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Study on Friesian Herds Raised in Egypt and Germany

II. Genetic and phenotypic trends in estimated transmitting ability

Summary

Original data consisted of 774 first lactation records of daughters of 124 sires of Friesian herds in Egypt and 9219 first lactation records of daughters of 679 sires of Friesian herds in Germany used to estimate genetic and phenotypic trends of initial milk yield in 70 days (IMY), 305-day milk yield (305-dMY), lactation period (LP) and calving interval (CI). Sire component of variance was consistently about 9.88%, 10.75%, 4.63% and 5.03% for IMY, 305-dMY, LP and CI, respectively of the total variation in Friesian cows in Egypt and about 16.69%, 16.69%, 3.63% and 4.37%, for IMY, 305-dMY, LP and CI, respectively of the total variation in Friesian cows in Germany. Annual genetic change was 29.98 kg, 112.99 kg, -0.92 d and 1.78 d for IMY, 305-dMY, LP and CI, respectively for Friesian cows in Egypt and was 70.41 kg, 200.38 kg, 0.12 d and -1.05 d for IMY, 305-dMY, LP and CI, respectively for Friesian cows in Germany. Annual phenotypic trend was 13.83 kg, 48.00 kg, -1.66 d and -1.82 d for IMY, 305-dMY, LP and CI, respectively for Friesian cows in Egypt and was 21.00 kg, 104.00 kg, 0.17 d and 0.78 d for IMY, 305-dMY, LP and CI, respectively for Friesian cows in Germany. The present results show that sires used in the later years were of superior genetic value than those used in the earlier years.

Key Words: Friesian cattle, milk production, Germany, Egypt, genetic and phenotypic trends

Zusammenfassung

Titel der Arbeit: **Studien über Schwarzbunte Rinder in Ägypten und Deutschland. II. Genetische und phänotypische Trends für die geschätzten Zuchtwerte**

An Hand der ersten Laktation von 774 Töchtern von 124 Bullen einer Herde Schwarzbuntrinder in Ägypten und von 9219 Töchtern von 679 Bullen in Deutschland wurden die genetischen und phänotypischen Trends für die Frühmilchleistung (IMY), 305-Tage-Milchleistung (305-dMY), Laktationsdauer (LP) und Zwischenkalbezeit (CI) geschätzt. Der Varianzanteil zwischen den Bullen war 9,88 %, 10,75 %, 4,63 % und 5,03 %, für das Datenmaterial in Ägypten und 16,69 %; 16,69 %, 3,63 % und 4.3 % für das Datenmaterial in Deutschland für IMY, 305-dMY, LP und CI. Der jährliche genetische Fortschritt war 29,98 kg; 112,99 kg; -0,92 d und 1,78 d in Ägypten und 70,41 kg; 200,38; 0,12 d und -1,05 d in Deutschland für die Merkmale IMY, 305-dMY, LP und CI. Der phänotypische Fortschritt war 13,83 kg; 48,00 kg; -1,66 d und -1,82 d für das Datenmaterial in Ägypten und 21,00 kg; 104,00 kg; 0,17 d und 0,78 d in Deutschland für die Merkmale IMY 305-dMY, LP und CI. Die Ergebnisse der Untersuchung zeigten eine deutliche Überlegenheit des Zuchtwertes der Bullen im Laufe der Jahre.

Schlüsselwörter: Schwarzbuntrind, Milchproduktion, Deutschland, Ägypten, genetische und phänotypische Trends

Introduction

Genetic and phenotypic changes in the performance traits of dairy cattle are the ultimate indicator of progress in a herd. Such a change is measured as genetic and phenotypic trend. The measure of genetic and environmental changes from field data has problems since many factors are confound with both genetic and environmental changes (CANON and MUNOZ, 1991). Many studies showed more additive genetic control in the first lactation than later lactations. REGE (1991) reported that the accuracy of sire evaluation is increased by using more records than the first lactation. On the other side, WELLER et al., (1984) working on Holstein cows, reported that genetic trend for milk yield and fat corrected milk yield were decreased with parity. They concluded that it is useful to depend on the first lactation in estimating genetic trend. It, surely, depends on the expected length of the lifetime production of the cow. Sire evaluation on first lactation and initial milk yield (IMY) appears justified by the strong relationship between the yield of first lactation and the measures of lifetime production (HOQUE and HODGES, 1981; AGYEMANG et al., 1985 and BAFFOUR-AWUAH et al., 1996). In addition, the part lactation records could be very useful in early evaluation of sires, because of high genetic correlations between complete production records and initial milk yield (KHATTAB et al., 1993 and BAFFOUR-AWUAH et al., 1996).

Maximizing genetic gain is the objective of animal breeders. The most rapid genetic gain can be achieved by selecting and sampling young bulls, because younger animals are on average superior to the older animals. As genetic progress accelerates, the importance of young animals in breeding programmes increases. The objectives of this study were to: (1) estimate sire transmitting ability for initial milk yield (IMY), 305-day milk yield (305-dMY), lactation period (LP) and calving interval (CI) for Friesian herds in Egypt and Germany, and (2) estimate genetic and phenotypic trends for these different traits.

Materials and Methods

The data used in this study were obtained from the milk records of Friesian cows in two locations. The first location was Dalla farm which is 130 kilometres from Cairo City, Egypt. The second location was Osnabrück in Germany, where data were collected from different farms. In Egypt data covered a period of 6 years, from 1987 to 1992. A total of 774 first lactation records of daughters of 124 sires were used. Each record included, cow, sire and dam identification, birth date, calving date, age at calving, parity, year, initial milk yield, 305-day milk yield, lactation period, days dry, calving interval, days open, and monthly milk yield (from first to tenth lactation month). The data was adjusted for year-season analysis.

In Egypt, animals were kept loose under semi-open sheds all the year round. Cows were fed on alfaalfa and rice straw during the year with concentrate ration. Concentrates were offered twice daily before milking, about 4-5 kg, according to animals' body weight and production. Cows were machine-milked twice a day (at 7 a.m. and 4 p.m.). Cows producing more than 10 kg a day and those in the last two months of pregnancy were supplemented with extra concentrate rations. The nucleus of this herd was imported to Egypt from the USA as pregnant heifers in 1986. Also, imported semen every year from the USA was used in artificial insemination (AI) at random. Heifers were served for the first time when they reached 24 months or 350 kg, therefore cows were usually served two months postpartum. Pregnancy was detected by rectal palpation 60 days after the last service.

In Germany, data was collected by VIT (Vereinigte Informationssysteme Tierhaltung, Verden) over a period of 15 years from 1979 to 1993. A total of 9219 first lactation records of daughters of 679 sires were used. Each record included the same division for Dalla farm data. Data originated from many farms in one sub-region in Osnabrück. It was the original data which was used for the estimation of the breeding values for the Friesian breed (Schwarzbunt). The animals were fed concentrates in addition to the grassland in spring, summer and autumn according to the performance. In the winter they got concentrates and conserved feed. The data was adjusted for year-season analysis.

Estimation of variance and covariance components depends mainly on Henderson's Method 3 (HARVEY, 1990). Accordingly, estimates of sire (σ^2_s) and remainder (σ^2_e) components of variances and covariances were obtained.

Estimate of sire transmitting ability (ETA)

Sire transmitting ability (ETA) of different traits studied was estimated by using best linear unbiased prediction (BLUP) and was obtained from using the first lactation. In addition, 5 daughters per sire or more were examined. In matrix notation, the model can be written as:

$$Y = Xf + Zs + Wb + e$$

Where: Y was a vector of observation for each trait, X was a known fixed design matrix, f was an unknown vector of fixed effect representing the mean and year of calving and month of calving, Z was a known design matrix, s was an unobservable vector of random sire effect, W was a vector of covariance variable (independent variable), b was a vector of regression of Y on W and e was unobservable random vector of error with mean zero and variance-covariance matrix I σ^2e. The mixed model equations (HENDERSON, 1973) are

$$\begin{bmatrix} X'X & X'Z & X'W \\ Z'X & Z'Z+K & Z'W \\ W'X & W'Z & W'W \end{bmatrix} \begin{bmatrix} \hat{f} \\ \hat{s} \\ \hat{b} \end{bmatrix} = \begin{bmatrix} X'Y \\ Z'Y \\ W'Y \end{bmatrix}$$

Where: $K = (4 - h^2)/h^2$, for each trait was added to the diagonal of sire effects in the matrix. The above analysis carried out to predict sire transmitting abilities (ETA) of sires was the sum of the sire solution. The breeding value was twice the estimated transmitting ability.

Estimate of phenotypic and genetic trends

Annual phenotypic and genetic change for different traits studied was computed as the regression coefficients of trait values on the year of calving after adjusting the records for year and season. Trends in sires transmitting ability for different traits studied were estimated by regression ETAs for each year by year. For the p^{th} year, the average of sires transmitting abilities was $\sum_{i} n_{ip}\hat{s}_i / n.p'$ where n_{ip} is the number of daughters of sire i born in the p^{th} year, and $\hat{s}_i$ is the predicted transmitting ability of the i^{th} sire.

Results and Discussion

Random components

Estimates of variance components for sire (σ^2s), cows within sires ((σ^2c:s) and residual effects (σ^2e) associated with IMY, 305-dMY, LP and CI for different parities are in (Table 1). For all these estimates, data were corrected for the systematic environment effects. Results obtained in this study show the possibility of the genetic improvement of milk traits through sire selection. ABUBAKAR et al., (1986); KHATTAB and SULTAN, (1990); TEMPELMAN and BURNSIDE (1990) and ABDEL GLIL et al., (1995) found that sires accounted for 7.39 to 10.21 % of the adjusted variance affecting milk yield. In addition, HAMED and SOLIMAN, (1994) with Fleckvieh cows found that sires accounted for 19.1 and 20.8% of the variation for 100 dMY and 305 dMY, respectively. In contrast, BHAT (1980) and GARCHA and DEV (1985) working on Tharparkar and crossbred of Holstein, respectively reported no significant effect of sire on milk yield. The effect of cows is may be due to the permanent environmental effects which are transmitted from one record to another and cannot be corrected. ABUBAKAR et al., (1986) and ABDEL GLIL (1995) working on Friesian cows, found cows within sires was 17 and 11.2%, respectively for milk yield. KHATTAB and SULTAN (1990) working on Friesian cows in Egypt, found that there is no significant sire effect on the lactation period, but accounted for 2.01% variance on LP. The low genetic variance for the both lactation period and calving interval is also according to the limited lactation length of 305-days and due to the aim CI of 1 year.

Table 1
Estimates of sires' variance components (σ^2s), cows within sires' components (σ^2c:s), residual variance components (σ^2e) and proportion of variance (V%) due to random effects for initial milk yield (IMY), 305-day milk yield (305-dMY), lactation period (LP) and calving interval (CI) of Friesian cows in Egypt and Germany (Schätzung der Varianzkomponente für Frühmilchleistung (IMY), 305-Tage-Milchleistung (305 dMY), Laktationsdauer (LP) und Zwischenkalbezeit (CI) Schwarzbunter Rinder in Ägypten und Deutschland)

Trait	Egypt						Germany					
	Sire		Cow:Sires		Residual		Sire		Cow:Sires		Residual	
	σ^2s	V%	σ^2c:s	V%	σ^2e	V%	σ^2s	V%	σ^2c:s	V%	σ^2e	V%
IMY	1824	9.88	4987	27.03	11643	63.09	30486	16.69	105478	57.74	46699	25.57
305-dMY	2818	10.75	6915	26.38	16480	62.87	76213	16.69	263702	57.75	116743	25.56
LP	337	4.63	2505	34.44	4431	60.93	935	3.63	9661	37.53	15146	58.84
CI	1533	5.03	11137	36.50	17841	58.47	39277	4.37	457803	50.89	402449	44.74

* Number of observation was 774 and 9219 for Friesian cows in Egypt and Germany, respectively.
** d.f of sires, cows:sires and residual components were 307, 398 and 1694 respectively for Friesian cows in Egypt and were 658, 8410 and 18667 respectively for Friesian cows in Germany.

Estimates of (σ^2e) is the residual variance component that contains the remainder of genetic and environmental variance which is the random effect, peculiar to the observation of traits studied and ranged from 58.47 to 63.09% for Friesian cows in Egypt and from 25.56 to 58.84 for Friesian cows in Germany (Table 1). The present estimates are lower than those reported by STANTON et al., (1991) on Friesian cows, found the residual components of variance for milk yield were 79.88, 78.08 and 80.53% in USA, Colombia and Mexico, respectively. In addition, KHATTAB et al., (1993) obtained high residual components of variance for cumulative monthly milk yield and ranged from 73.0 to 89.90%.

Estimate of Sire breeding values

HENDERSON (1973) found that the decreased number of daughters per sire would reduce the accuracy of predicted sire breeding value. Also, SCHAEFFER et al., (1973) on Holstein sires concluded that the important culling decision usually occurred on young sires with fewer than 50 daughters. However, ABUBAKAR et al., (1986) in a study based on 15512 lactation records of daughters of 138 sires, concluded that 10 daughters per sire are considered a minimum number for the evaluation of sires using BLUP procedures in tropical areas. Then it is necessary to estimate the sire evaluation based on a large number of daughters per sire. Therefore, the sire transmitting ability of sires with at least 5 daughters of first lactation was examined.

Estimates of sire transmitting abilities (ETAs) as deviation from the mean ranging from -22 to 36 kg for IMY, from -336 to 529 kg for 305-dMY, from -8 to 66 d for LP and from -0.69 to 1.56 d for CI, respectively in Friesian cows in Egypt, ranged from -201.39 to 179.71 kg for IMY, from -863.21 to 842.75 kg for 305-dMY, from -1.31 to 1.31 d for LP and from -8.28 to 12.73 d for CI in Friesian cows in Germany (Table 2). The present results show large genetic differences between sires for different traits studied, which indicate the high potential for rapid genetic improvement in milk yield through sire selection.

Table 2
Range for sire transmitting ability for initial milk yield (IMY), 305-day milk yield (305-dMY), lactation period (LP) and calving interval (CI) of Friesian cows in Egypt and Germany (Zuchtwert für Frühmilchleistung (IMY), 305-Tage-Milchleistung (305-dMY), Laktationsdauer (LP) und Zwischenkalbezeit (CI) Schwarzbunter Rinder in Ägypten und Deutschland)

Traits	Egypt Range		Germany Range	
	Minimum	Maximum	Minimum	Maximum
IMY, d	-22	+36	-201.39	179.71
305-dMY, d	-336	+529	-863.21	842.75
LP, d	-8	+66	-1.31	1.31
CI, d	-0.69	+1.56	-8.28	12.73

Similarly, EL-CHAFIE (1981) working on Friesian x native cows in Egypt, found that the range of breeding values of 17 sires for 100-dMY, 305-dMY and LP were large and ranged from -56 to 86 kg for 100-dMY, from -802 to 344 kg for 305-dMY and from -37 to 47 d for LP. In addition, ABDEL GLIL (1991) analysed 1653 lactation records for daughters of 163 sires (each with 5 or more daughters), found that predicted sire value (BLUP) ranged from -466 to 68 kg for 305-dMY, and from -48.8 to 43.3 d for LP. However, BLUP estimates of Friesian sires as deviations from herd mean show that there was a difference of 58 kg, 865 kg, 933 kg, 74 d and 2.25 d in IMY, 305-dMY, LP and CI, respectively between the top and bottom sires in Friesian cows in Egypt and 381.1 kg, 1705.96 kg, 2.62 d and 21.01 d in IMY, 305-dMY, LP and CI, respectively between the top and bottom sires in Friesian cows in Germany.

Accordingly, it is safe to conclude that there is a high genetic potential for rapid genetic progress in traits studied through selection.

In Egyptian data, the present results indicate that the genetic differences between sires for the calving interval traits were small as compared with other traits studied. So there could possibly be an improvement in CI by better environmental factors and managerial system than selection, while in German data, the present results indicate that the genetic differences between sires for the lactation period trait were small compared to other traits studied. It is according to the limitation of LP to 305-days. Therefore an improvement of CI by better environmental factors and managerial system than selection could be possible. KAFIDI et al., (1992) on Friesian cows, came to the same conclusion.

AGYEMANG et al., (1985) who estimated sire transmitting ability by using BLUP values, found that the predicted BLUP values ranged from -29 to 136 kg for first 90-dMY and from -71 to 561 kg for total milk yield. In addition, ABUBAKAR et al., (1986) analysed 15512 lactation records of daughters of 138 Jamaica Hope sires (each with 10 or more daughters) and reported that predicted sire values BLUP in 305-dMY ranged between -400 and 400 kg. Also, ZARNECKI et al., (1991) working on Friesian cattle, found that the expected breeding values for 305-dMY ranged from -481 to 521 kg.

On the other hand, GACULA et al., (1968) and MAHADEVAN et al., (1971) found that the expected sire breeding values did not have large genetic differences among sires. SCHAEFFER et al., (1973) with 1140 Holstein Friesian sires in USA, reported that the average change in breeding values of 63 sires for 305-dMY in lactation was small (about 49 kg).

In Egyptian data, the BLUP estimates of IMY, 305-dMY, LP and CI, indicate that the sires had negative BLUP values being 31.11%, 42.22%, 48.89% and 48.89% for IMY, 305-dMY, LP and CI, respectively, and about 45.69%, 44.83%, 36.21% and 51.72% of sires had negative BLUP values for IMY, 305-dMY, LP and CI, respectively in Friesian cows in Germany. EL-CHAFIE (1981) found that the percentage of sires having negative estimates of sire transmitting ability of 300dMY was 28%. Also, KHATTAB and MOURAD (1992) working on Egyptian buffaloes, found that the percentage of sires having negative estimates of ETAs for 90dMY and TMY were 44 and 53%, respectively. In addition, ABDEL GLIL (1997) with Friesian cows, found that the percentage of sires having negative estimates of sire transmitting ability of 305-dMY and LP were 45.3% and 48.4%, respectively.

Table 3 presents Egyptian proofs for IMY, 305-dMY, LP and CI of ten sires with the largest number of daughters in all data. Only 3 of those sires had a negative proof. The single most frequently used sire (51) with a total of 27 daughters in the data had positive (33 kg, 418 kg, 0.72 d and 0.60 d) proof for IMY, 305-dMY, LP and CI. The present BLUP estimates revealed that, in most cases, sires which had given positive values for IMY, 305-dMY, and LP gave negative values in CI. In addition, the percentage of sires with values 200 kg and 300 kg more than average of herd in 305-day milk yield were 26.67 and 15.16%, respectively. Selecting those sires for breeding purposes may lead to rapid genetic improvement for milk yield, lactation period and

Table 3
Ten most frequently used sires and their proofs for initial milk yield (IMY), 305-day milk yield (305-dMY), total milk yield (TMY), lactation period (LP) and calving interval (CI) in Friesian cows in Egypt (Zuchtwert 10 meist eingesetzter Zuchtbullen für Frühmilchleistung (IMY), 305 Tage-Milchleistung (305-dMY), Laktationsdauer (LP) und Zwischenkalbezeit (CI) Schwarzbunter Rinder in Ägypten)

Code sire	N*	Proof			
		IMY, kg	305-dMY, kg	LP, d	CI, d
51	27	33	418	0.72	-0.60
54	53	-12	-254	-4	-0.03
63	10	22	529	0.89	-0.59
86	10	6	354	-0.74	0.76
99	10	28	317	4	0.62
141	16	6	332	-0.37	-0.68
143	19	15	-73	-1.03	0.01
201	10	10	189	2	-0.65
204	11	-16	6	-6	-0.68
281	10	13	313	1.04	1.56

* Number of half-sibs daughters

Table 4
Thirty most frequently used sires and their proofs for initial milk yield (IMY), 305-day milk yield (305-dMY), lactation period (LP) and calving interval (CI) in German Friesian cows (Zuchtwerte 30 meist eingesetzter Bullen für Frühmilchleistung (IMY), 305 Tage-Milchleistung (305-dMY), Laktationsdauer (LP) und Zwischenkalbezeit (CI) Schwarzbunter Rinder in Deutschland)

Code sire	N*	Proof			
		IMY, kg	305-dMY, kg	LP, d	CI, d
240700	73	-102.58	-482.23	-1.20	-4.12
242200	244	-31.00	-149.11	-0.10	-2.16
244025	372	-31.12	-156.47	0.51	1.97
246346	135	98.04	178.45	-0.95	-5.79
246915	69	26.81	114.80	0.05	4.89
247960	406	177.09	743.19	0.46	9.58
502043	114	104.58	485.02	1.12	0.94
502130	71	90.91	386.82	0.52	-0.77
502150	152	42.51	211.42	0.50	3.75
502176	153	-64.05	-311.40	-1.23	-1.03
502187	93	35.26	171.57	0.26	-0.19
502232	139	-17.75	-83.71	-0.53	-3.05
502304	168	81.49	400.64	0.49	3.15
502313	209	53.95	262.86	0.57	6.19
502615	71	70.96	306.54	0.66	1.44
502642	235	100.26	425.51	-0.88	-1.48
502690	348	135.44	571.55	0.30	2.90
502729	165	114.99	484.07	0.52	5.35
502744	110	68.92	342.51	0.02	4.82
502848	85	93.52	422.28	0.15	-6.35
502903	87	140.20	610.36	0.53	3.94
503020	404	51.29	247.44	1.10	8.64
503141	124	51.18	249.72	0.94	3.97
503225	566	-108.04	-540.73	-0.72	-10.10
503283	137	179.71	842.75	1.10	12.73
503302	156	121.91	606.72	0.72	2.49
503313	173	61.38	292.55	1.31	-1.89
503327	81	117.32	555.57	0.11	6.60
503358	93	129.47	572.77	0.47	0.48
503398	81	12.77	470.86	0.57	4.29

* Number of half-sibs daughters

decrease the calving interval in the next generation and will tend to increase milk yield in the range from 189 to 529 kg.

Table 4 presents German proofs for IMY, 305-dMY, LP and CI of thirty sires with the largest number of daughters in all data. Only 5 of those sires had a negative proof. The single most frequently used sire (247960) with a total of 406 daughters in the data had a positive (177.09 kg, 743.19 kg, 0.46 d and 9.58 d) proof for IMY, 305-dMY, LP and CI. The BLUP estimates revealed that the percentage of sires with values 200 kg, 300 kg, and 400 kg more than the average of herd in 305-dMY were 22.41%, 14.65% and 11.21%, respectively and selecting those sires for breeding purposes may lead to rapid genetic improvement for milk yield in the next generation and will tend to increase milk yield in the range from 306 to 842 kg.

KHATTAB and SULTAN (1991) in a study based on 1317 normal lactation records of Friesian cows, constructed four selection indices, indicated that the index which includes 305-dMY, LP and AFC was best (R = 0.69) and the expected genetic gain in 305-dMY increased by 163 kg/generation and LP increased by 25 d/generation. In addition, MANGUKAR et al., (1986) working on Holstein cattle, found that ranking of Holstein bulls on the basis of selection index incorporating lactation milk yield increased the precision of sire proof.

Genetic and phenotypic trends

Estimates of genetic and phenotypic trends for different traits studied for Friesian cows in Egypt and Germany are presented in Table 5 and 6. Annual genetic change for IMY, 305-dMY, LP and CI were 29.98 ± 11.21 kg, 112.99 ± 77.57 kg, 129.08 ± 60.02 kg, -0.92 ± 1.75 d and 1.78 ± 0.64 d, respectively in Friesian cows in Egypt and were 70.41 ± 11.40 kg for IMY, 200.38 ± 69.16 kg for 305-dMY, 0.12 ± 0.16 d for LP and -1.05 ± 0.90 d for CI in Friesian cows in Germany, all of them were significant (P<0.01 Table 5 and 6). The present results in Table 5 indicate that sires used in the following 2 years (1991 and 1992) were of superior genetic value than those used in the earlier years. It can be inferred that the sires used in later years (1991 and 1992) were proven to be superior sires.

Table 5
Mean evaluations (PTA) of Friesian bulls for initial milk yield (IMY), 305-day milk yield (305-dMY), lactation period (LP) and calving interval (CI) with year calving and mean annual genetic and phenotypic progress (b) in Friesian cows in Egypt (Genetische und phänotypische Trends für Frühmilchleistung (IMY), 305 Tage-Milchleistung (305-dMY), Laktationsdauer (LP) und Zwischenkalbezeit (CI) Schwarzbunter Rinder in Ägypten in Abhängigkeit vom Jahr)

Years	Traits							
	IMY(kg)		305-dMY(kg)		LP(d)		CI(d)	
	PTA	P	PTA	P	PTA	P	PTA	P
1987	27.09	693	237.91	3734	18.89	329	-1.03	480
1988	-0.91	708	190.00	4255	38.01	330	-0.87	467
1989	17.00	750	-24.09	4405	-8.70	292	-0.64	402
1990	25.30	860	111.13	4988	-9.91	295	0.77	408
1991	135.59	875	690.13	5193	15.77	296	6.97	403
1992	163.35	1029	775.12	5246	18.12	295	7.31	388
b	29.98	13.83	112.99	48.00	-0.92	-1.66	1.78	-1.82
	±11.21	±1.50	±77.57	±7.05	±1.75	±0.39	±0.64	±0.48

b = annual genetic and phenotypic progress; PTA = Estimates of predicted transmitting ability.
P = Estimate of phenotypic values

Arch. Tierz. 43 (2000) 4

Also, Table 6 indicates that sires used in the later years were of superior genetic value than those used in the earlier years. Also, the present results show that sires used in the later years had, in most years, positive annual genetic gain in each of IMY, 305-dMY and LP, were shorter in calving interval, indicating, the use of those sires in purposes breeding will improve milk yield and lactation period and decrease calving interval, leading to a large calvers, big lactations and then, a large economic benefit from animals.

Table 6
Mean evaluations (PTA) of Friesian bulls for initial milk yield (IMY), 305-day-milk yield (305-dMY), lactation period (LP) and calving interval (CI) with the most daughters of a bull and year calving and mean annual genetic and phenotypic progress (b) in different traits in Friesian cows in Germany (Genetische und phänotypische Trends für Frühmilchleistung (IMY), 305 Tage-Milchleistung (305-dMY), Laktationsdauer (LP) und Zwischenkalbezeit (CI) Schwarzbunter Rinder in Deutschland in Abhängigkeit vom Jahr)

Years	Traits							
	IMY(kg)		305-dMY(kg)		LP(d)		CI(d)	
	PTA	P	PTA	P	PTA	P	PTA	P
1979	-358.63	1259	1856.90	5450	-0.16	303	13.18	395
1980	-194.68	1281	-925.14	5460	-0.48	302	8.51	387
1981	-179.31	1252	-861.68	5418	0.86	302	-1.27	387
1982	-192.86	1315	-841.14	5732	3.67	303	-26.63	396
1983	-102.68	1293	-131.36	5621	8.16	301	-20.73	385
1984	104.47	1294	356.87	5630	1.73	301	-19.72	388
1985	7.11	1359	-21.79	5952	2.22	301	-5.32	390
1986	-81.72	1376	-659.87	6039	3.62	302	-11.67	395
1987	-91.67	1368	-194.07	5996	5.04	302	20.25	395
1988	55.33	1395	256.56	6132	4.17	301	7.92	395
1989	268.92	1446	1084.06	6386	2.86	302	-1.19	394
1990	814.45	1463	3444.20	6473	1.56	302	7.31	396
1991	655.19	1497	2647.13	6645	1.92	302	-8.03	403
1992	655.32	1508	2662.96	6698	0.44	302	-25.05	404
1993	444.38	1542	1555.39	6865	4.29	302	-30.47	392
b	70.41	21.00	200.38	104.00	0.12	0.17	-1.05	0.78
	±11.40	±0.51	±69.16	±2.56	±0.16	±0.02	±0.90	±0.14

b = annual genetic and phenotypic progress; PTA = Estimates of predicted transmitting ability
P = Estimate of phenotypic values

NORMAN et al., (1991) working on Holstein, Jersey, Guernsey, Brown Swiss and Ayrshire cows, found that annual genetic trend in the breeding value for milk yield was 106, 79, 75, 85 and 44 kg for Holstein, Jersey, Guernsey, Brown Swiss and Ayrshire, respectively. POWELL (1990) indicated that genetic trend in breeding value for milk yield for Holstein by using the animal model evaluation was approximately 120 kg/year. Also, NIZAMANI and BERGER (1996) analysed 508828 American Jersey lactation records for 7942 sires from (1960 to 1990), and reported that the annual genetic response for milk yield was 232.00 kg/year. SHARABY and ELKIMARY (1982) on Friesian cows, estimated the genetic trend by using BLUP method and found that genetic change for LP was -0.30 d/year.

On the other hand, negative genetic trends have been reported for milk yield by SHARABY and ELKIMARY (1982) on Friesian cattle in Egypt. Also, REGE (1991) working on Friesian cows in Kenya from 1978 to 1988, found that the genetic trends per year for 305-dMY and first lactation milk yield were negative and not significant, being -2.5 and -5.2 kg, respectively. In addition, POWELL et al., (1977) with Friesian cows, found strong negative genetic trends in two regions in the United States from 1961 to 1970 with average sire breeding values for milk (kg) dropping from 100 to -220 kg from 1961 to 1964 in the West region and from 25 to -150 kg during the same period of the time in the Midwest region.

The annual phenotypic change for IMY, 305-dMY, LP and CI was 13.63 ± 1.50 kg, 48.00 ± 7.05 kg, 56.83 ± 5.64 kg, -1.66 ± 0.39 d and -1.82 ± 0.48 d, respectively for Friesian cows in Egypt (Table 5). These estimates were significantly varied ($P<0.05$ or $P<0.01$) except for LP and CI (Table 5). The observed negative phenotypic trends in the lactation period and calving interval are unexpected because the same data indicates positive phenotypic correlation between these two traits (LP and CI) and each of IMY and 305-dMY (Table 5). In Germany, The annual phenotypic change was 21.00 ± 0.51 kg for IMY, 104.00 ± 2.56 kg for 305-dMY, 0.17 ± 0.02 d for LP and 0.78 ± 0.14 d for CI. All those estimates were significant ($P<0.01$ Table 6). The present results in (Table 5 and 6) indicate that the differences in performance between years were mainly due to different nutritional, climatic and management practices prevalent over different times.

ABDEL GLIL (1985) working on Friesian cows in Egypt, found a positive annual phenotypic change for 305-dMY, being 33.29 ± 13.50 kg. In addition, WELLER et al., (1984) working on Israeli Holstein Friesian cows, reported that the phenotypic trend for a 305-day milk yield was 173 kg/year. On the other hand, a negative annual phenotypic change for milk yield has been reported by CANON and MUNOZ (1991) working on Spanish Holstein in Kenya, being -78 ± 8 kg and REGE (1991), being -5.5 kg, with Friesian cows in Kenya.

Data for Friesian cattle evaluated in this study suggest improving fodder supply in Egypt by 1) cultivation green fodder in the new land reclamation, 2) urea/ ammonia treated of poor quality roughages (agricultural by products) and 3) cultivation of more green forage (sorghum and darawa) in the summer season. The above measures together with selection programme could improve the producing ability of animals.

It could also be concluded from the present study that producing ability in German Friesian cows was higher than Friesian cows in Egypt. Estimates of predicted transmitting ability (PTA) for IMY, 305-dMY and LP were larger for German Friesian cows than Friesian cows in Egypt, while PTA for CI in Egypt was longer than in Germany, annual genetic progress was higher in German Friesian cows as compared to Friesian cows in Egypt. A great improvement in LP and CI could be possible by improving feeding and management systems in Egypt and Germany.

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