COMPARING GENETIC PARAMETERS OF FRIESIAN MILK PRODUCTION TRAITS IN COMMERCIAL AND STATE FARMS IN EGYPT

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Abstract

This study was conducted to estimate the genetic parameters for milk production traits of Friesian cattle in two selected dairy farms located in the Nile Delta of Egypt. A total of 1438 lactation records during the years2001 to 2009 were collected to represent 472 cows in Sakha Governmentfarm (SF). In comparison, a total of 1660 lactation records during the years 1998 to 2005 were collected to represent 465 cows in Gharbawy commercial (GF) farm. The derivative-free restricted maximum likelihood (REML) procedure was used to determine heritability, genetic correlation and breeding value of the studied traits. The results indicated that non genetic factors affecting lactation period (LP), total milk yield (TMY) and 305d -milk yield (305 d-MY) had highly significant ($p<0.001$) effect on those traits except the effect of season of calving on TMY. Interaction between (herd & parity) and the interaction between (herd & parity & season) had highly significant effect ($P< 0.001$) on all milk production traits. The overall means of LP, TMY and 305-dMY were 313day; 4140kg; 3630 kg, respectively for cows in SF and as the corresponding values in GFwere 369.5day,8820Kg and 7430 kg. Estimates of direct heritability for LP, TMY, and 305MY in SF were 0.10, 0.11and 0.19 respectively, the corresponding estimates for GF were 0.10, 0.13 and 0.07 respectively on the other hand, estimates of maternal heritability for LP,TMY and 305MY in SF were 0.04, 0.07 and 0.06, respectively, while , the estimate in GF were 0.08, 0.09 and 0.12, respectively. The breeding values of sires estimated for LP,TMY and 305d-MY were 50.4, 27.4 and 42.3, respectively in SF, while the same estimates in GF were150.1, 20.04,and 30.7. The breeding values of cow concerning LP, TMY and 305MY in SF were 63.32, 45,4 and 21.5 while in GF, values were 195.1 , 29.9 , 53.2 , respectively . It can be concluded that improving environmental conditions and management practices, coupled with improved genetic potential of dairy animals in the state or commercial farms would be more effective approaches for high milk productivity.

INTRODUCTION

Friesians are the most reputed dairy cattle in Egypt. In livestock population under computerized recording system, a large size of phenotypic observations is available at low cost and it is worthwhile to use them in estimation of genetic parameters for economic traits. Milk production in dairy farms can be increased either by increasing the number of milking animals or upgrading milk productivity per animal through improving the environmental conditions, managerial practices, and genetics. There are various mating systems to improve genetic potential of the dairy animals. Heritability is the keys genetic parameter which determines with other factors the amount of possible genetic progress for selected traits.(Usman *et al* ,2012)

Development of milk production in Egypt depends largely on establishment of modern and large commercial dairy farms . These farms in turn , depend on high technology operation , skilled labor and high producer dairy cattle . The government and the private sector imported large numbers of purebred dairy cattle. Particularly Friesian.(Amr, 2013). The aim of the animal breeding plans is not only to produce superior individual animals but also to cause a general improvement in a herd by selecting genetically superior sires and dams as parents for future generations. Quantitative genetics has a large applicability in animal husbandry. The main goal in animal breeding is to select those cows, which can produce offspring with improved phenotypes. In order to establish effective breeding programs it is necessary to recognize the genetic inheritance of a certain genetic characters (Bugeac et al., 2013).

There is no doubt that performance of governmental and commercial farms differs relatively due to many reasons such as capital assets, managerial practices ding , breeding plans …etc.

In this concern, appraisal of dairy farm profitability and evaluation of productivity through milk traits become important to improve the production efficiency.

Therefore, this study was carried out to compare efficiency of milk production in two farms, one of them is governmental and the other is commercial. The scientific basis of comparison was to investigate genetic and non-genetic factors affecting milk yield in both farm. Also, breeding value of cows sires and dams for the assigned milk traits were considered.

MATERIALS AND METHODS

The present study was conducted to determine genetic and phenotypic parameters that effect milk production traits of Friesian cattle in two selected dairy herds in the Nile delta of Egypt .

A total of 1438 lactation records during the years 2001 to 2009 were collected to represent 472 cows (daughters of 318 dams and 52 sires) in Sakha Experimental farm (SF) located in Kafr EL-Shaikh Governorate. In comparison, a total of 1660 lactation records during the years 1998 to 2005 were collected to represent 465 cows (daughters of 426 dams and 170 sires) in Gharbawy commercial farm (GF) located in El-Sharkia Governorate.

Animal nutrition in SF depends on concentrate feed mixture along with rice straw in addition to Egyptian clove in winter or clover hay during summer (May to November). On the other hand, cows in GF were feed on corn silage, wheat straws and concentrate feed mixture in addition to the Egyptian clover in winter or clover hay in summer . In both farms SF and GF, cows producing more than 10 kg of milk or cows at late pregnancy period were offered extra CFM.

As a common practice, milking cows were subjected to machine milking twice a day in SF and 4 times per day in GF. In both herds, cows were artificially inseminated by reaching the 2nd month post partum. Heifers in both farms were served when reaching 18 month of age or 305 kg of live body weight.

Statistical analysis:

Data were analyzed using the general linear model (GLM) procedure (SAS 2003).

The following statistical mixed model wasused :

$Y_{imjkl} = \mu + S_i + h_m + P_j + SE_k + Y_l + (h*P)_{mj} + (h*SE)_{mk} + (h*P*SE)_{mij} + e_{imjkln}$

where,

Y_{imjkl}: either LP, TMY and 305d-MY;

μ: an underlying constant specific to each trait; S_i: a random effect of i^{th} sire; hm the fixed effect of m^{th} herd P_j: the fixed effect of j^{th} parity of calving; SE_k:the fixed effect of k^{th} season of calving; Y_l: the fixed effect of l^{th} year of calving ,

$(h*P)_{mj}$= The interaction between m^{th} effect of herd and j^{th} effect of parity .

$(h*SE)_{mk}$ = The interaction between m^{th} effect of herd andk^{th} effect of season .

$(h*P*SE)_{mij}$ = The interaction between m^{th} effect of herd, j^{th} effect of parityand k^{th} effect of season .ande_{imjkl} = random residual assumed to be independent normally distributed with mean zero and variance $\sigma^2 e$.

Heritability, genetic correlations and breeding values of studied traits were estimated with derivative-free restricted maximum likelihood(REML) procedures using the MTDFREML program of Boldman *et al.,* (1995). The assumed model was:

$y = Xb + Z_1a + Z_2m + Z_3p + e$,

Cov (a,m)= A $\sigma_{a,m}$

where,

y: a vector of observations, b: a vector of fixed effect, a, m, p and e are the vectors of direct additive genetic effect, maternal genetic effect, permanent environmental effect and the residual effect, respectively, X, Z_1, Z_2 and Z_3 are incidence matrix relating individual records to b, a, m and p, respectively.

Table 1. Distribution of cows and lactation records in Sakha and Ghrbawy herds.

Observation	Sakha herd	Ghrbawy herd
No of records	1438	1660
No of sires	52	170
No of dams	318	426
No of cows	472	465

RESULTS AND DISCUSSION

As shown in table (2), coefficients of variability (CV) for all studied milk traits were considerably higher in SF than that in GF, the higher estimates of CV% in SF may reflect a great variation of milk traits among individuals which enhance the possibility of utilizing such variation to improve milk productivity of Friesian cows., The average TMY and 305d-MY in GF were greater by 113.0% and 104.7% than that in SF, respectively this finding indicate superiority of milk productivity of GF cows as purebred imported herd in the commercial farm .

The lactation period (LP) for Holstein cows in Egypt was found to vary from 286 to 407 days and the coefficient of variability of lactation period ranged from 5 to 31.74% as mentioned by Hammoud (2013), and Faid (2015) in Egypt, respectively . The average of LP in the present study lies within the range of the above mentioned studies.

Table 2. Means, standard deviations (SD) and coefficients of variation (CV%) for lactation period (LP), total milk yield (TMY)and305-day MY of Friesian cows in Sakha and Ghrbawy herds

Trait	Sakha herd (SF)				Ghrbawy herd (GF)			
	N	Mean	SE	CV%	N	Mean	SE	CV%
LP (day)	1438	312.97	3.1	37.86	1660	369.52	2.4	26.70
TMY (kg)	1438	4140	41.7	38.16	1660	8820	66.1	30.50
305d MY (kg)	1438	3630	32.5	33.88	1660	7430	43.7	23.96

Non genetic factors affecting milk production traits analysis of variance for factors affecting milk production traits under study in presented in table (3) . Least square means (LSM) and standard errors (S.E) for factors affecting LP,305d-MY and TMY are shown in table (4) .

The ANOVA results for the studied traits are give in table (3) it can be concluded that herd had significant effect on all milk production traits under study .

Table 3. Analysis of variance for milk production traits affected by management practices under study .

Source of variation	df	Mean Squares		
		LP	305d-MY	TMY
Sire	217	15266.8***	5836476***	13354333***
Herd	1	95606.5**	204540670***	468374645***
Parity	5	74226.2***	60425644***	30263873***
Season	3	51884.9**	14211514***	18475158***
Year	11	231343.4***	24476946***	108778727***
herd * parity	5	45763.5***	4831086*	14536320***
herd * season	3	54849.0***	2278026 n.s	6846670 n.s
herd * parity *season	30	21071.9***	5540663***	6716290**
Residual	2822	10029.9	2336762	3485239

* = significant at P< 0.05 , ** = significant at P< 0.01 ,*** = significant at P< 0.001 , ns = non significant

Table 3 shows that the effect of herd , parity , season and year of calving had highly significant effect(P< 0.001) on all milk production traits under study as reported previously table (3) .

Interaction between (herd& parity) and the interaction between (herd &parity &season) had highly significant effect (P< 0.001) on all milk production traits .

Except interaction between(herd & season)had non-significant effect for each of the 305-day MY and TMY .The differences among herds may be due to the differences , environmental condition and management practices in each farm and different herd size among farms .The same results were agreed with those obtained by Hammami *et al.* (2008) and Amr (2013) reported that farm had a highly significant effect on milk production traits .Gabr(2005) recorded that highly significant effect of herd on total milk yield and 305 day milk yield. These differences among farms may be due to the difference in genetic constitution among herds, management practices applied and the different environmental and climatic conditions due to different regions that affect adaptation of the cows.

Table (4) display the effects of parity, season of calving, year of calving and the farm on LP, TMY and 305d-MY. the result clarified highly significant (P<0.01) effects of the aforementioned factors on all studied milk traits. The LP tended to increase with advancement of parity up to the 4thlactation period then declined thereafter. Mean

while, LP was longer in winter and spring compared with summer and autumn. This result indicates that adjustment of LP to 305-dayMY was practically out of control particularly in SF that reached 378.5 days of LP. Wide variation was noticed among years of calving for LP. As a similar trend, TMY tended to increase from 6015.9 kg± 139.5in the 1st parity to 6910.4 ± 160.9 kg in the 4th parity and declined thereafter whereas 305MY tended to increase from 5111.9 $\pm$ 99.4 kg in the 1st parity to 5699.1 $\pm$103.1in the 3rd parity.

Both averages of TMY and 305d- MY were higher for cows calved in winter and spring than in autumn and summer. This finding points to the importance of green fodder season in improving milk productivity. Estimates of TMY and 305MY recorded within years of calving showed increased pattern from 1998 up to 2003 then fluctuated until 2009. The rates of increase in TMY and 305day-MY for this period were 100.1 % and 39.2%, respectively . The rate of increase in TMY and 305d-MY for SF was 37.4 % and 20.7 % during 2001-2004, the corresponding values in GF was 120.3% and 41.2 % , respectively during 1998-2003 . This result proved a significant effect of year of calving on milk traits and acceleration of milk production in GF within the period 1998-2003.Hammoud (2013) came to the same result for 305 MY. The same result was found for LP.

The averages of LP for Friesian cows in Egypt were recorded to be 314 , 327 ,332 and 357 days as reported by Allam (2011) , Taha (2013) , Faid (2015) and El-Attar (2009) , respectively. The averages of TMY for Friesian cows in Egypt were recorded to be 5387.0, 4348.0, 7208.7 and 9710 kg as reported by Taha (2013) , Allam (2011) , Faid (2015) and El-Attar (2009), respectively. The averages of 305 MY for Friesian cows in Egypt were recorded to be4229, 5387, 6384.9 and 8366 kg as reported by Allam (2011), Taha (2013), Faid (2015) and El-Attar (2009), respectively. The difference in milk traits among different authors may be attributed to genetic potentiality of the different herds or referring to management practices and variability of climatic changes. Gabr (2005) observed that the differences in TMY and 305day-MYbetween parities were highly significant while no significant effect of parity on LP was found. On contrary, El-Attar(2009) and Allam(2011) found that parity had a highly significant effect on LP.

Lakshmi *et al.* (2009) explained that cows calved in fall and winter had comparatively low LP due to better feeding of cows that led to early conception and on time subsequent calving whereas, the probable reason for longer LP may be missing heats, improper timely insemination and repeat breeding.

In agreement with the present study, Usman *et al.* (2011) detected higher TMY in spring and lower TMY in summer. Abdel-Gader *et al.* (2007) reported that milk production was higher in winter than the other seasons. Javed*et al.* (2004) reported that milk production was higher in autumn and spring seasons and lower in hot summer. Similar results were obtained by Abdel-Gader*et al* (2007), El-Attar (2009) and Allam (2011) who found that year of calving had significant effect on TMY and 305d-MY. Also , Mustafa and Serdar (2009) noticed that year of calving had significant effect on LP for Holstein cow .

Table 4. Least square means (LSM) and standard error(SE) for milk traits in Friesian cows as affected by parity, season of calving, year of calving and herd on milk traits.

dependent variable	NO	L P±SE ,d	TMY±SE, kg	305d-MY ±SE, kg
Parity				
1	857	339.98±7.11	6015.94±139.56	5111.86±99.4
2	661	331.62±7.4	6377.33±145.6	5500.43±103.7
3	649	344.77±7.4	6745.45±144.7	5699.13±103.1
4	415	365.23±8.2	6910.37±160.9	5671.3±114.6
5	249	343.36±9.2	6421.19±180.4	5331.4±128.5
6	267	310.9±10.1	5507.73±198.8	4640.9±141.7
Significant		***	***	***
Season of calving				
Autumn	1021	328.08±7.1	.28±139.1٦٢٢٤	5293.14±99.1
Winter	1056	343.05 ±7.3	6476.64±141.5	5406.98±100.8
Spring	526	356.77±7.9	6464.2±154.1	5352.71±109.8
Summer	495	329.39±7.7	6153.47±154.4	5250.53±109.9
Significant		***	***	***
Year of calving				
1998	198	222.72±11.94	3946.57±234.4	4186.51±167.0
1999	224	297.74±10.49	5771.0±205.8	5313.8±146.6
2000	245	321.16±10.18	6192.1±199.8	5350.80±142.3
2001	397	336.39±8.65	6406.8±169.7	5348.38±120.9
2002	347	360.17±8.79	6935.75±172.7	5518.78±123.0
2003	329	402.42±9.0	7896.15±176.7	5826.65±125.9
2004	330	329.66±8.9	6611.64±174.9	5524.18±124.6
2005	340	385.61±10.5	6239.25±177.4	5354.11±126.4
2006	178	369.43±11.9	6748.67±206.4	5449.8±147.1
2007	153	374.58 ±10.5	6596.32±234.0	5503.35±166.7
2008	170	329.14±10.9	6471.51±206.7	5306.5±147.3
2009	187	342.85±9.0	6140.1±213.7	5227.06±152.3
Significant		***	***	***
Farm				
GF	1660	378.52a±6.5	8493.61a±126.9	7093.87a±90.5
SF	1438	300.2b±16.8	4165.69b±329.2	3557.8b±234.6
Significant		***	***	***

***highly significant ($p<0.01$) ;n.s not significant($p<0.05$)

Heritability and the variance component estimates

Table (5) summarize results of milk traits analysis with respect to additive genetic and phenotypic variances as well as heritability estimates. The variance components were estimated after identification of the non-genetic factors affecting milk traits. Direct h^2estimates for milk were similar in both farms except h^2 estimate of 305d-MY that was relatively greater in SF (0.19) than that in GF (0.07).

This finding may be attributed to available breeding plan in SF that permits continuous selection and culling of low producer cows.

Maternal h^2 estimate of milk traits were considerably less than direct h^2 estimates except maternal h^2 of 305d-MY that was higher in GF (0.12) than its direct h^2 value. This result may indicate the genetic effect of sires on milk traits in both herds.

Generally, summation of direct and maternal h^2 indicated higher estimates for LP and TMY in GF as compared with SF while lower estimate for 305d-MY was detected in GF.

The results in Table 5. showed that the genetic correlation between LP, TMY and 305d-MY was positive in Sakha farm whereas the genetic correlation between LP ,TMY and 305 MY was negative in Ghrbawy farm.Also, maternal genetic correlation among milk traits studied were in most cases negative and small. Similar results are reported by Usman *et al.* (2011) and Mostafa *et al* (2013).

Table 5. Genotypic, environmental and phenotypic variance, covariance and heritability of productive traits of Friesian cows in Sakha and Ghrbawy herds.

		Sakha farm(SF)			Ghrbawy farm.(GF)		
		LP	TMY	305-dMY	LP	TMY	305-dMY
V_a		60540	205570	346220	60520	238250	314000
Vam		8950	117200	111790	500	-18670	-140050
Vm		23770	127390	105570	50690	171940	566750
V_{pe}		724	16483	1805	1823	50549	22165
Vte		500000	1448270	1249070	50000	1377020	3954740
V_p		593990	1914910	1814450	613530	1819080	1814450
h^2	h^2a	0.10	0.11	0.19	0.10	0.13	0.07
	h^2m	0.04	0.07	0.06	0.08	0.09	0.12
Phenotype (above) and genetic (below) the diagonal covariance							
		LP	TMY	305	LP	TMY	305
LP			275990	343320		341420	-310620
TMY		93740		655950	98920		0697660
305		23610	12265		-1650	-33870	
phenotypic (above diagonal) and genetic correlation between milk traits (below diagonal)							
		LP	TMY	305-dMY	LP	TMY	305-dMY
LP			0.26	0.33		0.32	0.18
TMY		0.84		0.35	0.82		0.24
305d-MY		0.16	0.46		-0.01	-0.12	

Va = additive genetic effect, Vam = covariance between direct and maternal genetic effect, Vm = maternal genetic effect, Vpe = permanent environmental effect,Ve = environmental effect, Vp= phenotypic variance .h^2adirect heritability for LP, TMY and 305d-MY, respectively, while, h^2m are maternal heritabilityfor LP, TMY and 305d MY, respectively, Low heritability estimates for LP indicate that this trait is affected mainly by environmental factors through improving feeding and managerial strategy procedures .Similar result were report by Mostafa *et al.* 2013 and Hommoud, 2013.

The differences in the estimated heritability in the present study due to herd and environmental conditions as well as the method of estimation. The low estimate indicated that the variation due to additive gene action was small and that the variation due to the environmental factor was important.

Breeding values:

Estimates of breeding values of cows, dams and sires for LP, TMY and 305d-MY are presented in Tables 6, 7and 8. The breeding values for LP, TMY and 305d-MYof cows ranged between 49.9 and -31.4 days, 15.7 and -29.7 kg , 8,6 and -12.9 kg, respectively in SF while it ranged between 130.1 and -65.0 days, 17.0 and -12.9 kg, 15.8 and -37.4 kg, respectively in GF. The ranges of breeding values for cows were higher than those for dams or sires for all traits. The results indicated that the range estimates for LP were considerably higher than that for TMY or 305d-MY and it were relatively greater for LP in GF than in SF. This finding cleared a wide variability in LP that can be controlled by proper management in order to optimize milk productivity of cows.

The range of cow breeding values for LP 63.32 days in SF and 195.12 days in GF (Table 6) is greater than 24.2 days reported by Afifi *et al*. (2002).This leads to state that selecting cows for milk production traits of the study according to the cow breeding values would be more reasonable and efficient than selecting them according to their sires or dams breeding values .

The range values either estimated by cows, sires or dams pathways for 305d-MY were wider than that estimated for TMY except that range estimated by cows in SF. Mean while, the maximum breeding values that estimated either by cows or sires for TMY were relatively higher than that for 305 d-MY. The maximum breeding values that estimated by dams did not give a reasonable results for milk traits. However, comparing the maximum breeding values of sires showed higher values attained by SF sires than those attained by GF for milk traits.

The range estimates for milk production either estimated by sires or dams in SF were greater than its correspondence in GF. On the other hand, the range values estimated by cows for TMY in SF were higher than in GF despite opposite trend was observed for 305d-MY.

In consequence, it could be stated that selecting cows in both farms for milk production traits according to cow breeding values concomitant with selecting them according to their sires would be more reliable and efficient.

The high range of breeding values of dams and cows compared to those of sires may be due to using few numbers of proven sires compared to using large number of dam and cows and thus makes a good media for selection in dams and cows . In addition , selection of dams for the next generation would lead to higher genetic improvement in the herd . The same trends were obtained by El-Attar (2009); Allam (2011) and Hammoud (2013) .

Table 6 . The predicted all Cows breeding values (CBV) for milk traits in Friesian cows in Sakha and Ghrbawy herds.

	SF			GF		
	305d MY (kg)	TMY (kg)	LP (day)	305d MY (kg)	TMY (kg)	LP (day)
Maximum						
CBW	49.90	15.75	8.62	130.08	17.02	15.80
Standard error	0.86	0.66	0.65	2.91	1.38	1.63
Accuracy	0.71	0.72	0.87	0.70	0.69	0.73
Minimum						
CBW	-13.42	-29.69	-12.89	-65.04	-12.86	-37.36
Standard error	0.81	0.66	0.58	2.64	1.21	1.72
Accuracy	0.74	0.73	0.91	0.76	0.77	0.69
Range(CBW^{Max} - CBW^{Min})	63.32	45.44	21.51	195.12	29.88	53.16

Table 7. The predicted all Sire breeding values (SBV) for milk traits in Friesian cows in Sakha and Ghrbawy herds .

	SF			GF		
	305d-MY (kg)	TMY (kg)	LP (day)	305d MY (kg)	TMY (kg)	LP (day)
Maximum						
SBW	23.25	15.70	15.24	102.60	11.32	8.66
Standard error	0.75	0.66	1.14	1.95	1.95	1.77
Accuracy	0.78	0.72	0.47	0.88	0.89	0.67
Minimum						
SBW	-26.79	-11.67	-27.04	-47.50	-8.72	-22.04
Standard error	0.83	0.64	1.15	3.02	1.40	1.48
Accuracy	0.73	0.74	0.47	0.67	0.68	0.78
Range(SBW^{Max} - SBW^{Min})	50.04	27.37	42.24	150.1	20.04	30.70

Table 8. The predicted all Dam breeding values (DBV) for milk traits in Friesian cows in Sakha and Ghrbawy herds.

	SF			GF		
	305d- MY (kg)	TMY (kg)	LP (day)	305d MY (kg)	TMY (kg)	LP (day)
Maximum						
DBW	26.69	15.49	16.24	59.93	12.09	15,56
Standard error	0.86	0.66	1.14	2.69	1.20	1.53
Accuracy	0.70	0.72	0.48	0.75	0.78	0.77
Minimum						
DBW	-30.26	-13.88	-29.96	-59.50	-12.56	-20.91
Standard error	0.90	0.64	1.14	2.46	1.15	1.61
Accuracy	0.66	0.75	0.48	0.80	0.80	0.74
Range(DBW^{Max} - DBW^{Min})	56.95	29.37	46.20	119.43	24.65	36.47

CONCLUSION

Results of the present study indicated that non genetic factors (parity, season of calving, year of calving) were found to have a significant (P <0.01) effects on milk production traits. The results also showed that heritability estimates for 305d MY trait of cows in Ghrbawy farm (commercial) were less than that of cows in Sakha farm(state) while, it was greater for LP and TMY traits of Ghrbawy cows.

In the commercial farm (GF), it was found that low negative genetic trends in sires for the studied traits were expected due to the absence of a long term selection plan for sires. On the other side, long term selection program of cows to improve milk production and fertility of cows would be beneficial in the commercial herd. In addition, planned mating with semen of proven sires which possess high potential for milk production would be effective to increase milk traits in such herds.

The ranges of breeding values for cows were higher than those for dams or sires for milk traits. It could be stated that selecting cows for milk production traits according to their breeding values would be more reasonable and efficient than selecting cows according to sires or dams breeding values in both farms.

It can be concluded that improving environmental conditions and management practices, coupled with improved genetic potential of dairy animals in the state or commercial farms would be more effective approaches for high milk productivity.

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مقارنة المعالم الوراثية لصفات انتاج اللبن الفريزيان في المزارع الخاصة والحكومية في مصر

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في هذه الدراسة تم عمل مقارنة من الناحية الوراثية بين مزرعتي سخا و الغرباوي أحدهما تجاري (الغرباوي) والاخر حكومي (سخا) .

اجريت هذه الدراسة على عدد ١٤٣٨ سجل لقطيع ابقار فريزيان (مزرعة حكومية) خلال الفترة من عام ٢٠٠١ الي ٢٠٠٩ التابعة لمعهد بحوث الانتاج الحيواني ، وزارة الزراعة ، الدقي ، مصر لمقارنة هذه المزرعة الحكومية بقطيع تجاري بمزرعة خاصة (الغرباوي) و تم استخدام عدد ١٦٦٠ سجل حليب لقطيع في مزرعة وادى الشرقية بمحافظة الشرقية خلال الفترة ١٩٩٨ الى ٢٠٠٥ لعدد ٤٦٤ بقرة و ٧١ طلوقة .

و شملت الدراسة صفات انتاج اللبن و هي صفة طول فترة الحليب ، انتاج اللبن الكلي ، ٣٠٥ يوم انتاج لبن و دراسة اهم العوامل الغير وراثية ، العوامل الوراثية و كذلك تقييم القيم التربوية لصفات انتاج اللبن

باستخدام تحليل البيانات نموذج الحيوان بطريقةMTDFREML (1995) وتضمن النموذج التأثيرات العشوائية للعوامل الوراثية والتأثيرات الثابتة (ترتيب موسم الولادة ، الموسم ، السنه) لحساب المكافئات الوراثية والقيم المتوقعة للقيم التربوية لكل صفة وكذلك للارتباط الوراثي بين الصفات المختلفة حيث كان لسنة الولادة تأثير عالي المعنوية على صفات الدراسة (طول فترة الحليب، انتاج اللبن الكلى ، 305 لبن يوم) كما كان تأثير موسم الولادة معنوي لجميع صفات الدراسة في حين لم يكن لموسم الولادة أي تأثير معنوي على صفة انتاج اللبن الكلي و ذلك للمزارع الخاصة بينما كان تأثير موسم الولادة معنوي لجميع الصفات المدروسة و ذلك للمزرعة الحكومية.

وجد ان التداخل بين القطيع وبين ترتيب موسم الحليب كان معنويا في كل الصفات المدروسة بينما كان التداخل بين القطيع وموسم الولادة غير معنوي لصفة انتاج اللبن الكلي ، ٣٠٥ يوم انتاج لبن وكان التداخل بين القطيع وترتيب موسم الحليب وموسم الولادة عالي المعنوية لجميع صفات الدراسة .

المكافئ الوراثي لجميع الصفات المدروسة في المزرعة الخاصة اعلى من المزرعة الحكومية .حيث كان ٠،١ ، ٠،١١ ، ٠،١٩ بالنسبة لصفة طول الحياة الانتاجية ، انتاج اللبن الكلي ، ٣٠٥ يوم انتاج لبن في حالة المكافئ الوراثي المباشر و كان ٠،٠٤ ، ٠،٠٧ ، ٠،٠٦ على التوالي للمكافئ الوراثي الامي و ذلك في محطة سخا (الحكومية) بينما كان ٠،١٠ ، ٠،١٣ ، ٠،٠٧ بالنسبة لصفة طول الحياة الانتاجية ، انتاج اللبن الكلى ، ٣٠٥ يوم انتاج لبن في حالة المكافئ الوراثي المباشر

وكان ٠،٠٨ ، ٠,٠٩ ، ٠،١٢ في حالة المكافئ الوراثي الأمي لجميع الصفات على التوالي . و عند مقارنة المزرعتين من الناحية الوراثية وجد أن الارتباط الوراثي في مزرعة سخا عالي وموجب بين الصفات و بعضها بينما في مزرعة الغرباوي الخاصة كان الارتباط الوراثي بالسالب نتيجة للرعاية وبمقارنه القيمة التربوية لإنتاج اللبن للصفات المدروسة للمزرعتين وجد ان القيم التربوية للغرباوي اعلى لصفة LP ، حيث كانت في حالة البقرة ١٩٥،٥ ، الاب ١٥٠،١ ، الام ١١٩،٤ بينما كانت في مزرعة سخا للبقرة ٦٣،٣ ، الاب ٥٠،٤ ، الام ٥٦،٩ على التوالي حيث كانت٤٥،٤ ، ٢١،٥ في سخا لصفة انتاج اللبن الكلي ، ٣٠٥ يوم بالنسبة للبقرة .وكان مدي القيم التربوية للمزرعة الحكومية لصفة انتاج اللبن ، ٣٠٥ يوم اعلى من المزرعة الخاصة بالنسبة للبقرة ، الاب و الام وهذا نتيجة استعمال التلقيح الصناعي وكذلك لوجود انتخاب مما يعني أمكانية التحسين الوراثي في المزارع الخاصة عن طريق الانتخاب واستعمال التلقيح الصناعي .

كان مدي القيم التربوية للبقرة بالنسبة لأغلب الصفات المدروسة أعلي من نظائرها للأب والأم لذلك يمكن الانتخاب للأبقار لصفات أنتاج اللبن علي أساس القيم التربوية للبقرة يكون أكثر كفاءة من الانتخاب علي أساس القيم التربوية للاب أو الام وذلك في كلا المزرعتين (سخا ، الغرباوي) ، كما يمكن تحقيق تحسينا وراثيا ملموسا لصفات أنتاج اللبن في الابقار لكلا المزرعتين عن طريق الانتخاب بالنسبة للقطيع التجاري والرعاية الجيدة والانتخاب بالنسبة للمزرعة الحكومية .