle genetic improvement. One of the main criteria for enhancing the genetic potential of progenies in a herd is to use proven sires to transmit superior genetic potential for economic traits (Banik & Gandhi 2010). The sire evaluation based on milk yield was the most widely used criteria; milk yield is an important economic trait in livestock species. It represents a major source of income in most dairy enterprises (Al-Samarai et al. 2015). At the past decade, most dairy cattle breeding goals consist of functional traits and milk production traits (Miglior et al. 2005). In addition, functional traits are a collective term for all traits that increase efficiency by lowering the costs of production (Groen et al. 1997). Economic traits are generally controlled by genetic factors but environmental influences like, year of calving, the season of calving; parity and age at first calving have significant effects on milk yield (Pirzada 2011). Identification of the best sires with higher accuracy is of enormous importance for any breed improvement program, as sires are easily and rapidly spread in many herds used progeny test (Kumar & Chakravarty 2014). In the recent past, the best linear unbiased prediction (BLUP) procedure has been widely used as a standard method of sire evaluation.

The objective of this study was to estimate breeding values (EBVs) for Holstein sires and dams of milk production traits (90-DM, 180-DM, 270-DM, 305-DM), and MAST in 12 herds under Egyptian condition.

MATERIALS AND METHODS

Data and economic traits

Data were obtained from a commercial farm called Dena, located in Cairo-Alex desert road (80 Km), Menofia, Egypt. Data included 4791 cows as progenies of 4227 dams and 248 sires that represented the period from 2007 to 2014.

Random factors as sire, dam and fixed factors as farm (1-12), parity (1^{st} to $\geq 5^{th}$), year of calving (2007 to 2014), season of calving (summer 22/6 to 21/9, autumn 22/9 to 21/12, winter 22/12 to 21/3, spring 22/3 to 21/6) and AFC was used as co-variable. Sires having more than five progenies (on average 19 daughters per sire) were evaluated on the basis of Best Linear Unbiased Prediction (BLUP) method via MTDFREML program. Studied traits were milk production traits as cumulative milk yield at 90 days (90-DM), cumulative milk yield at 180 days (180-DM), cumulative milk yield at 270 days (270-DM), cumulative milk yield at 305 days (305-DM) milk yield and hygiene trait as number of mastitis infection around the season of lactation (MAST)

Animals were housed free in shaded open yards, grouped based to milk yield, and fed on TMR system around year based to NRC (NRC 2001). Holstein heifers were AI using semen of Holstein proven sires, around 350 kg of weight and pregnancy was detected at day sixty after service. The animals were machinery milked in milking parlour 3 times/day.

Genetic parameters and estimated breeding value

Genetic parameters and estimated breeding values (EBV) were carried out by derivative-free REML with a simplex algorithm using the Multiple Trait Derivative-Free Restricted Maximum Likelihood [MTDFREML] (Boldman et al. 1995). Models in matrix notation were as follow:

$$\mathbf{Y = Xb + Za + e}$$

Where:

Y	=	The vector of observations (milk production and hygiene traits)
b	=	Vector of fixed effects and covariates (farm, parity, calving year, calving season, covariate =afc)
a	=	Vector of random additive genetic direct effects (sire and dam)
X, Z	=	Known incidence matrices relating observations to the respective traits
e	=	Vector of residual effects (0,1)

RESULTS AND DISCUSSION

Descriptive statistics, heritability and genetic variance

Table (1) represents the mean, SD of studied traits for cumulative milk production traits as cumulative milk yield at 90 days (90-DM), cumulative milk yield at 180 days (180-DM), cumulative milk yield at 270 days (270-DM), cumulative milk yield at 305-days (305-DM) and number of mastitis infection around the season of lactation (MAST) are 3026.29±655.09 kg, 5873.31±1081.05 kg, 7891.1±2692.23 kg, 9611.18±1897.86 kg and 0.712±1.16 time/parity, respectively.

In Egypt, the mean of milk yield at 305 days for Holstein cows were 4295 kg (Ashmawy & Khalil 1990), 4736±1097 kg (Tawfik et al. 2000), 10847 kg (Abou-Bakr et al. 2006), 9038±1181 kg (Salem et al. 2006), 6118 kg (Abdel-Moez 2007), 8750 kg

Table 1. Descriptive statistics and genetic parameters of milk production traits and mastitis in Holstein cattle

Trait	Mean	SD	Genetic variance(σ^2G)	Phenotypic variance (σ^2p)	h^2	±se
MAST, time/parity	0.712	1.161	0.121	1.347	0.09	±0.029
90-DM, kg	3026.29	655.09	47206.23	429147.57	0.11	±0.016
180-DM, kg	5873.31	1081.05	175300.59	1168670.57	0.15	±0.014
270-DM, kg	7891.10	2692.23	1304654.37	7248079.85	0.18	±0.012
305-DM, kg	9611.18	1897.86	792411.59	3601870.88	0.22	±0.015

Records No = 4801
MAST = Number of mastitis infection around the season of lactation
90-DM = Cumulative milk yield at 90 days
180-DM = Cumulative milk yield at 180 days
270-DM = Cumulative milk yield at 270 days
305-DM = Cumulative milk yield at 305 days

(Ghoneim et al. 2011), 8455.4±1535.1 kg (Hammoud 2013), 8805±2024.3 kg (Rushdi et al. 2014) and 6384.95±1236.9 kg (Faid-Allah et al. 2016). In addition, the average of total milk yield for Friesian cattle in six commercial farms ranged from 3057 to 10900.7 kg (Farrag et al. 2017).

The mean value of the total milk yield in Holstein cows in Yemen was 3919.66±42.99 kg, this value ranged from 1720 to 5890 kg (Al-Samarai et al. 2015). In addition, the mean value of milk yield at 305 days for Ethiopian Holstein cows was 3,504.02±1,222.56 kg, this value ranged from 1,004 to 9,301 kg (Ayalew et al. 2017).In Friesian cattle, the average, SD of cumulative milk yield in 90, 150 and 180 day were 921±375, 1415±554, and 1637±637 kg (Khattab et al. 1993), 1837±512, 3392±744, and 3777±902 kg (Atil 1999) and 1475.49±527.49, 2337.08±860.78, and 2931.45±963.42 kg (Zein 2014), respectively.

The average, SD for cases number of clinical mastitis per lactation (time/parity) were 0.46±0.91 (Perez-Cabal et al. 2009), 1.99±1.62 (Zavadilová et al. 2015) and 0.38±0.4861 (Zavadilová et al. 2017).

Table (1) represents estimates of heritability (h^2±se) of studied traits for milk production traits as 90-DM, 180-DM, 270-DM, 305-DM, and MAST are 0.11±0.016, 0.15±0.014, 0.18±0.012, 0.22±0.015 and 0.09±0.029, respectively; genetic variance are 47206.23 kg, 175300.59 kg, 1304654.37 kg, 792411.59 kg and 0.12 time/parity, respectively; and phenotypic variance are 429147.57 kg, 1168670.57 kg, 7248079.85 kg, 3601870.88 kg, and 1.35 time/parity, respectively.

Estimates of h^2 are low to moderate and in agreement with most of the previous investigators. Heritability estimates for 305-day milk yield of Holstein were 0.17 (Meyer 1985), 0.13±0.040 (Abou-Bakr et al. 2006), 0.29 (Dadpasand et al. 2013), 0.24±0.12 (Endris et al. 2013), 0.20 (Kaygisiz 2013) and 0.25±0.001 (Rushdi et al. 2014).

In Egypt, heritability estimates of total milk yield for Friesian cows were 0.37 (El-Shalmani 2011), 0.14 (Shalaby et al. 2012) and 0.44 (Hammoud 2013) and 0.42 for 305-DM (Hammoud 2013).

The other researchers reported that heritability estimates ranged from 0.27 to 0.36 by method of REML in Holstein cattle (Tuna 2004; Atashi et al. 2006; Guler et al. 2010), and heritability estimates of milk yield for Brown Swiss in Turkey for first and all lactations were 0.23 and 0.19, respectively (Muammer et al. 2009). The present result was slightly lower than previously showed results for 305-DM and milk in the first three parities (0.51, 0.49, and 0.47) using the model of RR model for Holstein cattle in Netherland (De Roos et al. 2004). In spite of, it was still higher than 0.02 and 0.10 as heritability estimates of 305-DM and test day milk yields for Brown Swiss cattle in the USA, respectively (Suleyman & Ali 2008). The high estimate of heritability for total milk yield in Holstein cow in Yemen was 0.35±0.12 (Al-Samarai et al. 2015). However, the low estimate of heritability for 305 days milk yield from the first three lactation records was 0.15±0.04 in Ethiopian Holstein cattle (Ayalew et al. 2017).

Heritability estimates of cumulative milk yield in 90,150,180 days and 305 day milk yield were 0.213, 0.271, 0.286 and 0.327, respectively (Zein 2014); ranged from 0.22 to 0.52 for cumulative milk yield in 90 day (Khattab et al. 1993; Atil 1999; Khattab et al. 2000; Salem et al. 2000); ranged from 0.23 to 0.52 for cumulative milk yield in 150 day (Khattab et al. 1993; Atil 1999; Silvestre et al. 2005); ranged from 0.29 to 0.55 for cumulative milk yield in 90 day (Khattab et al. 1993; Atil 1999; Salem et al. 2000).

Estimates of heritability, genetic variance and phenotypic variance for 305 days milk yield (1807 records) in Holstein-Friesian cattle under Egyptian conditions were 0.149±0.045, 7275.0 kg, and 48757.0 kg; in addition, the previous estimates for total milk yield (1631 records) were 0.065±0.041, 4611.6 kg, and 70827 kg, respectively (Salem & Hammoud 2016). In addition, estimates of heritability, genetic variance and phenotypic variance for 305 days milk yield were

0.24±0.08, 81225 kg, and 1369720 kg in Holstein-Friesian cattle under Indonesian conditions (Malindo 2017).

Heritability estimates for mastitis trait were ranging from 0.09 to 0.11 in Norwegian Red cows (Heringstad et al. 2005), ranging from 0.07 to 0.15 (Zwald et al. 2006), 0.07±0.007 in Spanish Holstein cattle (Perez-Cabal et al. 2009), ranging from 0.11 to 0.13 for the number of mastitis cases per lactation (Wolf et al. 2010), ranging from 0.07:0.08 for clinical mastitis and ranging from 0.13 to 0.17 for subclinical mastitis in Swedish Holsteins (Urioste et al. 2012), ranging from 0.03 to 0.05 reported for clinical mastitis recorded from calving to 150 days after calving (Jamrozik et al. 2013), 0.04 for clinical Mastitis and 0.05 for number of cases of clinical mastitis in Spanish Holstein cattle (Pérez-Cabal & Charfeddine 2013), 0.09 (Zavadilová et al. 2015), 0.02 (Govignon-Gion et al. 2016), 0.05±0.007 (Zavadilová et al. 2017).

Differences in heritability estimates are caused by the correction for non-genetic factors, the records number used in estimation, the genetic constitution of the breed, research objects, management, climate and different model affecting genetic and environmental variances, and the estimation method (Abou-Bakr et al. 2006; Fu et al. 2017).

Estimated breeding value (EBV)

Estimated breeding value (EBV) is defined as the total genetic ability of an animal for a given trait. Thus, EBV refers to the value of an animal in a breeding program for a particular trait. In practice, breeders want to know the level of performance that can be expected from the offspring of certain individuals (Salem & Hammoud 2016). EBV is expressed as deviations from the population mean and sires were ranked based on their genetic merit (Faid-Allah et al. 2016).

Table (2) shows the EBV values as mean, SD, (Mini: Max) for MAST, 90-DM, 180-DM, 270-DM and 305-DM in sires and dams of Holstein cattle. The EBV values for sires were 0.0±0.179 (-0.4: 0.66) for MAST, 0.0±86.176 (-263.09: 245.43) for 90-DM, 0.0±227.523 (-600.32: 800.34) for 180-DM, 0.0±413.48 (-1323.29: 1277.72) for 270-DM and 0.0±440.26 (-1280.9: 1565.05) for 305-DM. The EBV values for dams were 0.0±0.055 (-0.14: 0.45) for MAST, 0.033±26.244 (-142.76: 103.02) for 90-DM, 0.074±76.811 (-360.21: 289.55) for 180-DM, -0.045±139.655 (-591.91: 529.21) for 270-DM and 0.266 ±154.1 (-666.31: 617.57) for 305-DM.

Table 2 and Figure 1 shows that the EBVs for sires had a wide range of all studied traits may be due to export sire from many sources around the world for Holstein cattle and change the desired goal of breeders from milk production traits as the main goal to functional and hygiene traits. In addition, The EBVs for dam had a smaller range than sires of all studied traits may be due to the selection of the superior cows inside the farms. Since 2012 the breeders were being used proven sires for mastitis and functional traits with lower breeding values for milk production traits, further improvement of mastitis performance and it explained the high genetic variation for sires EBVs.

In Egypt, EBVs estimated via Best Linear Unbiased Prediction (BLUP) method for 305-DM were in between –466 and 681 kg estimated from 1653 records of daughters/163 sires (Abdel-Glil 1991), and in between– 506 and 675 kg estimated from 1931 lactation records of daughters/76 sires (Atil & Khattab 1999). EBVs of all animals from 3464 records of Holstein cows/99 sires ranged from -4917.4 to 4731.3, -3863.1 to 3076.4, for total milk yield, 305-DM, respectively (Radwan et al. 2015). Predicted transmitting abilities for mastitis trait ranged from −0.0785 to 0.0965 for a number of cases of clinical mastitis, the ranges were from −0.2184 to 0.3884 (Perez-Cabal et al. 2009).

Table 2. Estimated breeding values for milk production and mastitis traits in Holstein cattle

	Traits	Min	Max	Mean	SD	Variance
Sire	MAST	-0.4	0.66	0.000	0.179	0.032
	90-DM	-263.09	245.43	0.000	86.176	7426.28
	180-DM	-600.32	800.34	0.000	227.523	51766.57
	270-DM	-1323.29	1277.72	0.000	413.48	170965.67
	305-DM	-1280.9	1565.05	0.000	440.26	193829.25
Dam	MAST	-0.14	0.45	0.000	0.055	0.003
	90-DM	-142.76	103.02	0.033	26.244	688.74
	180-DM	-360.21	289.55	0.074	76.81 1	5899.97
	270-DM	-591.91	529.21	-0.045	139.655	19503.58
	305-DM	-666.31	617.57	0.266	154.1	23746.68

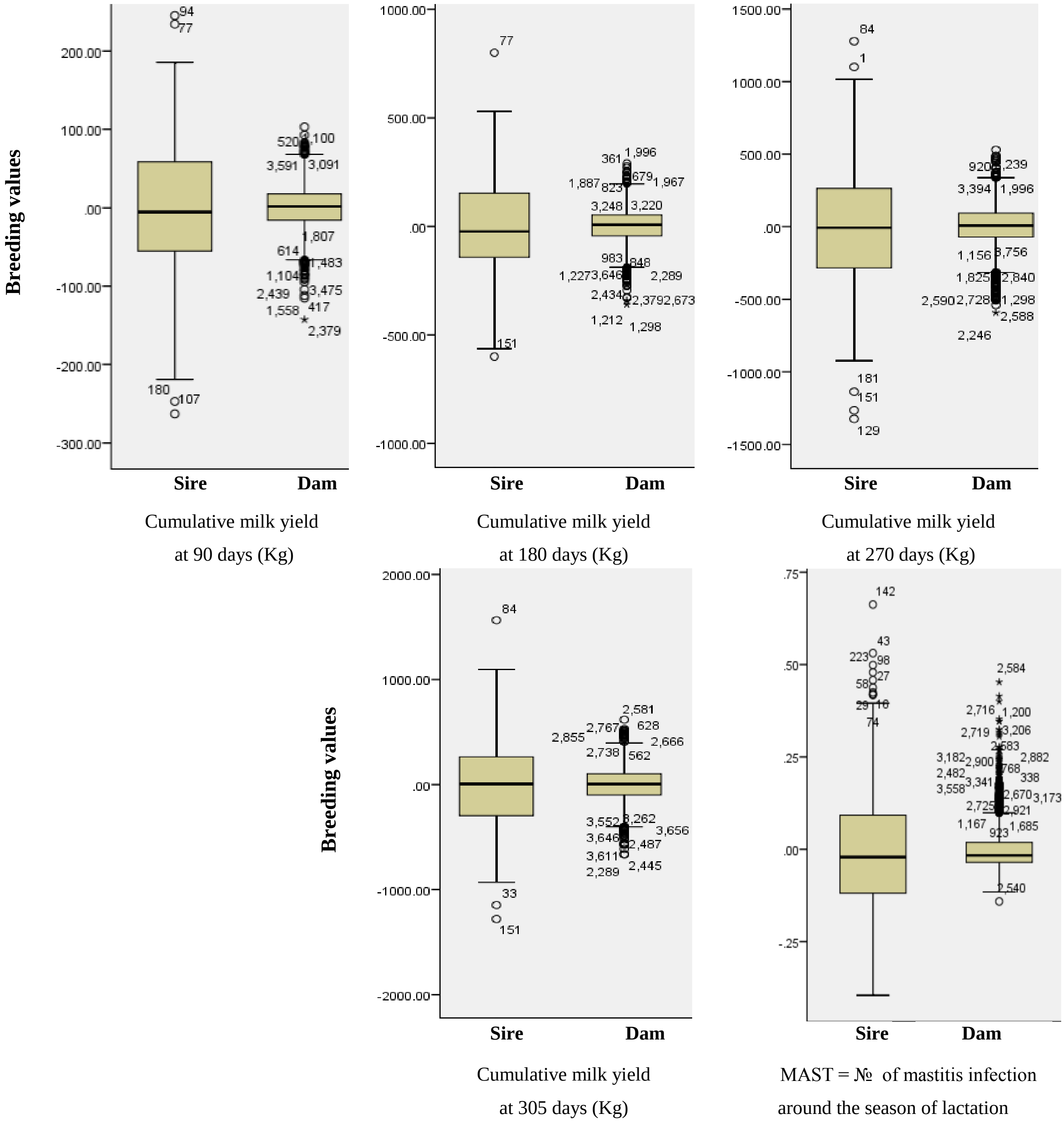

Figure 1. Box and Whisker plot of EBVs for milk production and mastitis traits in Holstein cattle.

EBVS for milk yield at first lactation using BLUP method ranged from 1262.90 to 1543.65 kg for Sahiwal sires (Duelkar & Kothekar 1999), as averageEBVs in Friesian cattle in Egypt as average (Min:Max) for 305-DM was 65.01 kg (-300.7: 706), total milk yield was 98.27 kg (-371.5:1105.7), cumulative milk yield in 90 days was 13.96 kg (-181:298), cumulative milk yield in 150 days was 15.73 kg (-362:381) and cumulative milk yield in 180 days was 49.70 kg (-397:390) (Zein 2014). EBVs for total milk yield , 305-DM from 3464 records of Holstein cows in Egypt ranged from -2096 to 2117, -372.9 to 315.9 kg, respectively, the values for dams were ranged from -1372 to 2113, -396.2 to 226.8 kg, respectively. EBVs for sires were ranged from -1095 to

1186, -245.9 to 171.9 kg for the previous traits, respectively (El-Bayoumi et al. 2015). EBVs of sires for the total milk yield (the average number of daughter/sire was 3.51) in between -471.88 and 443.8 with a marginal difference of 915.68 kg between lower and higher value in Holstein cattle in Yemen (Al-Samarai et al. 2015). EBVs for milk production in Holstein cattle in Egypt as a total milk yield ranged from -2736.6 to 3284.5, and for 305-DM ranged from -1698.0 to 1337.8 of cows, the EBVs for sires were ranged between -1056.8 to 659.1, and -737.1 to 621.9, respectively. EBVs for dams were ranged from -2835 to 2979.1, -985.2 to 1875.1 for the previous traits estimated from 1807 lactation records of daughters/73 sires, respectively (Salem & Hammoud 2016).

Table (3) shows that the values of EBV via MTDFREML program in percentiles of studied traits with great variation for 248 Holstein sires that imported for 12 herds in Egypt as semen for artificial insemination. High genetic variation was reported among the EBVs of sires as reported by many researchers in cattle (Dalal et al. 1999; Dubey et al. 2006; Banik & Gandhi 2006; Kumar et al. 2008; Moges et al. 2009).

Table (3) shows that the sires' EBVs ranged from -263.09 to 245.43 kg for milk yield at 90 days, -600.32 to 800.34 for milk yield at 180 days, -1323.29 to1277.72 for milk yield at 270 days, and -1280.9 to 1565.05 for milk yield at 305 days. Also, the sires' EBVs ranged from -0.4 to 0.66 for sire for the MAST.

About 50% out of 248 sires showed higher values than the average for milk production traits, 12 sires (5%) out of 248 sires as a best 5% showed higher EBVs than 148.61. 387.37. 720.35 and 813.57 kg for 90-DM, 180-DM, 270-DM, and 305-DM, respectively. About 50% out of 248 sires showed lower values than the average for the MAST. Also, 12 sires (5%) out of 248 sires showed lower EBVs than -.2747 for the MAST.

Milk yield EBVs ranged in -1013.9 to 1965.7 kg, The average of sires EBV via DFREML for milk yield at 1st parity was 3050.84 kg out of 57 sires 30 (52.63%) sires had EBV above the average and 24 (47.32%) sires had the below the average (Zutere 2008).

Table (4) shows that the dams' EBVs ranged from -142.76 to 103.02 for milk yield at 90 days, -360.21 to 289.55 for milk yield at 180 days, -591.91 to 529.21 for milk yield at 270 days, and -666.31 to 617.57 for milk yield at 305 days. Also, the dams' EBVs ranged from -0.14 to 0.45 for the dam for MAST

About 50% out of 4227 dams showed higher values than the average for milk production traits, 3170 dams (75%) out of 4227 dams as a best 75% showed higher EBVs than -16.0655, -44.1182, -70.4308 and -99.0659 kg for 90-DM, 180-DM, 270-DM, and 305-DM, respectively. About 50% out of 4227 dams showed lower values than the average for the MAST. Also, 3170 dams (75%) out of 4227 dams showed lower EBVs than-.0354for MAST.

The EBVS of milk yield at first lactation of Sahiwal sires using BLUP method ranged from 1153.95 to 2560.29 kg respectively. 38 out of 112 sires (33.93%) had EBVS above the average, while 74 sires (66.07%) had EBVS below the average. The top ranking sires had 35.46% genetic superiority over the overall average, whereas below average ranking sires had 38.95% low EBVS than the overall average (Singh & Singh 2016).

Table 3. EBVs Percentiles for studied Holstein sires

	EBVs Percentiles for 248 sires						
	5%	10%	25%	50%	75%	90%	95%
MAST	-.2747	-.2082	-.1200	-.0213	.0925	.2480	.3469
90-DM	-130.1630	-103.2672	-55.1935	-5.2273	58.7855	126.0289	148.6048
180-DM	-351.5393	-280.7055	-143.2290	-23.4620	153.2494	312.3312	387.3708
270-DM	-657.3163	-495.2965	-285.3595	-6.7086	264.6430	535.4776	720.3470
305-DM	-720.9358	-516.6709	-295.5986	6.8916	263.8430	612.9766	813.5737

Table 4. EBVs Percentiles for studied Holstein cows (as a dam)

	EBVs Percentiles for cows (as 4227 dam)						
	5%	10%	25%	50%	75%	90%	95%
MAST	-.0525	-.0458	-.0354	-.0164	.0185	.0709	.1129
90-DM	-45.6075	-34.5661	-16.0655	1.9182	17.8139	32.4053	42.1834
180-DM	-133.4583	-101.2163	-44.1182	7.3149	52.8633	95.7136	119.7531
270-DM	-251.4390	-180.8339	-70.4308	7.0513	93.1474	168.8614	221.1210
305-DM	-264.7312	-205.0363	-99.0659	5.9119	102.7117	188.5172	253.4017

EBVS for milk yield at first lactation using BLUP method ranged from 1262.90 to 1543.65 kg for Sahiwal sires (Duelkar & Kothekar 1999), as average was 1581.80 kg for Karan Fries sires (Kumar et al. 2008). BLUP via Derivative-free restricted maximum likelihood (DFREML) gave the EBV average ofSahiwal sires for 305-MY as 1503.99 kg and ranged from 1912.64 to 846.89. 49.38% out of 81 sires showed higher values than the average. In this method, 3 sires showed EBV over and above 20% as compared to the EBV average. Out of 81 sires, 7, 17 and 28 sires were having EBV s 15, 10 and 5% higher than the overall average (Banik & Gandhi 2010).

The EBVs of 51 Sahiwal sires (≥5 daughters/sire) were estimated from the 305-DM at 1st parity using four methods for sire evaluation. The mean of EBVs via BLUP “SAS”, least squares “LSM”, simple regressed least squares “SRLS” and Derivative-free restricted max likelihood “DFREML” methods were 1908.70 kg, 1869.91 kg, 1869.99 kg, and 1923.87 kg, respectively (Dongre & Gandhi 2014). EBVS for milk yield at first lactation using LSM as average were 1502.27 kg and it ranged from 830.41 kg to 2247.90 kg for Sahiwal cattle (Banik & Gandhi 2006).

CONCLUSION

The genetic evaluation was carried by MTDFREML method for milk production and mastitis traits using 4791 records on daughters of 4227 dams and 248 sires of Holstein cattle. The great variations were detected in EBVs for Holstein sires in milk production and mastitis traits. The high importance of genetic evaluation for Holstein sires and dams in our herds to help the breeder for making a decision in a breeding program. Re-evaluate Holstein sires under Egyptian conditions as a Bio-Safety protocol. Since 2012 the farm is being used proven sires for mastitis and functional traits with lower breeding values for milk production traits, further improvement of mastitis performance and it explained the high genetic variation for sires’ EBVs.

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