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A Comparison Between Sire and Animal Model for Lifetime Production Traits in Egyptian Buffaloes.

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ABSTRACT

A total of 1621 normal lactation records of Egyptian buffaloes, kept at Mehalat Mosa farm, belonging to the Animal production Research Center, Ministry of Agriculture, Doki, Cairo, Egypt, during the time from 1990 to 2010 were used. Data were analyzed by using sire model (SM) and animal model (AM). For sire model, includes the fixed influences of year, month of birth, age at first calving as covariate and sire as a random effects. For animal model, it includes the fixed influences for month, year of birth, random effects of animals and errors on total milk yield (TMY), totals lactation period (TLP), age at disposal (AGDS) and the numbers of lactation complete (NLC). Means were 10552 kg, 1173 d, 125 mo., and 5.97 for TMY, TLP, AGDS and NLC, respectively. Estimates of heritability from sire model were 0.45, 0.18, 0.90 and 0.36 for TMY, TLP, AGDS and NLC, respectively and from AM were 0.27, 0.17, 0.12 and 0.06 for above traits studied, respectively. Estimates of phenotypic correlations among traits studied ranged from 0.55 to 0.73 for SM and for AM 0.40 to 0.80 and genetic correlations among traits studied ranged from 0.19 to 0.96 for SM and from AM ranged from 0.10 to 0.98. Rank correlations among lifetime and longevity traits as estimated from SM were highly significant (P<0.01) and positive except rank correlation among NLC, TMY and TLP and ranged from 0.08 to 0.98 as estimated from SM. Rank correlations of sire transmitting ability among lifetime and longevity traits as estimated from AM were highly significant (P<0.01) and positive and ranged between 0.33 and 0.88.

Keywords: Sire, animal model, lifetime, Egyptian buffaloes

INTRODUCTION

Dairy females' lifetime production is a really important trait in a herd affecting overall profitability in the dairy industry. A high female lifetime production is desirable because it reduces the cost of rearing heifers moreover it allows a greater proportion of culling decisions to depend on production, instead of involuntary culling. Dairy females have been chosen intensively for productivity traits while lifetime production within the herd has decreased (Galeazzi *et al*. 2010 a). In other words, satiability is an important economic trait that is analyzed in some programs of breeding. This trait measures the period of permanence of the females in the herds and it is highly correlated to milk production and also to its health (Galeazzi *et al*., 2010 b).

The present study aims to study (1) estimates of genetic and phenotypic parameters for lifetime production traits, (2) estimates sire transmitting ability for lifetime production traits by using sire and animal models and (3) comparison between both two models for lifetime production traits in buffalos in Egypt.

MATERIALS AND METHODS

Data of the present study were taken from lactation records of Egyptian buffaloes raised at Mehalet Mousa Farm, belonging to Animal Production Research Centre Ministry of Agriculture, Cairo, Egypt. Data of the present study were recorded during the time from 1990 to 2010. The number of sires, buffaloes and total of lactations records were 115, 360, and 1621, respectively. Sires with less than 5 daughters were not included. Abnormal records affected by diseases like mastitis and udder troubles or disorders such as abortion were not included. Bulls were assigned to naturally mate the female randomly. Artificial insemination (AI) was used from 2009 to 2015. Heifers were served for the first time when they reached 24 mo., or 350 kg. Pregnancy was detected by means of rectal palpation 60 days after the last service. Buffalo bulls were chosen for purposes of breeding at 2-3 years of age. They were assessed for body conformation and for semen characteristics. Each bull was used for breeding for about 3-7 years.

Animals were fed on Egyptian clover (Berseem) during the period from Decem.to May. The animals were fed on concentrate mixture alone with rice straw during the rest of the year. Buffaloes producing more and pregnant in the last 2 months of pregnancy were supplemented with extra concentrate ration. Buffaloes were hand milked twice a day. Lifetime production estimated by total lifetime milk yield (MT, kg) and total lactation period (TLP, d) and longevity which estimated by age at disposal, mo., (AGDS) and the period from birth to disposal(AGDS) and Number of lactations completed (NLC).Table 1, Shows the structure of data used in this analysis.

Table 1. table of data used in the analysis and Numbers. of iterations

Observation	Number
Numbers. of records	1621
Numbers. of buffaloes	360
Numbers. of sires	115
Numbers. of dams	294
Animals in relationship matrix	769
Mixed model equations	5092
No. of iterations	23285

Analysis

Data were analyzed by using sire model (SM) and Animal model (AM). For sire model (SM), data were analyzed by the Mixed Model Least Squares and maximum Likelihood Computer program of Harvey (1990). The fixed effects of month and year of birth and parity and age at first calving as covariate and ransom effects of sire and buffaloes within sires were included in this model. Estimates of sire, buffaloes within sire and residual components of covariance and variance have been computed according to method II of Henderson (1953). Heritability estimates (h^2) , paternal half – sibs heritability (h^2) estimates have been calculated as four times the ratio of $\sigma^2 s$ (sire variance components) to the sum of $\sigma^2 s$, $\sigma^2 c{:}s$ (buffaloes within sire) and σ^2 e (remainder variance components) i.e.,

$$h^2 = 4\,\sigma^2 s / (\sigma^2 s + \sigma^2 c{:}s + \sigma^2 e)$$

The standard error (S.E) of heritability was computed by the formula of Swiger *et al*,. (1964)

$$S.E_{(h^2)} = \sqrt[2]{\frac{2(n.-1)(1-t)^2\left[1+(k_1-1)t\right]^2}{k_1^{\,2}(n.-S)(S-1)}}$$

Where: s = total number of sires, n = total number of records and k = harmonic mean of daughters per sire. Estimates of breeding values are estimated according to program of Harvey (1990).

For Animal Model (AM) heritability, genetic correlations and components of covariance of studied traits were estimated using the MTDFREML program (Boldman *et al*. 1995). The fixed effects of year and month of birth, age at first calving as covariate, and random effects of animals, permanent environmental and errors were included in the model. To estimate heritability (h^2) the following equation was used:

$$h2 = \sigma^2 a / (\sigma^2 a + \sigma^2 p_e + \sigma^2 e)$$

Where $\sigma^2 a$ is additive genetic variance; $\sigma^2 p_e$is permanent environmental variance and $\sigma^2 e$ is the random residual effect.

Estimates of breeding values with standard errors and their accuracy were estimated by Boldman *et al*. (1995).

RESULTS AND DISCUSSION

Table (2) presents unadjusted means of total milk yield (TMY), total lactation period (TLP), age at disposal (AGDS) and number of lactations completed (NLC) . Mean of LTMY was 10551 kg (Table 2). The present means were higher than those reported by Khattab *et al*. (1992) (4732 kg) working on another set of buffaloes in Egypt. Also, the present means were higher than those reported by Dutt *et al*. (1966) (9726kg) on Murrah buffaloes, Awadesian (1997) (5395 kg) on Iraq buffaloes, El-Arian (2001 a) (6240 kg) on Murrah buffaloes, Patel and Tripathi (1998) (5943 kg) on Surit, Bashir *et al*. (2007) (7723 kg) on Nili- Ravii buffalos and Thiruvenkadan *et al*. (2015) (5442 kg) on buffaloes of Murrah.

Overall means of total lactation period (TLP) were 1174 d (Table 2).The current means were longer than those found by Khattab *et al*. (1992)(1083 d) on buffaloes of Egypt, Singh and Yadav (1987)(1013 d) on Murrah buffaloes, Awadesian (1997)(1059 d) on Iraq buffaloes and Bashir *et al*. (2007) (1061 d) on Nili- Ravi buffaloes. Means of age at disposal (AGDS) were 125 mo., (Table 2). The present means were longer than those found by Khattab *et al*. (1992)(114 mo.,) on Egyptian buffaloes, El-Arian and Tripathi (1989) (95 mo.,) on Murrah buffaloes, and Thiruvenkadan *et al*. (2015)(111 mo,.) on Murrah buffaloes. Mean of number of completed lactations was 5.97 (Table 2). The present mean was longer than those found by Khattab *et al*. (1992), El- Arian (2001 a) and Thiruvenkadan *et al*. (2015) studying Egyptian buffaloes and Murrah buffaloes, respectively and ranged from 3.0 to 3.88.

Coefficient of variability for lifetime and longevity traits ranged from 45.39 to 73.59 % (Table 2), it is non-cable that CV % was rather high 73.59%. This was mainly because of the fact that the data included records of animals that were culled in various lactations. In addition, such large variation for lifetime and longevity traits may indicate wider scope for genetic important in these traits in the examined herds. Also, higher CV% for lifetime and longevity traits reflects big variation among individuals in lifetime and longevity traits.

Table 2. Unadjusted means , Standard deviation (SD) and coefficient of variability for Lifetime milk yield (LTMY) , total lactation period (TLP), age at disposal (AGDS) and number of lactation completed (NLC) for Egyptian buffaloes.

Traits	Mean	SD	CV%
LTMY, kg	10551	7764	73.59
TLP, d	1174	750	63.86
AGDS, Mo	125	57	45.39
NLC	5.97	3.22	53.82

Non genetic effects

Month of birth had no significant effects on LTMY, TLP, AGDS and NLC (Table 3). Similar results were reported by Youssef and Asker (1959),Khattab *et al*. (1992), El- Shafie (1994) working on another sets of Egyptian buffaloes and Awadesian (1997) on Iraq buffaloes, El- Arian(2001 a) on Murrah buffaloes, and Sultan and Khattab (1989) and Abou – Bakr (2009) on Friesian cows. Year of birth had a significant effect on LTMY, TLP, AGDS and NLC ($P < 0.01$, Table 3). The significant effect of year of birth on lifetime and longevity traits may be due to different nutritional, managerial practices prevalent at different periods and phenotypic trend (Table 3). Similar results were found by different researchers working on different breeds of buffaloes. In this respect, Sharaby *et al*. (1983) and Khattab *et al*.(1992) with Egyptian buffaloes, reported that year of birth had a significant effect on age at disposal, herd life and number of lactation completed. Awadesian (1997) with Iraq buffaloes found that year of calving had a significant effect on total lifetime production and total days of lactation, they found that the effect of year of calving may be due to annual variation in herd size, feeding system and management practices.

Estimates of phenotypic trends for all lifetime production and longevity traits studied were negative and highly significant, being – 529 kg, -73 d, -5.16 mo., and – 0.34 lact, for LTMY, TLP, AGDS and NLC, respectively ($P < 0.0001$, Table 4). The negative phenotypic trend may be due to limitation of environmental at Mehallet Mousa Farm which did not allow the genetic potential of Egyptian buffaloes to be express fully or may be due to sub- optimal management practices prevailing on the farm and also may be due to different kind of feeding from year to year and different climates and temperature from year to another. Similar results were obtained by El- Arian (2001 a) working on Murrah buffaloes, he concluded that the phenotypic trend for LTMY, TLP and NLC were -253 kg, -77 d and – 0.149, respectively.

In Pakistan, Bashir *et al*. (2007) working on Nili – Ravi buffaloes, reported that year of birth had a significant effect on lifetime milk yield, herd life and productive life.

The same authors also found that the overall phenotypic trend was negative for lifetime milk yield (-280 kg/d), herd life (-93 d) and productive life (-42 d). Galeazzi *et al*. (2010 b) arrived at the same results on Murrah buffaloes.

Values of partial linear and quadratic regression coefficients of LTMY, TLP, AGDS and NLC on age at first calving are presented in (Table 3). Estimates of partial of quadratic regression and linear coefficients of LTMY on age at first calving was not significant and being 78.21±86.13kg/mo., and -8.19±10.48 kg/mo.,2, respectively. Similar results were reported by El- Shafie (1994) working on Egyptian buffaloes. Estimates of partial linear and quadratic regression coefficients of TLP on age at first calving were significant ($P < 0.01$, Table 3) and being 13.82±7.25 d/mo., and -1.54±0.88 d/mo.,2, respectively. Similar results are reported by many authors. In this aspect , Khattab *et al*.(1992) working on 3400 lactation records of buffaloes in Egypt, found that values of partial linear regression coefficients of total milk yield, total lactation period, age at disposal and number of lactation completed were significant being -73.98±8.85 kg/ mo.,– 16.18±2.06 d/mo., 0.60 mo./mo., and -0.0122 lact/mo., respectively. Also, Katrey *et al*. (2005) analysis 953 Friesian cows, reported that first calving age had a significant influence on productive life, cows with very low age at first calving had lower productive life. This might be because of the cows at a very low age could not attain full growth and thus might have been culled out. Also, the same authors concluded that less number of total calves is produce by those cows which had longer first calving age as the cows with lower first calving age had longer productive life.

Table 3. Least squares analysis of variance for factors affecting total milk yield (TMY), total lactation period (TLP), age at disposal (AGDS) and N0. of lactation completed (NLC).

S.O.V	D.f	F – Values			
		LTMY	TLP	AGDS	NLC
Between Sires	114	1.46**	1.33**	1.24**	1.36**
Between month of birth	11	0.80	1.20	0.30	1.39
Between Year of birth	20	2.09**	2.57**	2.61**	1.64**
AFC, Linear	1	0.82	3.61**	0.11	0.02
AFC, Quadratic	1	0.61	3.03**	0.09	0.02
Reminder, M.S.	353	42580509	301966	10.39	1792.20

**** P < 0.01**

Table 4. Estimates of phenotypic trend (P) for total milk yield (TMY),total lactation period (TLP), age at disposal (AGDS) and number of lactations completed (NLC) for Egyptian buffaloes.

Traits	Phenotypic trend (P) and Stander error	
	P + SE	Pr
TMY, kg	-529± 48.71	<0.0001
TLP, d	-73 ±4.09	< 0.0001
AGDS, mo.	-5.16±0.32	< 0.0001
NLC (Lact.)	-0.35+0.02	< 0.0001

Estimates of quadratic regression and partial linear coefficients of AGDS and NLC on first calving age were not significant and being 0.014±0.043 mo./mo., and – 0.085±0.005 mo./mo.,2 , respectively for AGDS as well as 0.042±0.029 lactation/mo., and – 0.008±0.004 lactation/mo., 2 , respectively for NLC (Table 3). Similar results were reported by El-Shafie (1994) in a study based on 907 Egyptian buffaloes, found that estimates of partial linear regression coefficient of age at disposal and No. of lactations completed on first calving age was not significant.

Genetic parameters

Random effects

The buffaloes sire had significant effects on LTMY, TLP, AGDS and NLC ($P < 0.01$, Table 3). The current results indicated that the genetic development of lifetime production and longevity traits could be achieved by selecting sires to improve the production traits of their progeny. Particularly, large magnitude of the sire estimates may indicate a sizable potential for sire in selection programs and or / in change of the herd management to develop yield traits. Similar results were reported by many workers on different varieties of buffaloes. In this respect, Khattab *et al*. (1992) found significant effects of sire on lifetime milk yield and total lactation time. El- Shaife (1994) with another herd of Egyptian buffaloes, reported that sire of the cow had significant effects on age at disposal and number of lactations completed.

Heritability estimates for LTMY, TLP, AGDS and NLC as estimated from sire model (SM) and animal model (AM) are shown in Table 5.Estimates of heritability for LTMY, TLP, AGDS and NLC from SM, by using the model including the fixed effects of month and year of birth, first calving age as a covariate and sire as random effects, were 0.45±0.18, 0.18±0.10, 0.90±0.80 and 0.36±0.18, respectively (Table 5). The present values are higher than those reported by many authors working on different lines of dairy cattle by using sire model. In this respect, Kawthar Mourad *et al*. (1992) with another set of these data reported that h2 values for LTMY, TLP, AGDS and NLC are 0.11, 0.16, 0.05 and 0.03, respectively. El-Arian (2001 a) with Murrah buffaloes, found that h2 values for LTMY and NLC are 0.308 and 0.342, respectively. Also, higher values of h2 for lifetime and longevity traits are reported by El Shafie (1994) stated that h2 values for AGDS and NLC were 0.62 and 0.59, respectively. In addition, El- Arian(2001 b) with 3360 normal lactation records of Holstein cows, using sire model, found that heritability values for , LTMY, TLP and NLC were 0.344, 0.309 and 0.439, respectively.

Heritability values for LTMY, TLP, AGDS and NLC from using multi trait animal model (MTAM), according to MTDFREML program of Boldman (1995) which the model including the fixed effects of month and year of calving and first calving age as covariate and random effects of animals, permanent environmental and errors were 0.27±0.01, 0.17±0.01, 0.12±0.03 and 0.06±0.01, respectively (Table 5). The present values are higher than those reported by many authors working on different breeds of buffaloes. In this respect, Bashir *et al*. (2007) working on 1037 Nili – Ravi buffaloes, using Multi Trait Animal Model (MTAM), found that heritability estimates for lifetime milk yield, herd life and productive life were 0.093 ± 0.056, 0.001± 0.055 and 0.144±0.079, respectively. Galeazzi *et al*. (2010 a) analyses 1016 Murrah female buffaloes, reported that h2 estimates for satiability ranged from 0.11 to 0.23. Chander *et al*. (2008) with Sahiwal cattle, showed that h2 estimates for lifetime performance traits were found to be higher and ranged from 0.40 (no of days in milk) to 0.90 (lifetime milk yield).Khattab *et al*.(2009) with 878 Friesian cows ,by using Multi Trait Animal Model (MTAM), indicated that heritability estimates for lifetime milk yield, lifetime fat yield, lifetime protein yield and number of lactation completed are 0.24, 0.24, 0.23 and 0.12, respectively .Kern *et al*. (2014) working on Holstein cows in Brazil, showed that heritability estimates for measures of longevity ranged from 0.06 to 0.09 using the linear model and from 0.05 to 0.18 for traits using the threshold model.

According to high and moderate estimates of h2 for LTMY, TLP (Table 5), we could come to a conclusion that the genetic improvement in yield of milk and period of lactation could be achieved through sire selection, while the two longevity measurements (.i.e., age at disposal and number of lactation completed) were low heritability estimates. These results indicated that selection for traits of longevity would not be effective because of its low heritability estimates and these traits mainly affected by environmental factors.

Table 5. Estimates of heritability (on diagonal) , genetic correlations (below diagonal) and phenotypic correlations (above diagonal) for total milk yield (TMY), total lactation period (TLP), age at disposal (AGDS) and No. of lactation completed as estimated from sire model (SM) and Animal model (AM) for Egyptian buffaloes.

Traits	SM				AM			
	TMY	TLP	AGDS	NLC	TMY	TLP	AGDS	NLC
TMY	0.45±0.18	0.73	0.55	0.13	0.27±0.01	0.80	0.60	0.50
TLP	0.69±0.18	0.18±0.10	0.69	0. 69	0.70±0.20	0.17±0.01	0.70	0.40
AGDS	0.63± .27	0.19±0.69	0.90±0.80	0.72	0.66±0.21	0.98±0.20	0.12±0.03	0.70
NLC	0.63± .21	0.88±0.10	0.60±0.48	0.36±0.18	0.30±0.10	0.70±0.20	0.10±0.1	0.06+0.01

The present estimates of h2 for various traits studied and calculated from Animal Model (AM) are lower than those estimates obtained from Sire Model (SM) (Table 5). This might be attributed to inclusion of some permanently environmental effects in the animal model and consequently a correction for this effect was taken into account in animal model, which was not considered in the sire model. Moreover, estimate of h2 from sire model was calculated as four times of the covariance between paternal half sibs related to the total phenotypic variance. Similar results are reported by many authors. In this respect, El- Awady *et al*. (2014) with 847 Friesian cows, found that h2 estimates for 305 day milk yield, 305 day fat yield and 305 day protein yield were 0.245, 0.216 and 0.246, respectively as estimated from SM and were 0.057, 0.046 and 0.048, respectively as estimated from AM.

Phenotypic correlation may be defined as the association between two characters that can be directly observed on the same individuals. Phenotypic correlations between LTMY, TLP, AGDS and NLC are presented in Table 6.Phenotypic correlation between LTMY and each of TLP, AGDS and NLC was positive and highly significant and were 0.80, 0.60 and 0.50, respectively(P <0.01, Table 5), and phenotypic correlation between NLC and each of LTP and AGDS were positive and highly significant 0.40 and 0.70, respectively (P <0.01, Table 5).The present results show that high yielding buffalo will remain longer in the herd and the low yielding ones leave the herd at early age after they completed their first lactation. Similar results are obtained by many workers on different varieties of buffaloes. In this respect, Kawthar Mourad *et al*. (1992) with another set of herd reported that Phenotypic correlation between lifetime production milk yield, total lactation period, age at disposal; productive life and number of lactation completed were positive and they ranged from 0.27 to 0.67. El- Shaife (1994) with 907 Egyptian buffaloes, found that phenotypic correlation between age at disposal and number of lactation completed was 0.49.Chauhan *et al*. (1993) on Holstein cows. They found that phenotypic correlations among lifetime yields of milk, fat and protein, productive life and number of lactations completed were close to one. .El- Arian (2001 a) with Murrah buffaloes, reported that there were phenotypic positive and high correlations among total milk yield and longevity traits ranging from 0.87 to 0.95.

Estimates of genetic correlations among LTMY, TLP, AGDS and NLC are presented in Table 5. Genetic correlations between LTMY and each of TLP, AGDS and NLC were positive, highly significant and being0.69, 0.63 and 0.63, respectively (P <.0.01, Table 5). Genetic correlations between NLC and each of TLP and NLC were positive, highly significant and being 0.19 and 0.88 (P <0.01, Table 5). Higher genetic correlations between lifetime and longevity traits showed that the high producing buffaloes are genetically correlated with their longevity. In other words, both the lifetime production traits and longevity traits were likely controlled by the same number of genes so that these traits could be improved simultaneously through selective breeding.

The present values are similar to those reported by many researchers working on different varieties of buffaloes. In this respect, Kawthar Mourad *et al*. (1992) with another set of herd reported that the genetic correlation between lifetime milk yield and total period of lactation was 0.75. Genetic correlation between lifetime production milk yield, total lactation period, age at disposal, productivity life and No.of lactation completed were positive and ranged from 0.41 to 0.63. El-Arian (2001 a) with Murrah buffaloes, found that genetic correlations among lifetime milk yield and longevity traits are positive, highly significant ranging from 0.897 to 1.00. These estimates revealed that both the lifetime production traits and longevity traits were likely controlled by the same number of genes. Bashir *et al*. (2007) with Murrah buffaloes reported that the selection for productive life will increase herd life also total milk yield will be improved. Thiruvenkadan *et al*. (2015) analysis 664 Murrah buffaloes, found that genetic correlation among longevity and traits of milk production were positive and ranged between 0.68 and 1.00.

Estimates of sire transmitting ability (STA's or BLUP values without A-1) as estimation from the mean for lifetime and longevity traits by using sire model (SM) are presented in Table 6. BLUP values ranged between – 961 and 3414 kg for LTMY, between -243 and 132 d for TLP, between -12.22 and 12.16 mo., for AGDS and between – 0.82 and 0.69 lact., for NLC, with the range being 4375 kg, 375 d, 24.38 mo., and 1.61, respectively (Table 6). The present results show that the large differences between sires in the STA's and gave idea about the genetic variation between sires in lifetime production and longevity traits. Increasing the genetic variations between sires revealed that selection of sires which gave positive BLUP values will be helpful for faster genetic improvement in lifetime and longevity traits.

Also, the present results suggested that the importance of evaluating the sires through their daughters and select the top ranking sires with highest positive proofs for future use. Also, the frozen semen of these top ranking sires (to achieve higher selection intensity) for lifetime production and longevity traits as well as their widely and extensively through the field units, this will lead finally to rapid improvement in the genetic potentiality of such important economic traits of Egyptian buffalo.

The current estimates are higher than those found by Kawthar Mourad *et al*,. (1992) working on the same herd and found that the EBV's showed large variations among sires for productive and traits of longevity. The EBV's for lifetime milk yield ranged between -962 and 758 kg; for total lactation period ranged between – 568 and 678 d; for age at disposal ranged between -3.97 and 8.82 mo.; for productive life ranged between -4.19 and 4.56 mo. and for number of lactation completed ranged between 0.04 and 0.03. The higher estimates of the present study than those reported by Kawthar Mourad *et al*. (1992) may be due to used proven sires and used artificial insemination (AI) in recent year from the top bulls which kept at Mehalet Mousa farm. Also, the current estimates are higher than those shown by El-Arian (2001 a) with Murrah buffaloes, he found that ranges of sire transmitting ability were 3070 kg, 820 d and 1.79 for LTMY, TLP and NLC, respectively. The same author suggested that all the buffalo cows should be served using the top ranking sires (to achieve higher selection intensity) as well as their sons for the improvement of genetic potential of buffalos for lifetime production and longevity traits.

Table 6. Estimation of sire transmitting ability (STA) from Sire Model (SM) for total milk yield (TMY), total lactation period (TLP), age at disposal (AGDS) and No. of lactation completed (NLC) for Egyptian buffaloes

Traits	BLUP, values		
	Min	Max	Range
TMY	-961	3414	4375
TLP	-243	132	375
AGDS	-12.22	12.16	24.38
NLC	-0.82	0.69	1.61

In addition, Khattab (1992) and El- Arian (2001 b) working on Friesian and Holstein cows, respectively, estimated BLUP values from Sire Model (SM). They concluded that the large differences observed among sires in their sire transmitting ability values gave an idea about the genetic variation between sires in these important economic traits. The higher values of genetic variation between sires clarified that selection of sires will be helpful for faster genetic improvement in lifetime production and longevity traits which leads simultaneously to increase the productivity.

Min, max, range and accuracy of predicted sire transmitting ability (STA's) for various studied traits as estimated from Multi Trait Animal Model are presented in Table 7. Min and max predicted sire transmitting ability ranged between – 961 and 3414 kg for LTMY, between -243 and 132 d for TLP, between -12.22 and 12.16 mo., for AGDS and between – 0.82 and 0.69 lact, for NLC, with the range being 4375 kg, 375 d, 24.38 mo., and 1.61, respectively (Table 8). The current results indicate large differences among sires for LTMY, TLP, AGDS and NLC, which indicate the great potential for rapid genetic improvement in lifetime and longevity traits of Egyptian buffaloes. Also, the current estimates were smaller than those obtained from SM (Table 7). This may be due to the (1) considering the relationship among sires and (2) considering the genetic covariance among traits and (3).

Table 7. Estimation of sire transmitting ability (STA) with it is accuracy (rit)from Animal Model (AM) for total milk yield (TMY), total lactation period (TLP), age at disposal (AGDS) and No. of lactation completed (NLC) for Egyptian buffaloes

Traits	BLUP, values			
	Min	Max	Range	rit
TMY , kg	-1101	1779	2289	0.30 to 0.35
TLP	-106	180	286	0.20 to 0.30
AGDS	-3.0	2.86	5.87	0.20 to 0.23
NLC	-0.57	0.58	1.15	0.30 to 0.40

Rank correlations of STA's among LTMY, TLP, AGDS and NLC as estimated from SM and AM are presented in Tables 8 and 9. Rank correlations among lifetime and longevity traits as estimated from SM were positive and highly significant expect the rank correlation between NLC and LTMY and TLP (P <0.01) and ranged between 0.08 and 0.98 (Table 8). Similar results are found by Khattab (1992) with Friesian cows, found that the product moment correlation between lifetime and longevity traits as estimated from SM, ranged from 0.10 to 0. 0.69.

Table 8. Rank correlation for sire transmitting ability (STA) for different traits by Using Sire Model (SM.)

Traits	TMY	TLP	AGDS
TLP	0.70±0.05		
AGDS	0.46±0.05	0.98±0.06	
NLC	0.08±0.05	0.08±0.06	0.26±0.06

Table 9. Rank correlation for sire transmitting ability (STA) for different traits by Using Animal Model (AM).

Traits	LTMY	TLP	AGDS
TLP	0.88±0.01		
AGDS	0.67±0.02	0.68±0.04	
NLC	0.48±0.02	0.55±0.05	0.33±0.04

Rank correlations of sire transmitting ability among lifetime and longevity traits as estimated from AM were highly significant (P <0.01) and positive and ranged between 0.33 and 0.88 (Table 9). The present results suggested that in most cased sires have positive BLUP values for lifetime milk production gives positive BLUP values for total lactation period, productive life and more number of lactations and selection of these sires and collect semen from these sires will increase milk production in next generation. In addition, rank correlation among lifetime and longevity traits as estimated from SM and AM are near similar to genetic correlations (Table 5), while the difference may be due to small number of observations for each sire.

Rank correlations between sire model and animal model for sire transmitting ability were significant and positive and ranged from 0.20 to 0.62 (Table 10). The present estimates are the same trend obtained from sire model (0.08 to 0.98, Table 8) and animal model (0.33 to 0.88, Table 9). Also, the rank correlation between SM and AM are similar to genetic correlations among lifetime and longevity traits as estimated from sire model (0.10 to 0.98, Table 5) and from animal model (0.19 to 0.69, Table 5). The present results indicated that both the two methods are succeeded in estimating sire transmitting ability, while using sire model is easy in estimation. Similar results are reported by many authors.

In the same trend, Nowier (2006) in a study based on 2181 Friesian cows, found that the product moment correlations between SM and AM for milk traits were positive, highly significant and ranged from 0.48 to 0.90. Also, the same authors concluded that the product moment correlations between (SM and AM) - AM) were small and ranged from 0.01 to 0.10. Sun *et al*. (2009) with 471,742 records of the first lactation of Danish Holstein cows, found that the correlation between sire breeding values between animal model and sire mode for fertility traits were positive and highly significant and ranged between 0.92 and 0.97.

Table 10. Rank correlation for sire transmitting ability (STA) for different traits by using animal model (AM) and sire Model (SM)

Variable	LTMY	TLP	AGDS
TLP	0.62±0.10		
AGDS	0.48±0.10	0.37±0.10	
NLC	0.20±0.09	0.28±0.10	0.48±0.10

Finally, from breeding side of view and on the basis of the present results which show that although a little difference between SM and AM and in the same time many authors concluded that animal model (AM) is more accurate than sire model (SM). In the other side sire mode are the cheapest in terms of computing costs, while animal model need a higher power of computers and need a starting values to estimate variance components and also suggested that used sire model in small number of observations.

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مقارنة بين نموذج الاب ونموذج الحيوان لصفات طول الحياة الانتاجيه في الجاموس المصري

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تم استخدام مجموعة من سجلات الحليب للجاموس المصري عددها 1621سجلا اخذت من مزرعة محلة موسى التابعة لمركز بحوث الانتاج الحيوانى- وزارة الزراعة - الدقى –القاهرة- مصر . أثناء الفترة من 1990-2010 وقد استخدمت البيانات فى التحليل باستخدام نموذج الاب ونموذج الحيوان. بالنسبة لنموذج الاب كان يحتوى النموذج على التاثيرات الثابتة لسنة وشهر الولادة والعمر عند اول ولادة والتغاير بينهم والاب كعامل عشوائى. بالنسبة لنموذج الحيوان كان يحتوى على التاثيرات الثابتة لسنة وشهر الولادة والتاثيرات العشوائية للحيوانات والاخطاء لكمية اللبن الكلية واجمالى مواسم الحليب والعمر عند الاستبعاد وعدد مواسم الحليب الكاملة .كانت المتوسطات بالنسبة لكميه اللبن الكلية واجمالى مواسم الحليب والعمر عند الاستبعاد وعدد مواسم الحليب الكاملة هي 10552كجم 1173يوم 125شهر.و5.97 على التوالى . وتم تقدير المكافى الوراثى بالنسبة لنموذج الاب كان بالنسبة لكميه اللبن الكلية واجمالى مواسم الحليب والعمر عند الاستبعاد وعدد مواسم الحليب الكاملة هي 0.45 – 0.18- 0.90 و0.36على التوالى . وبالنسبة لنموذج الحيوان كان 0.27- 0.17- 0.12 و.06 بالنسبه للعوامل التي تم دراستها علي التوالي. تم تقدير الارتباط المظهري بين الصفات المدروسه بالنسبه لنموذج الاب و تراوحت بين 0.55-0.73 اما بالنسبه لنموذج الحيوان كانت 0.40- 0.80 والاتباط الوراثي بين الصفات المدروسه بالنسبه لنموذج الاب كانت بين 0.19-0.96 اما بالنسبه لنموذج الحيوان كانت تتراوح من 0.10-0.98 .تم تقدير معامل ارتباط الرتب بالنسبه لنموذج الاب بين صفات طول الحياه الانتاجيه كانت موجبه وعاليه المعنويه ما عدا صفات عدد المواسم الكامله وكمية الحليب الكليه واجمالي موسم الحليب وتراوحت بين 0.08-0.98 كما هو في نموذج الاب . تم تقدير معامل ارتباط الرتب للمقدره التربويه للطلائق بالنسبه لنموذج الحيوان بين صفات طول الحياه الانتاجيه كانت موجبه وعاليه المعنويه وتراوحت بين 0.33-0.88.