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Comparative Performance Between Imported and Local Born Holstein Friesian Cows Maintained at a Commercial Farm in Egypt

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Abstract: Least squares analysis of variance showed significant on month of calving, year of calving and parity on all traits studied ($p<0.05$ or $p<0.01$) except for the effect of year of calving on lactation period. The effect of group was significant on DP and DO ($p<0.05$ or $p<0.01$). The effect of sire was significant on 305 day milk yield and heritability estimates was 0.203 ± 0.064. The present results show that local born are produced less milk and smaller LP, DP, DO and CI than their imported dams. Then it is adapt Holstein Friesian in Tropical countries. Improving the management in the farm may result in better performance especially in reproductive traits.

Key words: Productive traits, reproductive traits, lactation milk yield

Introduction

Recently, in Egypt different private farms of dairy cattle were established for commercial production through the introduction of Friesian, Holstein Friesian and Brown Swiss with the aim of increasing milk production (Gad, 1995). Also, a little research effort has been spent to determine the productive and reproductive potentialities of these imported breeds of dairy cattle and their purebred descendants under the local Egyptian condition in private (commercial) farms (Salem, 1991; Gad, 1995).

Sadek (1994) used two herds of Friesian cattle in the united Arab Emirate, imported Friesian (IF) and local born female (LBF). He found that the IF cows calved for the first time at a younger age compared to the IBF cows. Also, IF produced greater milk yield in the first lactation than LBF.

In Turkey, Sekerden and Ozkutuk (1990) concluded that the Jersey breed can not be easily adept to Gelemen State Farm conditions. The farm probably kept repeat breeders in order to increase the number of the animals. Improving the management in the farm may result in better performance.

The present study was conducted to compare some productive and reproductive traits of imported Holstein Friesian with their locally born herd mates in one of the commercial farm in Egypt.

Material and Methods

Records of Holstein Friesian cattle kept at Dalla farm in Egypt were used. The total numbers of useable of records were 3354 produced by 1574 cows from 1987 to 1993. 546 of these cows were imported as pregnant Heifers in 2 difference years (1987 to 1988), the other 928 cows are the offspring of these born between 1989 and 1993. Productive traits studied are 305 day milk yield (305 dMY), lactation period (LP) and dry period (DP). Reproductive traits studied are days open (DO) and calving interval (CI). The number of sires and average of daughters per sire were 486 and 6.77 respectively. Genetic analysis included the sires, which had more than 5 daughters and cows with more than two records. Artificial insemination (AI) was used at random.

Animals grazed mainly on Alfalfa with concentrate ration and limited amount of rice straw. Cows producing more than 15 kg a day and those in the last two months of pregnancy were supplemented with extra concentrated rations.

Heifers were attempted for service for the first time when they reached 24 months or 350 kg. Cows usually were served when seen in oestrus two months after calving. Rectal palpation for pregnancy diagnosis was performed 60 days after the last service. Cows in lactations were machine milked twice daily. Two months before the expected next calving date, the cow, if already not dry was dried off.

Data were analyzed using Harvey (1987)'s mixed model computer program. The following mixed model was used.

$$Y = \mu + g_i + s_{ij} + d_{ijk} + m_l + y_m + p_n + e_{ijklmno}$$

Where Y is a 305 dMY, LP, DP, DO or CI; μ is the overall mean; g_i is the fixed effect of the group, s_{ij} is the random effect of sire within group; d_{ijk} is the random effect of cow within group within sire; m_l is the fixed effect of month of calving; y_m is the fixed effect of year of calving; p_n is the fixed effect of parity and $e_{ijklnmo}$ is the random error specific to the particular observation.

Results and Discussion

Least squares means of different traits are presented in Table 1. The mean of 305 dMY is 5068 ± 176 kg produced in a lactation period of 303 ± 7 day a period recommended as the ideal period for cattle in Egypt [El-Sedafy, 1989 (309 d); Khalil *et al*., 1994 (290 d); Atil and Khattab, 1999b (281 d)]. The present mean of 305 dMY is higher than those reported by Khattab and Ashmway (1988), Khalil *et al*. (1994) and Atil and Khattab (1999b) working on Friesian cattle in Egypt, being 2950, 2254 and 2252 kg, respectively. While, the present mean of 305 dMY is lower than those reported by Baffour-Awuah *et al*. (1996) (6078 kg) on Holstein Friesian in England, Kaya (1996) (5444 kg) on Holstein Friesian in Turkey and Tawfik *et al*. (2000) on Holstein Friesian in Germany.

The mean of dry period of 140 ± 6 day is lower than those of Friesian cattle raised of the Egyptian studies [Ashmawy, 1975 (114 d); Badran, 1978 (117 d); Khalil *et al*., 1994 (83 d)]. Gill and Allaire (1976) found the maximum profit per day of herd life was expected for cows with 42 days dry.

Least squares means of DO and CI are 195 ± 9 day and 469 ± 8 day, respectively. The present means are shorter than those reported by Ashmawy (1975), El-Sedafy (1989) and Salem (1991) working on Friesian cattle in Egypt, being 161, 147 and 100 days for DO and 441, 424 and 381 days for CI, respectively.

The differences between the present means of productive and reproductive traits and those reported by other workers for

Table 1: Least squares constant of factors affecting 305 day milk yield, lactation period, dry period, days open and calving interval

Classification	N	305 dMY	LP	DP	DO	CI
Overall mean Group	3354	5068 ± 176	303 ± 7	140 ± 6	195 ± 9	469 ± 8
Imported	827	289 ± 312	-0.43 ± 14	37 ± 13	36 ± 18	7 ± 17
Local	2527	-289 ± 413	0.43 ± 16	-37 ± 14	-36 ± 21	-7 ± 20
Month						
1	262	358 ± 101	17 ± 5	12 ± 6	39 ± 7	28 ± 6
2	211	410 ± 05	13 ± 5	13 ± 6	44 ± 7	3 ± 6
3	222	280 ± 102	22 ± 5	26 ± 6	48 ± 7	46 ± 6
4	174	117 ± 108	20 ± 5	23 ± 6	41 ± 7	43 ± 7
5	185	115 ± 106	21 ± 5	12 ± 6	30 ± 7	28 ± 6
6	238	-72 ± 100	18 ± 5	4 ± 6	23 ± 7	23 ± 6
7	378	-202 ± 77	-4 ± 4	0.3 ± 4	-2 ± 5	2 ± 5
8	452	-312 ± 73	-8 ± 4	4 ± 4	-8 ± 5	-6 ± 4
9	430	-222 ± 75	-14 ± 4	-13 ± 4	-30 ± 5	-31 ± 4
10	273	-264 ± 85	-23 ± 4	-17 ± 5	-50 ± 6	-41 ± 5
11	259	-160 ± 85	-30 ± 4	-31 ± 5	-68 ± 6	-60 ± 5
12	270	-54 ± 90	-32 ± 4	-33 ± 5	-68 ± 6	-65 ± 5
Year						
87	266	-529 ± 579	947 ± 31	45 ± 4	-54 ± 41	175 ± 38
88	555	266 ± 58	93 ± 28	25 ± 30	-67 ± 37	190 ± 33
89	741	1062 ± 224	25 ± 12	49 ± 13	-61 ± 16	82 ± 14
90	908	262 ± 197	-16 ± 10	23 ± 11	-61 ± 14	-3 ± 12
91	471	94 ± 231	-65 ± 12	-23 ± 13	55 ± 16	-97 ± 15
92	251	-250 ± 291	-100 ± 19	-53 ± 17	66 ± 26	-169 ± 19
93	162	-905 ± 364	-84 ± 19	-66 ± 21	67 ± 20	-177 ± 23
Parity						
1	984	-905 ± 364	-111 ± 15	-60 ± 1 17	-70 ± 20	-144 ± 19
2	924	-644 ± 290	-59 ± 9	-53 ± 10	-54 ± 12	-138 ± 11
3	631	45 ± 134	-24 ± 3	-33 ± 4	-62 ± 5	-55 ± 4
4	526	227 ± 73	28 ± 10	30 ± 5	62 ± 6	61 ± 6
5	234	266 ± 99	63 ± 16	53 ± 11	60 ± 13	92 ± 12
6	55	38 ± 188	102 ± 15	63 ± 17	60 ± 20	182 ± 19

Table 2: Least squares analysis of variance for factors affecting productive and reproductive traits in Holstein Friesian cattle

S.O.V	D.F.	F – Values				
		305 dMY	LP	DP	DO	CI
Groups	1	0.84	0.001	7.99**	4.76**	0.19
Group : sire	485	1.25**	0.83	0.91	0.69	0.80
Cow : group/sire	1087	2.01**	1.92**	1.31**	1.88**	1.94**
Month	11	3.33*	7.96**	6.62**	20.79**	20.52**
Year	6	30.91**	16.16**	8.75**	31.55**	29.88**
Parity	5	15.33**	12.67**	14.95**	39.60**	39.51**
Reminder	1758					
Reminder M.S.		945967	2823	3395	4867	4081

Friesian cattle in Egypt, could be possibly attributed to: (1) the herds were treated under different climatic and managerial conditions, (2) some animals were imported and some were locally produced, (3) different herds could possibly be genetically and phenotypically different from each other and (4) different models of analysis were used.

Least squares analysis of variance of different traits studied is presented in Table 2. Effects of month of calving, year of calving and parity are significant on all traits ($p<0.05$ or $p<0.01$), while group is significant effect on dry period and days open ($p<.0.05$ or $p<0.01$)

The imported Holstein Friesian cows (G1) produced higher 305 dMY than their respective local born Holstein Friesian (G2) (5357 vs 4779 kg). Sekerden and Ozkutuk (1990) in Turkey, Sadek (1994) in United Arab Emirate (U.A.R.) and Gad (1995) in Egypt arrived at the same results.

Salem (1991) concluded that the differences among sources of cows could be attributed to genotype environment interaction. He also, found that imported Friesian cows produced more 90 dMY, 305 dMY with shorter LP, and DP than local born females cows.

Sadek (1994) working on two herds of Friesian cattle in U.A.R., imported Friesian (IF) and local born female (LBF), found that IF produced greater milk in the first three lactations, being 3080 kg, 4735 kg and 4570 kg, respectively for IF and 2940, 3820 and 4520 kg, respectively for LBF. Also, he found that IF was longer LP than LBF cows, physiological maturity of cows at calving is most likely a major factor for higher productive of IF cows.

Gad (1995) working on Holstein Friesian cows, found that imported cows reached higher initial milk yield, 305 day milk yield and total milk yield than locally born ones in the first and second lactations, while, the reverse was observed when dealing with the same traits across all lactations. He also, concluded that these results might be due to that the imported cows in the first and second lactations have not been greatly influenced yet by the adverse effects of local conditions.

The least squares means of DO and CI for imported Holstein

Friesian cows were 177 and 476 days, respectively, while for local born Holstein Friesian were 103 and 462 days, respectively. However, local born Holstein Friesian cows produced less 305 dMY than their imported dam, the findings of this study regarding most of reproductive traits indicate that local born Holstein Friesian performed better than imported Holstein Friesian cows under climatic conditions of Egypt. The production potential in the exotic herd can be increased by breeding the cows with semen of genetically superior sires, through intensive management and with more effective disease control programming.

Results (Table 1) show that animals calving in Winter and Spring months had highest 305 dMY and longer LP, DP, DO and CI. While, Summer and Autumn calves produced the lowest 305 dMY and shorter LP, DP, DO and CI. These findings are in close agreement with those of Ashmawy (1975), Badran (1978), Salem (1991) and Gad (1995). Results of the present study could be explained on the basis that cows calved in Winter and Spring will be in lactation during Summer and Autumn where green fodder will be available and weather become milder during most days of lactation period. The shortest LP, DP, DO and CI in animals calving during Winter and Spring may be due to silent heat, ovarian inactivity embryonic mortality, infertile service and short day light. El-Fouly *et al*. (1976) reported that preparing the animals to have the full chance for conception during the season of full ovarian activity (October-March) could reduce DO considerably. In addition, El-Menoufy *et al*. (1984) concluded that, seasonal variation in reproductive performance could be attributed to the physiological changes in reproductive efficiency of either males or female, also, photoperiodicity, heat stress, level of nutrition and exercise appear to the main factors responsible for seasonal variation in reproductive performance of Friesian cattle raised in Egypt.

On the other hand, Ali *et al*. (1999a, b) found no significant effect of season of calving on DO and the shorter CI was found after Winter calving while, longer CI was observed after Summer calving. Also, Sadek (1994) found that cows calving during the mild season (October - March) produced more total milk yield, annual milk yield and had greater number of days in milk. Cows calving during the mild season had significantly shorter CI than had their herd mates calving during hot season (421 vs 467d). Nigm *et al*. (1994) in U.A.R. and Ashmawy and Khattab (1991) reported that cows calving during hot season had markedly longer days open when compared with mild season calves.

Results given in Table 1 revealed a general trend indicating that there was a decrease in LP, DP, DO and CI with the advance of year of calving. This trend mainly represents the improvement in strategies of management and feeding system, which carried out in these commercial farms with advance of years rather than genetic changes. Similar results obtained by Khattab and Ashmawy (1988), El-Sedafy (1989), Sekerden and Ozkutuk (1990), Sadek (1994), Atil and Khattab (1999b) and Tawfik *et al*. (2000).

Tawfik *et al*. (2000) concluded that the effect of year of calving on 305 dMY, LP and CI could be due to differences in feeding system, management and the variation in humidity and temperature.

Least squares constants given in Table 1 lead to concluded that 305 dMY, LP, DP, DO and CI increased linearly as parity advanced up to the 6th parity. With advanced age the animals is mature, the body weight and size is fully developed accompanied by the increase in size and function of digestive and circulatory system, mammary glands and the other body systems. The amount of feed intake and feed utilization are generally increased and associated with increased efficiency of milk synthesis and secretion of the udder glandular tissues. Rege (1991) arrived at the same results on Friesian cows in Kenya, found that the highest 305 dMY was reached in the 5th lactation. The present results show that the first parity had the lowest means of DO and CI. Poor fertility (i.e., long DO and CI) appeared for later lactations (Table 1) was a reflection of lactation stress. Hillers *et al*. (1984) reported that older cows had longer DO than younger ones. Similarly Louca and Legates (1968) and Gad (1995) came to the same results. This trend is indicating an antagonistic relationship between production and reproduction performance. Since milk yield increased with advance of lactation number, high yield cows require excellent management, and part of this management lead to an effective reduction in the number of days open of these cows. Missed heat periods or nutritional problems may be responsible for such high fluctuation in DO and CI in different lactations. In contrast with the trend of the present study, Arata (1987) and El-Sedafy (1989) reported that length of DO and/or CI tends to decline as lactation number advanced until reaching it is minimum value at a definite lactation and increased thereafter. Also, Salem (1991) found that older cows within each parity had shorter DO and CI than younger ones. This trend indicate that reproductive efficiency of the cow improved slightly as the cow got older.

F ratios presented in Table 2 indicate that month of calving, year of calving and parity are considered the major factors affecting 305 dMY, LP, DP, DO and CI. This leads to conclude that adjusting of lactation records for these factors are very necessary for estimating genetic parameters and sire evaluation.

Sire was found to have significant effect on 305 dMY ($p<0.01$, Table 2). The present results is in agreement with those reported by Salem (1991), Khalil *et al*. (1994), Gad (1995), Atil and Khattab (1999a, b) and Tawfik *et al*. (2000). The effect of cow within sire was significant effect on all traits studies ($p<0.01$, Table 2). Variance among cows in different traits may be due to sizable differences in genetic potentiality of lactation cows along with some changes in the herd management (Camoens *et al*., 1976). Similarly, Salem (1991), Khalil *et al*. (1994), Gad (1995) and Atil and Khattab (1999a, b) came to the same results. The present results indicate that through sire and cow selection for 305 dMY a genetic improvement of 305 dMY is possible.

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