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DAIRY PERFORMANCE OF SOME EXOTIC BREEDS AT TAHREER PROVINCE

BY

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INTRODUCTION

Raising improved exotic breeds is the quickest strategic option suggested for genetic improvement of cattle productivity in developing countries (Cunningham, 1981). Friesian is recommended if the market demand is for liquid milk and beef (Mason and Buvanendran, 1982).

Performance of exotic temperate breeds in subtropics deteriorated under the stress of adverse environment and possible depression of inbreeding (AOAD, 1983). Injecting locally born Friesian, of European origin, with Holstein germ plasm is thought to improve its productivity.

Egypt started importation of Friesian in the 1930's (Ragab et al., 1973). Thenafter, substantial numbers of Dutch and Danish Friesian were imported into Tahreer province, west of the Nile Delta, during the period 1954-1961.

The Pinzgauer was introduced into Egypt in 1980 considering its good reputation in high fertility, easy calving, rapid growth and satisfactory milk production (Briggs and Briggs, 1969). The objective of the present study is to evaluate the performance of purebred locally born Friesian, Holstein-sired Friesians and their mates of imported Pinzgauers raised under the prevailing conditions at Tahreer province.

MATERIALS AND METHODS

In 1976, semen from twenty American Holstein Friesian bulls were used to inseminate part of the locally born Friesian herd maintained at the state farm of Sala Eldin at Tahreer province, Egypt. The Holstein semen was kindly donated by USDA. The other part of the herd was inseminated, as was usually practiced, with semen from six Friesian bulls in the farm. In 1980, 152 in-calf Pinzgauer heifers were imported from Austria and maintained at the same farm.

Animals were fed on concentrate mixture, rice straw and green fodder. Cows were artificially inseminated when seen in estrus starting 45 days after calving. They were hand milked and were dried off according to their productivity of milk and expected date of calving. New born animals were raised on whole milk, calf starter and clover hay till they were weaned when their body weight reach 120 kg.

Data were collected on the reproduction and milk production traits of the three genotypes; the pure home produced Friesian, referred to as "Egytpian Friesian, EF", the Holstein-sired Friesian (HF) and the Pinzgauer (PG). Traits studied were age at 1st, 2nd and 3rd calving; total milk yield (TMY) and lactation period (LP) in the first three lactations. Milk produced per day of cow age (M/D) was calculated by dividing total amount of milk produced by the cow up to the end of the 1st, 2nd and 3rd lactation by the respective cow age (in days) at these dates.

Analysis of variance were carried out using least squares technique (Harvey, 1960) and differences between individual means were tested (Duncan, 1955). The statistical model used to analyze age at first calving included the main effects of genotype and season of birth. The latter effect was replaced by season of preceding calving for analyzing age at 2nd and 3rd calving. In analysis of TMY, LP and M/D, the statistical model used included the main effects of genotype and season of calving. Whenever considered, season was classified into; winter (Dec. Feb.), Spring (March-May), Summer (June-August) and Autumn (Sept. Nov.).

RESULTS AND DISCUSSION

Table (1), shows least squares means of age at first calving (AFC) for the three genotypes studied. The use of Holstein sires on Friesian dams reduced AFC of their daughters (HF) by eleven months compared to their purebred Friesian mated (EF). In the following two calvings **(Table, 2)**, the HF kept almost similar difference ($P < 0.1$). The estimates obtained for AFC of Friesian cattle in Egypt showed wide variation (24.8 to 34.4 months; El-Itriby and Asker, 1958; El-Sheikh, 1960, Fehmy et al., 1963; Ragab et al., 1973; Mohamed et al., 1985 and Mostageer et al., 1987 a). Much of this variation was attributed by Mostageer et al. (1987 a) to strain, lactation and inclusion of data of imported pregnant heifers. It should be noted here that AFC of EF in the present study is much higher than all estimates found for the same breed in the Egytpian literature. Pinzgauer (PG) scored the youngest AFC since they were imported as pregnant heifers.

Table, 3 presents total milk yield (TMY) and lactation period (LP) of the first three lactations.First

Table 1. Age at first calving (month).

Classification	N	X	SE
Genotype :			
HF	26	34.0 a	1.42
EF	82	45.2 b	0.77
PG	152	33.2 a	0.67
Source of variation :	d.f.	Mean squares	
Genotype	2	3406**	
Season of birth	3	223**	
Residual	254	46	

** $P < .01$
Means followed by different letters differ significantly ($P < .05$).

Table 2. Age at second and third calving (month).

Classification	Age at second calving N	X	SE	Age at third calving N	X	SE
Genotype :						
HF	26	51.1 a	1.5	24	68.6 a	1.6
EF	60	61.0 b	1.0	54	76.4 b	1.1
PG	114	52.3 a	0.7	85	66.6 a	0.9
Source of variation :	d.f.	Mean squares		d.f.	Mean squares	
Genotype	2	1650**		2	1581	
Season of birth	3	123^NS		3	179^NS	
Residual	194	57		157	62	

Means followed by different letters differ significantly ($P < .05$).

NS Not significant

** $P < .01$

lactation record of one animal from both HF and EF was lost. The HF excelled the other two genotypes while PG produced the lowest TMY. The superiority in TMY of HF over EF averaged 17,25 and 18% in the 1st, 2nd and 3rd lactations, respectively.

Part of HF superiority in TMY is due to the statistically longer LP of this genotype in the 1st and 2nd lactations. However, daily milk yield is still higher for HF. Daily milk yield can be calculated from table 3 as 8.2, 7.5 and 6.3 KG in the 1st; 9.4, 8.3 and 9.6 KG in the 2nd and 9.3, 8.3 and 7.0 KG in the 3rd lactation for HF, EF and PG, respectively. American Holstein is known for its straight dairy breeding and its higher production of milk than that produced by the European Friesian (politiek et al, 1982; Jasiorowski et al., 1988 and Djemali, 1989). Also Egyptian Frisian in the studied herd was not subjected to any selection practice except otherwise natural selection. The relative low milk production of the PG is expected regarding the breeding objectives of this dual purpose breed.

Mostageer et al. (1987 b) indicated that the stressful environment may reject earlier the high yielding animals of dairy breeds (using data on Friesian and Jersey in Libya). This was not the case for the dual purpose Pinzgauers (in Egypt) since their production of milk was rather low. However, it seems from the present data that poor reproductive performances is a main reason for early culling of imported dairy cows under the prevailing subtropcial conditions. Number of days open declined gradually with increasing order of lactation for all genotypes. The estimates of days open after the 1st and 3rd calvings were 272 and 190 d for HF, 245 and 237 d for EF, and 316 d for PG, respectively. These findings let us expect more pronounced superiority for HF over EF and PG at improved standards of management.

Table, 4 shows milk produced per day of cow age (M/D). Holstein-sired cows surpassed statistically ($P< .01$) both EF and PG in all comparisons. Up to the end of the third lactation, HF produced 1.13 kg more milk/ day than that produced by EF (34%). Corresponding increase of HF over PG was 1.41 kg (47%).

Major parts of the HF superiority over EF in AFC , TMY and M/D is of genetic nature, since both genotypes were kept at one farm under the same mangement conditions. Two possible reasons could be suggested for the superiority of HF over EF;

1. The difference in the genetic potentiality between the American Holstein bulles used in producing HF cows and the locally-produced unproven bulls used to sire EF mates .
2. The heterotic effect on performance of HF.

Breeding of the foundation closed herd of Friesian dams used to produce EF and HF depended for long period on semen from farm produced bulls. This practice might have caused some inbreeding depression. Inbreeding was early reported to slow growth and consequently delay sexual maturing (Dickerson, 1940; Backer et al., 1945 and Ralston et al., 1948). Inbreeding, also, lowers fertility (Johnson, 1961) and milk production (Tyler et al., 1949, and Von Krosigk and Lush, 1958). On the other hand, Johanson (1961) concluded that characters which show the most inbreeding degeneration also show the most pronounced heterosis in crosses between inbred lines, strains or breeds. This conclusion is supported by results if Jasiorowski et al. (1988) in their trial to use ten strains of Friesian to improve performance of Polish Friesian.

Results of the present investigation refer to the significance of improved germ plasm in maintaining genetic potentiality of exotic dairy breeds introduced into Egypt.

Table 3. Total milk yield (TMY, kg) and lactation period (LP, day) in the first three lactations.

Classification	First lactation N	First lactation TMY	First lactation LP	Second lactation N	Second lactation TMY	Second lactation LP	Third lactation N	Third lactation TMY	Third lactation LP
Genotype :									
HP	25	3063 a ±136	374 a ±13	26	3891 a ±158	414 a ±15	14	3439 a ±242	371 ±25
EP	61	2621 b ±88	350 a ±8	62	3106 b ±101	374 b ±10	48	2906 ab ±131	349 ±13
PG	123	1914 c ±99	303 b ±9	104	2542 c ±78	369 b ±7	64	2720 b ±114	386 ±12
Source of variation :	d.f.	Mean squares		d.f.	Mean squares		d.f.	Mean squares	
Genotype	2	10696$^{\prime **}$	42904**	2	20512$^{\prime **}$	21051**	2	2895$^{\prime *}$	17861^{NS}
Season of calving	3	719829^{NS}	1837^{NS}	3	329505^{NS}	7630^{NS}	3	70806^{NS}	6135^{NS}
Residual	203	433408	3886	186	623987	5656	120	801122	8251

Means followed by different letters differ significantly ($P < .05$).

NS Not significant

* $P < .05$

** $P < .01$

$'$ = to be multiplied by 10^3

Table 4. Milk (kg) per day of cow age at the end of each lactation.

Classification	At end of 1st lactation N	X	SE	At end of 2nd lactation N	X	SE	At end of 3rd lactation N	X	SE
Genotype :									
HP	25	2.22 a	0.09	25	3.69 a	0.12	14	4.42 a	0.18
EP	59	1.61 b	0.06	51	2.68 b	0.09	38	3.29 b	0.11
PG	123	1.44 b	0.06	103	2.26 c	0.09	61	3.01 b	0.13
Source of variation :	d.f.	Mean squares		d.f.	Mean squares		d.f.	Mean squares	
Genotype	2	4.76**		2	12.80**		2	8.30**	
Season of calving	3	0.18^{NS}		3	0.18		3	0.34	
Residual	201	0.17		173	0.35		107	0.42	

Means followed by different letters differ significantly ($P < .05$).

NS Not significant

** $P < .01$

SUMMARY

Frozen semen from 20 American Holstein bulls were used to inseminate part of a Friesian herd maintained in Tahreer province, Egypt. Performance of Holstein-sired Freisians (HF) was compared with their purebred home produced Friesians (Egyptian Friesian, EF) and Pinzgauer mates imported from Austria as pregnant heifers (PG). Least squares technique (Harvey, 1960) was applied for analysis of variance of traits investigated.

HF excelled EF in all comparisons, having younger age at first calving (34 vs. 45.2 mo.); second calving (51.1 vs. 61.2 mo.) and third calving (68.6 vs. 76.4 mo.) PG's scored 33.2, 52.3 adn 66.6 months for age at the first three calvings, successively.

HF, also yielded the highest total milk yield (TMY) in the first three lactations. Means of TMY were 3063, 2621 and 1914 kg in 1st; 3891, 3106 and 2542 in 2nd and 3439, 2906 and 2720 kg in the 3rd lactation of HF, EF and PG, respectively.

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