Egyptian J. Anim. Prod.(1994) 31(2):221-233.

THE PERFORMANCE OF IMPORTED AND LOCALLY BORN FRIESIAN COWS IN A HERD LOCATED IN THE UNITED ARAB EMIRATES

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SUMMARY

This investigation was conducted to compare performance of the imported Friesian (IF) cows with their locally born female (LBF) herd mates located at Ras Al-Khaima, U.A.E. The data included 662 productive and reporductive records collected during the period from 1987 to 1989. The traits studied were: age at first calving (AFC), total milk yield (TMY), days in milk (DIM), annualized milk yield (AMY) and calving interval (CI) during the first three lactations. Two statistical models were used: the first to analyze AFC and included the single main effect of season of birth of the cow; the second to analyze the rest of the traits and included origin of cow (O), season of calving (S), age at calving (AC) and interactions of O x S and O x (AC).

The IF cows calved for the first time at a younger age compared to the LBF cows (28.2 vs 33.3 months). Also, IF produced greater milk yield in the first three lactations. Least squares means of TMY in the first three lactations were 3950 Kg, 4735 Kg, and 4570 Kg for IF and 2940 Kg, 3820 Kg and 4520 Kg for LBF ones. Only first lactations of IF and LBF cows were significantly different ($P<0.0001$). Corresponding means for AMY were 3425 vs 2655 kg, $P<0.0002$; 4365 vs 3670 kg, $P<0.193$ and 4535 vs 4660 kg, $P<0.85$ for the two groups in the first three lactations, respectively.

Season of calving affected significantly AMY ($P<0.005$) and DIM ($P<0.041$) in the first lactation. Cows calving during the mild season (October-March) produced more AMY

Issued by Egyptian Society of Animal Production.

and had greater number of DIM than did animals calving during hot season (April - September). Age at first calving had significant effect on TMY ($P<0.001$) and AMY ($P<0.003$) of first lactation. The effect was more pronounced in the IF group where cows calving at ages <24 months produced the lowest yield, significantly lower than all older groups. Effects of interactions of origin of cow x season of calving and origin x age at calving were all nonsignificant.

Keywords: Friesian, performance, imported, locally born, U.A.E.

INTRODUCTION

The national dairy industry in the United Arab Emirates, U.A.E., relies mainly on importation of standard dairy breeds, mostly Friesian. The culling rate for Friesian imported into U.A.E. ranges from 20-30% according to the number of lactations. Relatively higher culling rates were observed for locally born cows (Aboul-Ela et al., 1994).

Replacements for the dairy herd might be home raised or purchased. Home rearing guarantees animals with known characteristics and helps to prevent disease spread. Under the harsh environmental conditions prevailing in the U.A.E., which is regared as a hot arid region, replacement policy should be based on reliable information.

The present study was conducted to compare some productive and reproductive characteristics of imported Friesians with their locally- born herd- mates in the United Arab Emirates.

MATERIALS AND METHODS

The data utilized in this study included 662 productive and reporductive records and were collected during the period from 1987 to 1989 on Friesian cattle in the herd of the Arab Company for Animal Production, located in Degdaga, Ras Al-Khaima, 250 Km to the north east of Abu Dhabi, United Arab Emirates. The climatic conditions prevailing in the location were described in detail by Nigm et al. (1994).

All animals were housed in shaded open yards. Cooling

system of water sprinklers and ceiling fans was used to ameliorate the effect of heat stress during the hot season. The area is characterized with a hot humid climate for most of the year (April through September) with a maximum temperature of >40°C and maximum relative humidity of >90%. Locally-born heifers were first bred when the body weight reached 320 kg. Cows were observed for heat twice daily and inseminated at the first observed heat after 45 days postpartum. Cows were machine milked twice daily, and were dried off two months before the expected calving date. Cows were fed on rhodes grass (Chloris gayana), and supplemented with concentrate mixture according to their level of milk production.

The data collected covered the first three lactations of Friesians imported from Germany (IF) and their locally-born female (LBF) herd mates. The following traits were studied: (1) Age at first calving (AFC, month); (2) Total milk yield (TMY, kg), total milk produced by the cow during the entire lactation; (3) Days in milk (DIM, day); (4) Annualized milk yield (AMY, kg) which was computed according to Bar Anan and Soller (1979), AMY= (TMY/ respective calving interval in days) x 365; and (5) calving interval (CI, day)= number of days between two successive calvings.

The data were analyzed by the Least Squares technique using the General Linear Models procedure of SAS (1985). Two models were used; model (1) was used to analyze AFC for each of IF and LBF, separately, and reads:

$Y_{ij} = \mu + S_i + e_{ij}$, where

Y_{ij} is AFC; μ is the overall mean; S_i is the effect of season of birth i (for IF, i = 1,2,3,4 where 1= winter (Dec. - Feb.), 2= Spring (March - May), 3= Summer (June-August) and 4= Autumn (Sept.- Nov.); and LBF 1= mild season (Oct. - March) and 2= hot (April - Sept.) and e_{ij} is the random error term.

Model (2) was used to analyze TMY, DIM, AMY and CI and reads:

$Y_{ijkl} = \mu + O_i + S_j + A_k + OS_{ij} + OA_{ik} + e_{ijkl}$, where

Y_{ijkl} is CI, TMY, DIM or AMY; μ is the overall mean;

O_i is the effect of origin of cow, i= (1= IF, 2= LBF); S_j is the effect of season of calving, j= (1= mild including Oct. through March, 2= hot including April through September); A_k is the effect of age at calving;

OS_{ij} is the effect of interaction of origin x season; OA_{ik} is the effect of interaction of origin x age at calving and e_{ijkl} is the random error term.

RESULTS AND DISCUSSION

Levels of probalitity of significance of various sources of variation in the traits are shown in Table 1. In general, the origin of the cow, season of calving and age at calving affected significantly the first lactation, declined in the second to vanish completely in the third lactation. Season of birth affected significantly AFC in IF group ($P<0.0001$). Origin of the cow (IF or LBF) had significant effect on TMY ($P<0.0001$) and AMY ($P<0.0002$) for the first lactation. The probability of significance of the effect of origin on DIM in first and TMY of second lactation was 0.067 and 0.066, respectively. Season of calving influenced first lactation AMY ($P<0.005$) and DIM ($P<0.041$) while age at calving affected TMY ($P<0.001$) and AMY ($P<0.003$) of the first lactation. Interactions of origin x season of calving and origin x age at calving were all nonsignificant.

Table 1: Probability levels of significance among different sources of variation

Traits	(N)	Sources of variation				
		Season of birth				
		IF	LBF			
Age at 1st calving:	(463)	0.0001	0.8230			
		Origin(O)	Season of calving(S)	Age at calving(AC)	O x S	O x AC
Total milk yield:						
First lactation	(463)	0.0001	0.134	0.001	0.505	0.449
Second lactation	(110)	0.066	0.186	0.367	0.511	0.210
Third lactation	(89)	0.936	0.967	0.552	0.895	0.599
Days in milk:						
First lactation	(403)	0.067	0.041	0.856	0.513	0.798
Second lactation	(110)	0.715	0.838	0.443	0.721	0.149
Third lactation	(89)	0.869	0.351	0.737	0.996	0.457
Annualized milk yield:						
First lactation	(403)	0.0002	0.005	0.003	0.137	0.739
Second lactation	(110)	0.193	0.181	0.516	0.218	0.483
Third lactation	(89)	0.850	0.388	0.325	0.962	0.706
Calving interval (CI):						
First CI	(403)	0.265	0.106	0.555	0.080	0.910
Second CI	(110)	0.688	0.401	0.797	0.379	0.471

Least squares means and standard errors of age at first calving for IF and LBF are shown in Table 2. The IF cows were younger AFC than LBF ones (28.3 vs 33.3 months). This result agrees with findings of Barrada et al. (1969); Mokhtar (1971) and Badran (1978) in Egypt and with that of Djemali and Berger (1992) in Tunisia. However, Afifi et al. (1992) regarded the difference in AFC between IF and LBF in Egypt (27.5 vs 27.7 months) as nonsignificant. Older ages observed for LBF in U.A.E. could be attributed to lowered rate of growth of these animals raised under adverse harsh environment.

Table 2. Least squares means[1] (±SE) of age at first calving (AFC, months) of imported (IF) and locally-born Friesian (LBF) in the U.A.E.

	IF			LBF		
	N	$\bar{X}$	±SE	N	$\bar{X}$	±SE
Overall	291	28.2	0.14	172	33.3	0.40
---------- Season of birth ----------						
Winter	77	26.3^{a}	Mild	98	33.2	0.54
Spring	18	29.3^{bc}	Hot	74	33.4	0.62
Summer	53	30.6^{c}				
Autumn	143	28.2^{b}				

1 Means, within column, followed by different letters differ significantly ($P<0.05$).

Table 3 shows estimates on the first lactation characteristics. Imported Friesians produced greater TMY (34%) than the LBF cows. Differences in DIM and CI were 21 days and 23 days, respectively with IF cows having longer intervals. Physiological maturity of cows at calving is most likely a major factor for higher production of IF cows.

Cows calving during the mild season (Oct. - March) produced more TMY, AMY and had greater number of days in milk. The difference was significant only in the case of AMY of IF group (610 kg). IF cows calving during the mild season had significantly shorter CI than had their herd mates calving during hot season (421 vs 467 days).

Table 3: Least squares means[1] (±SE) of the first lactation characteristics of imported Friesian cows (IF) and their locally-born female (LBF) herd mates in the U.A.E.

	IF			LBF		
	N	$\bar{X}$	±SE	N	$\bar{X}$	±SE
			Total Milk Yield (Kg)			
Origin:	291	3950[a]	117	172	2940[b]	158
Season of calving:						
Mild	236	4095[a]	104	122	2995[b]	151
Hot	55	3805[a]	179	50	2885[b]	218
Age at first calving (AFC):						
≤24 mo.	11	2810[a]	352	6	2505[a]	462
>24 to ≤27	95	4270[b]	138	17	2925[a]	292
>27 to ≤30	121	4260[b]	116	32	3075[a]	218
>30 mo.	64	4465[b]	143	117	3250[a]	107
			Days in Milk (day)			
Origin:	291	304	7.5	172	283	10.1
Season of calving:						
Mild	236	310[a]	6.7	122	294[ab]	9.7
Hot	55	298[ab]	11.5	50	271[b]	14.0
AFC:						
≤24 mo.	11	280[abc]	22.6	6	284[abc]	29.7
>24 to ≤27	95	316[a]	8.9	17	280[abc]	18.8
>27 to ≤30	121	310[a]	7.4	32	280[bc]	14.0
>30 mo.	64	310[ab]	9.2	117	286[c]	6.9
			Annualized Milk Yield (Kg)			
Origin:	291	3425[a]	123	172	2655[b]	166
Season of calving:						
Mild	236	3730[a]	109	122	2745[bc]	159
Hot	55	3120[b]	188	50	2560[c]	229
AFC:						
≤24 mo.	11	2840[a]	370	6	2230[a]	486
>24 to ≤27	95	3600[b]	145	17	2600[a]	307
>27 to ≤30	121	3700[b]	122	32	2780[a]	230
>30 mo.	64	3915[b]	150	117	3005[a]	112
			1st Calving Interval			
Origin:	291	444	11.9	172	421	16.1
Season of calving:						
Mild	236	421[a]	10.6	122	422[a]	15.4
Hot	55	467[b]	18.3	50	420[a]	22.3
AFC:						
≤24 mo.	11	429[ab]	36.0	6	417[ab]	47.3
>24 to ≤27	95	457[a]	14.1	17	444[ab]	29.6
>27 to ≤30	121	452[a]	11.9	32	414[ab]	22.3
>30 mo.	64	438[ab]	14.6	117	411[b]	10.9

1 Means, within classification followed by different letters differ significantly ($P<0.05$).

Table 4: Least squares means[1] (±SE) of the second lactation characteristics of imported Friesian cows (IF) and their locally-born female (LBF) herd mates in the U.A.E.

	IF			LBF		
	N	$\bar{X}$	±SE	N	$\bar{X}$	±SE
			Total Milk Yield (Kg)			
Origin:	66	4735[a]	288	44	3820[b]	441
Season of calving:						
Mild	44	4600[a]	331	36	3430[b]	430
Hot	22	4865[a]	393	8	4210[ab]	642
Age at second calving (ASC):						
≤36 mo.	5	3380[a]	698	5	4000[ab]	1095
>36 to ≤39	52	4985[b]	229	32	3745[a]	353
>39 to ≤42	9	5840[b]	523	7	3715[a]	561
			Days in Milk (day)			
Origin:	66	298	12.5	44	290	19.1
Season of calving:						
Mild	44	303	14.3	36	289	18.6
Hot	22	294	17.0	8	291	27.7
ASC:						
≤36 mo.	5	262[a]	30.2	5	322[ab]	47.4
>36 to ≤39	52	291[a]	9.9	32	275[a]	15.3
>39 to ≤42	9	342[b]	22.6	7	273[a]	24.3
			Annualized Milk Yield (Kg)			
Origin:	66	4365	290	44	3670	444
Season of calving:						
Mild	44	4345[a]	334	36	3160[b]	434
Hot	22	4385[a]	397	8	4180[ab]	647
ASC:						
≤36 mo.	5	3300[a]	304	5	3700[ab]	1104
>36 to ≤39	52	4685[b]	231	32	3645[a]	356
>39 to ≤42	9	5110[b]	527	7	3670[b]	566
			2nd Calving Interval			
Origin:	66	399	16.5	44	387	25.2
Season of calving:						
Mild	44	399	18.9	36	407	24.6
Hot	22	400	22.5	8	368	36.7
ASC:						
≤36 mo.	5	367	39.9	5	397	62.6
>36 to ≤39	52	393	13.1	32	389	20.2
>39 to ≤42	9	438	29.9	7	376	32.1

1 Means, within classification followed by different letters differ significantly ($P<0.05$).

Table 5: Least squares means[1] (±SE) of the third lactation characteristics of imported Friesian cows (IF) and their locally-born female (LBF) herd mates in the U.A.E.

	IF			LBF		
	N	$\bar{X}$	±SE	N	$\bar{X}$	±SE
			Total Milk Yield (Kg)			
Origin:	66	4570	292	23	4520	583
Season:						
Mild	40	4595	312	18	4475	714
Hot	26	4550	389	5	4560	765
ATC:						
≤48 mo.	5	3945	727	3	4835	1668
>48 to ≤51	45	4520	231	10	4285	611
>51 to ≤54	16	5250	402	10	4440	526
			Days in Milk (day)			
Origin:	66	285	11.5	23	290	22.9
Season:						
Mild	40	276	12.3	18	280	28.1
Hot	26	294	15.3	5	299	30.1
ATC:						
≤48 mo.	5	270	28.6	3	265	65.6
>48 to ≤51	45	284	9.1	10	314	24.0
>51 to ≤54	16	302	15.8	10	290	20.7
			Annualized Milk Yield (Kg)			
Origin:	66	4535	301	23	4660	601
Season:						
Mild	40	4745	322	18	4895	737
Hot	26	4325	401	5	4425	789
ATC:						
≤48 mo.	5	4075	750	3	5320	1720
>48 to ≤51	45	4465	238	10	3975	630
>51 to ≤54	16	5060	414	10	4690	543

1 Means, within classification followed by different letters differ significantly ($P<0.05$).

This result is in agreement with the findings of Ansell (1976) and Nigm et al. (1994) in U.A.E., and Ashmawy and Khattab (1991) in Egypt who reported that cows calving during the hot season had markedly longer days open when compared with mild season calvers.

Age at first calving showed significant differences in TMY and AMY of the IF only. Cows calving for the first time at ages ≤24 months yielded the lowest in both traits. Friesian cows should be imported to calve at age >24 months. Neither CI nor DIM was influenced by AFC.

Milk production characteristics and calving interval of the second lactation are shown in Table 4. IF cows kept their advantage (although not statistically significant) in producing higher TMY (915 kg, 24% extra over LBF) and AMY (about 700 kg, 20% extra over LBF). Differences in CI and DIM due to origin of cow were 12 and 8 days (both nonsignificant). TMY increased progressively with age at second calving in the group of IF, cows calving at ages ≤36 months scored the lowest TMY. The same trend was observed in AMY. This finding confirms the fact that pregnant Friesian heifers should not be imported to calve for the first time at an early age. In the locally born cows, the youngest group produced the highest TMY, due apparently to their greater number of DIM. Differences, however, were nonsignificant in both traits.

No significant differences were detected for origin of cow, season of calving or age at second calving in DIM or CI, except for age at second calving on DIM; cows calving at ages >39 and ≤42 months had greater DIM (342 days). Figures obtained for CI and DIM of the different groups indicated the presence of positive association between the two traits. Cows that failed to conceive continued to produce milk.

Table 5 shows the milk production characteristics in the third lactation. The number of LBF cows dropped from 44 in the second to only 23 in the third lactation, due to unavailable data rather to culling of cows. None of the sources of variation showed significant differences in any of the traits studied. However, similar trends can be observed for age at calving on TMY, AMY and DIM in the third lactation.

The present study indicates the advantages of imported Friesian cattle for calving earlier and producing greater amount of milk yield. The advantage of this

group in annualized milk yield refers to more profitability than the locally-born herd mates. Many investigators indicated the advantage of imported over locally born Friesian in milk production (Barrada et al., 1969 in Egypt; Djemali and Berger, 1992 in Tunisia; Al-Khamees and Al-Mokhadub, 1986 and Salah et al., 1988 in Saudi Arabia).

Further research on larger numbers in different locations which may include economic aspects of herd management is required to investigate aspects of longevity and profitability.

ACKNOWLEDGEMENT

The author appreciates the help of Dr. M.B. Aboul-Ela, Professor of Animal Physiology and Dr. A.A. Nigm, Professor of Animal Breeding, U.A.E. University in providing the data and reading the manuscript.

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أداء الأبقار الفريزيان المستوردة والمولودة محليا فى قطيع بالإمارات العربية المتحدة

ربيع رجب صادق

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أجريت هذه الدراسة بغرض مقارنة أداء الأبقار الفريزيان المستوردة بمعاصراتها المولودة محليا فى قطيع برأس الخيمة بالإمارات العربية المتحدة وشملت الدراسة ٦٦٢ سجلا إنتاجيا وتناسليا أنتجت خلا ل الفترة من ١٩٨٧ الى ١٩٨٩).

وتم دراسة الصفات التالية لأول ثلاثة مواسم: (١) العمر عند الولادة، (٢) إنتاج اللبن الكلى، (٣) طول فترة الحليب، (٤) إنتاج اللبن السنوى و(٥) الفترة بين ولادتين و درس آثر فصل ميلاد البقرة على صفة العمر عند أول ولادة، أما باقى الصفات فقد تم دراسة تأثير منشأ البقرة، فصل الوضع، العمر عند الوضع والتداخل بين منشأ البقرة وكل من فصل الوضع وعمر البقرة عند الوضع عليها.

وتتلخص أهم النتائج التحصل عليها فى الآتى:

١- وضعت الأبقار المستوردة لأول مرة على عمر أصغر (٢٨,٢ شهر) مقارنة بمعاصراتها المولودة محليا (٣٣,٣ شهر).

٢- كانت متوسطات إنتاج اللبن الكلى فى أول ثلاثة مواسم حليب هى ٣٩٥٠، ٤٧٣٥ و ٤٥٧٠ كيلوجرام للأبقار المستوردة، ٢٩٤٠، ٣٨٢٠ و ٤٥٢٠ كيلوجرام لتلك المولودة محليا.

٣- كانت متوسطات إنتاج اللبن السنوى هى: ٣٤٢٥، ٤٣٦٥ و ٤٥٣٥ كيلوجرام للأبقار المستوردة ، ٢٦٥٥، ٣٦٧٠ و ٤٦٦٠ كيلوجرام للأبقار المولودة محليا فى الثلاثة مواسم حليب الأولى، على التوالى.

٤- كان لمصدر المنشأ أثرا معنويا على صفتى إنتاج اللبن الكلى (بإحتمال ٠,٠٠٠١) وإنتاج اللبن السنوى (بإحتمال ٠,٠٠٠٢) للموسم الأول فقط.

٥- أثر فصل الوضع معنويا على صفتى إنتاج اللبن السنوى (بإحتمال ٠,٠٠٥) وطول فترة الحليب (بإحتمال ٠,٠٤١) للموسم الأول حيث حققت الأبقار التى وضعت فى فصل السنة المعتدل (أكتوبر - مارس) انتاج لبن أعلى وفترة حليب أطول مقارنة بتلك التى وضعت فى فصل السنة الحار (أبريل- سبتمبر).

٦- كان للعمر عند الولادة آثرا معنويا على صفتى إنتاج اللبن الكلى (بإحتمال ٠,٠٠١) وإنتاج اللبن السنوى (بإحتمال ٠,٠٠٣) للموسم الأول فقط. وكان التأثير واضحا فى الأبقار المستوردة حيث حققت الأبقار التى تلد على عمر يقل عن أو يساوى ٢٤ شهرا إنتاج لبن اقل معنويا عن باقى المجاميع الأكبر عمرا.

٧- كان تأثير التداخل بين منشأ البقرة وكل من فصل الوضع والعمر عند الوضع غير معنوى على جميع الصفات المدروسة.

٨- توصى الدراسة بإجراء مزيد من البحوث الأخرى على أعداد أكبر وفى مواقع مختلفة حتى يمكن تقييم جميع الجوانب الفنية والإقتصادية لأداء الأبقار الفريزيان المستوردة والوقوف على جدوى تربيتها فى مثل هذه البيئات المعاكسة.