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GENETIC AND PHENOLYTIC PARAMETERS FOR EARLY GROWTH TRAITS ON EGYPTION BALADI CALVES

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ABSTRACT

Data on the pre-weaning growth traits of 815 Egyptian native baladi calves borned from the period 1993 to 2014 were used to study the non-genetic, and genetic phenotypic factors of pre-weaning growth traits. The data were collected from Animal Production Research Station at El-Serw, Ministry of Agriculture. Covariance component for birth weight (W0), weaning weight (WW) and average daily gain from birth to weaning (ADG) were estimated by using least squares and maximum likelihood (LSMLMW) computer program of Harvey (1990). Model included sirs and dams within sires as random effects, year and season of birth, sex of calf and parity of cow as fixed effects. In addition, cow weight at calving and suckling days were used as covariate.

The means and standard deviations of body weight at birth, weaning, and average daily gain were 23.47±4.29 kg, 80.59±6.36 kg and 0.477±0.06 g/d, respectively. Statistically season and year of calving and parity of cow did not showed significant effects, but sire and sex of calf had significant effects on studied traits.

The values of heritability were 0.15, 0.33 and 0.38 for body weights at birth, weaning and average daily gain from birth to weaning, respectively. The results showed that most estimates of genetic and phenotypic correlations among body weights and daily gain traits were positive.

Keyword: Genetic parameter- Pre-weaning traits - Egyptian native baladi.

INTRODUCTION

Unfortunately in Egypt, There are no specialized beef breeds. For there the Egyptian native baladi cattle and its crosses breed with Frisian consider as the most published animals in the farms which play an active role in meat production beside the milk. As subside for meat from the meat production side of view; Knowledge on body weight of an individual at early ages (until pre-weaning) in farm animals plays a vital role in their genetic improvement for meat production (Kucuk and Eyduran, 2009; Eyduran *et al*., 2009; Karakus *et al*., 2010). The genetic light of birth weight in farm animals indicated that it consider as the most important character influences the lifetime yields of the animal (Karakus *et al*., 2010). On the basis of this knowledge genetic improvement programs must be introduce the birth weight for its easily measur in one hand and its correlation with of other beef performance traits in the other hand (Sahin *et al*., 2012).

The objectives of the present study were to investigate non-genetic factors affecting pre-weaning growth traits and estimate the genetic and phenotypic parameters for these traits of Egyptian native baladi calves in Egypt.

MATERIALS AND METHODS

Data on the pre-weaning growth traits of 815 Egyptian native baladi borned from the period 1993 to 2014 were collected from Animal Production Research Station at El-Serw, Ministry of Agriculture. The farm located at the north – eastern part of Nile Delta. The data collected to be use in the present study to examine birth weight, weaning weight and average daily gain from birth to weaning. Data were distributed according to season of calving to two seasons, winter from October to March and summer from April to September, year of calving from 1993 to 2014 and parity of nine parties. The management system in the experimental farm was normal system as in most farms. Calves were produced mainly by natural mating for heifers or cows. After calving, birth weight, sex and pedigree of calves were recorded. Calves were borned at round of the year. Body weight were recorded in the morning before feeding. Calves were kept in a semi-open sheds throughout the year. Calves still with cows for three days to fed on colostrum then it gives milk by 10% from its weight twice a day. From the second week it gives starter concentrate of 18% protein and 5% fiber with Egyptian clover in winter while in summer with Egyptian clover hay, then decrease the amount of milk from the sixth week to weaning.

Data were statistically analyzed by linear mixed model least squares and maximum likelihood (LSMLMW) computer program (Harvey, 1990). The analytical model included sire and cow within sire as random effects, year and season of birth , sex of calf and parity as fixed effects. Weight of cow at calving and suckling days as a covariate were included in the model:

$Y_{ijklmno} = \mu + S_i + D_{jj} + Y_k + M_l + S_m + P_n + B(WD) + B(SD) + e_{ijklmno}$

Where:

$Y_{ijklmno}$ = dependent variable (TMY, 305-dMY, LP, DP, FP, FY, FCM and AMY),

μ = the generalized least squares mean,

S_i = the random effect of the i^{th} sire,

D_{jj} = the random effect j^{th} dam within the i^{th} sire,

Y_k = the fixed effect of the $_k^{th}$ year of birth (1993, 1994, 1995 …and 2014),

M_l = the fixed effect of the $_l^{th}$ season of birth (winter (from October to March) = 1, summer (from April to September) = 2),

S_m = the fixed effect of the m^{th} sex of calf (male= 1, female=2),

P_n = the fixed effect of the n^{th} parity of cow (n= 1, 2… 9),

B (W) = the linear regression coefficient of the studied traits on weight of cow at calving (WD),

B (SD) = the linear regression coefficient of the studied traits on suckling day (SD) and

e_{ijklmn} = residual error assumed as random .

Variance and covariance components for different traits studied were computed by using the LSMLMW program (Harvey, 1990). Heritability estimates (h^2) were computed by the paternal half sibs method according to the formula of Henderson (1953) as follows:

$h^2 = 4\ \sigma^2 s/(\sigma^2 s+\sigma^2 e)$

Where, σ^2 s is sire variance component and $\sigma^2 e$ is randam of error.

RESULTS AND DISCUSSIONS

Means, standard deviations (SD) and coefficient of variation (CV %) of birth weight (BW), weaning weight (WW) and average daily gain (ADG) from birth to weaning are presented in Table 1. The present mean of birth weight (23.47±4.29 kg) is lower than 35.3 kg estimated by Gaffer *et al*. (2005), 32.74 kg by Faid-Allah and Ghoneim (2012) and 38.18 kg by El-Arain *et al*. (2014) on Friesian calves in Egypt.

Table 1: Descriptive statistics for studied traits.

Items	BW(kg)	WW (kg)	ADG g/d
Mean	23.47	80.59	0.477
S.D	4.29	6.36	0.06
CV%	0.18	0.08	0.13

The same trend was found in the weaning weight (80.59±6.36 kg) which was lower than these estimated by the same authors in birth weight. In addition, the present estimate of ADG is lower than 0.620 g/d estimated by Oudah and El-Awady (2006) in Frisian calves. Generally the present means for all examined traits are lower in relation to the Friesian calves under Egyptian conditions. The differences may be due mainly to differences in the breed and genotype, as well as management, number of animals, year and months and the models used in the analyses.

Least squares analysis of variance (Table 2) showed significant sire effect on weaning weight and average daily gain ($p<0.01$) and on birth weight ($p<0.05$). Also the year of birth showed high significant effect ($p<0.01$) on weaning weight and average daily gain. Similarly, the results of Oudah and El-Awady (2006) on Frisian calves showed highly significant effects of sire and year of birth on birth weight, weaning weight and average daily gain but the effect of season of calving on weaning weight of calves was not significant. However, Habib et al. (2010) did not found significant effect of sire on birth weight. On the same trend, Simcic et al., (2006), observed significant effects of parity on birth weight. Therefore, Melaku et al. (2011) reported that influence of parity of dam on weaning weight of calves could be related to milking and mothering ability of the dams. This lead to observe the fact that, the calves born from elder dams performed lower than those produced from younger one in relation to higher milk yield effect on the birth weight and subsequent growth performance of calves. The present results showed the significant effect of sex of calf on each BW and WW (Table 2). Likewise, Oudah and El-Awady (2006) reported significant effect of sex on birth and weaning weight and average daily gain of Friesian calves.

Table (1) showed the estimates of heritability (h^2), genetic correlations (r_g) and phenotypic correlations (r_P) among different examined pre-weaning growth traits. Heritability estimates for W0, WW and ADG were 0.15±0.04, 0.33±0.07 and 0.38±0.08, respectively. These estimates are moderate and nearly close with these obtained by Oudah and El-Awady (2006) for weaning weight and average daily gain on Frisian calves in Egypt. The moderate

estimates of h^2 of the pre-weaning growth traits may refer to the possibility of genetic improvement for such traits through selection. In this regard, El-Awady (2003), Oudah and El-Awady (2006) and Faidallah (2010) reached to similar conclusions on Friesian calves.

Table 2: Levels of significant of independent variable on studied traits

Items	BW(kg)	WW (kg)	ADG g/d
Independent variables			
Sire	*	**	**
Dam within the sire	*	NS	*
Year of birth	NS	**	**
Season of birth	NS	NS	NS
Sex of calf	*	**	NS
Parity of cow	NS	NS	NS
Regression			
Dam weight at calving(L)	NS	NS	NS
Suckling days(L)	NS	NS	NS

***significant at p<0.05., NS = Not Significan**

Table 3: Heritability (±SE) (on the diagonal), genetic correlation (below the diagonal) and phenotypic correlations (above the diagonal) between the traits studied

Trait	BW	WW	ADG
BW	0.15±0.04	0.144	-0.480
WW	0.292	0.33±0.07	0.797
ADG	-0.615	0.934	0.38±0.08

Table (3) presents genetic and phenotypic correlations among the studied traits. It could be observe, that birth weight had significant low genetic correlation with WW (0.292), and it was negative with ADG (-0.615); the corresponding phenotypic correlations between BW and WW as well as BW ADG were 0.144 and -0.480, respectively. Weaning weight had significant high genetic correlation (0.934) with the pre-weaning daily weight gain; the corresponding phenotypic correlation between WW and ADG was 0.797. Therefore, selection would be expected to improve pre-weaning daily weight gain trait.

The results of El-Awady (2003) are in agreement with the present results, he obtained positive genetic (0.49) and phenotypic (0.56) correlations between birth weights and weaning weights of calves. He also found that the negative genetic (-0.14) and phenotypic (-0.22) correlations between birth weight and average daily gain. Similarly, Oudah and El-Awady (2006) found that the genetic and phenotypic correlations among different traits of growth in Friesian calves were positive except between birth weight and average daily gain was negative. Therefore they concluded that selection for birth weight would be associated with genetic and phenotypic improvement in the growth traits from birth to weaning on the basis of the linkage between pre- and postnatal growth traits in beef cattle.

CONCLUSION

In spite of, the low productivity of the native baladi cattle in Egypt; the farmers in Egypt still look to their animals as a principle for meat as well milk production. However, from the other side, these animals still represent genes store of the native cattle. The results of the present study indicated that sire have highly significant effects on pre-weaning traits. Therefore, more Genetic improvement could be achieve through sire selection. Also according to the moderate h^2 estimates and positive genetic and phenotypic correlations, it could be concluded that the genetic improvement for pre-weaning growth traits could be achieve through direct or indirect selection.

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المعالم الوراثية والمظهرية لصفات النمو المبكر للعجول البلدية المصرية

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تم استخدام البياتات الخاصة بصفات النمو لمرحلة ماقبل الفطام الخاصة ب ٨١٥ بلدي مصري في الفترة من ١٩٩٣-٢٠٠٤. لتقديرالعوامل غير الوراثية و الوراثية والمظهرية المؤثرة على صفات النمو لمرحلة ماقبل الفطام. تم تجميع البيانات من مركز بحوث الانتاج الحيواني، محطة السرو، وزارة الزراعة. وتم تحليل البيانات باستخدام برنامج Harvy (1990).

كانت متوسطات صفات الوزن للعجول عند الميلاد والفطام ومتوسط الزيادة اليومية في الوزن هي ٢٣,٤٧, ٨٠,٥٩ كيلو جرام و٤٧٧ جم/يوم على التوالي.

لم يكن لفصل وسنة الولادة وموسم الولادة تاثير معنوي, ولكن كان للذكر والجنس تاثير معنوي على الصفات المدروسة.

كانت قيم المكافئات الوراثية ٠,١٥، ٠,٣٣و٠,٣٨ لصفات الوزن للعجل عند الميلاد والفطام ومتوسط الزيادة اليومية في الوزن على التوالي ومعظم الارتباطات الوراثية كانت موجبة.

اشار البحث الي أهمية الماشية المحلية للحفاظ علي الجينات الخاصة بها و انه يمكن الحصول على تحسين وراثي لصفات النمو في الفترة قبل الفطام من خلال الانتخاب المباشر او الغير مباشر.