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GENETIC EVALUATION OF INDIVIDUAL TEST DAY MILK YIELDS, REPRODUCTION AND PERSISTENCY OF LACTATION OF FRIESIAN COWS IN EGYPT

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ABSTRACT

Data comprised 11231 test day (TD) milk yield records from 1209 Holstein heifers calved between 2000 and 2003 were used in the present study. In addition to individual ten TD milk yield records and 305-day lactation yield records (305-dMY), the persistency of lactation (Per MY), days open (DO), peak daily milk yield (PEAK) and days from parturition to day of peak milk yield (DPMY) were recorded. All studied traits considered as different traits. Genetic parameters and breeding values for all studied traits were estimated by the REML method using single trait animal models analysis. Series of bivariate animal model analyses were used to estimate genetic and phenotypic correlations among all studied traits. Also, the Spearman rank correlations among estimated breeding values (EBV) for different studied traits were calculated.

Milk yield increased with time up to 2nd TD (around 52.87 days) and decreased afterwards. The average of PEAK was 30.39 kg. Higher 305-dMY recorded in the present study (6183 kg) was associated with longer DO (159.8 days). The coefficients of variations of TD milk yields were ranged from 29.05 to 42.63%, while the coefficient of variation of 305-dMY was 26.49%.

Heritability estimates for individual test day records using a single-trait animal model ranged from 0.20±0.10 to 0.26±0.06. The lowest heritability estimate was recorded in TD8 as well as TD1 of lactation, increased toward the middle of lactation period (TD5), and then decreased to raise again at the last two tests (TD9 and TD10). However, the heritability estimate of 305-dMY was 0.31±0.07. Heritability estimate for days open, persistency of lactation, peak daily milk yield and days of peak milk yield were 0.10±0.05, 0.08±0.05, 0.25±0.08 and 0.06±0.04, respectively.

Phenotypic and genetic correlations among test day milk yield records ranged from 0.11 to 0.85 and 0.62±0.09 to 0.99±0.06, respectively. Correlations among TD milk yields tended to decrease as the TD intervals increased, with largest estimates in mid-lactation than at both the beginning and the end of lactation. Genetic correlations between different TD milk yields and 305-dMY were high and positive, ranged from 0.80±0.09 to 0.99±0.04, while the estimates of phenotypic correlations ranged from 0.44 to 0.86, with highest values in the middle of lactation.

Estimated genetic and phenotypic correlations between DPMY and Per MY were 0.29±0.13 and 0.15, respectively. Also, the genetic and phenotypic correlations between DPMY and peak milk yield were negative (-0.66±0.08 and -0.25, respectively).

Higher rank correlations of breeding values for TD milk yields occurred at the mid-lactation than that between TD at the beginning and the end of lactation. Also, the higher rank correlations between breeding values of 305-dMY and TD milk yields were observed in the mid-lactation. Positive rank correlation was obtained between breeding values for peak milk yield and days open, while the negative ones were recorded between PEAK and each of DPMY and Per MY. The present results indicated that the TD milk yields at the mid-lactation were informative enough to represent the 305-dMY than the others. Also, the selection strategy could be attempted by decreasing stressful peak yields and maintaining a high level of production after peak yield, which is expected to improve energy balance at an earlier stage in lactation in first parity and may lead to an improve in animal reproduction and health.

Keywords: Individual test day, peak milk yield, persistency of lactation, reproduction, genetic parameters, breeding values.