



## GENETIC EVALUATION OF RAMS FOR TOTAL MILK YIELD IN IRAQI AWASSI SHEEP

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### ABSTRACT

This study was conducted at the Improvement of Sheep and Goats Station, Ministry of Agriculture, Iraq. A total of 344 milk records of the Awassi ewes collected during 2006-2007 were used to investigate the effect of non-genetic factors (year of calving, parity, lamb sex and litter size) on total milk yield (TMY), average daily milk yield (ADMY) and lactation period (LP). Data were analyzed by using GLM in SAS program. Components of variance for the random effects in the employed mixed model were estimated by MIVQUE method. Harvey program was used to estimate Best Linear Unbiased Prediction (BLUP) values of sires for all studied traits. Results showed that the total milk yield (TMY), average daily milk yield (ADMY) and lactation period (LP) was significantly affected by parity and production year. Litter size affected only LP, whereas the effect of lamb sex was not significant on all traits. The averages of total milk yield, average daily milk yield and lactation period were 73.16 kg, 0.81 kg and 85.78 day, respectively. Heritability estimates ( $h^2$ ) of TMY, ADMY and LP were 0.47, 0.44 and 0.33 respectively. BLUP values of sires for total milk yield were between 48.49 and -39.17 kg. These results provide evidence that Awassi sheep will response to genetic improvement process.

**Keywords:** sheep, awassi, genetic evaluation, productive traits, milk yield.

### INTRODUCTION

The Awassi is the most numerous and widespread breed of sheep in south-west Asia. It is the dominant type in Iraq, the most important sheep in the Syrian Arab Republic and the only indigenous breed of sheep in Lebanon, Jordan. In the north of the Kingdom of Saudi Arabia, it is bred under desert conditions. In Turkey, the Awassi makes up one percent [6]. The name of the Awassi is attributed to the El-Awas tribe between the Tigris and Euphrates rivers.

Awassi breed is well adapted to harsh conditions and capable to produce and reproduce properly under these conditions [11].

The low productivity of this breed has been documented in Iraq [1, 5, 11]. Several attempts have been made to improve the productivity of this breed in different countries such as Eliya and Juma [5] and Karam *et al.* [11] in Iraq; Carasso [3], Eyal *et al.* [8] and Epstein [7] in Palestine; Wallach and Eyal [24] in Iran and Yalcin [25] in Turkey. The most notes worthy of all these researches is for their agreement about that the Awassi breed highly responds to genetic improvement.

The present study aimed to evaluate rams according to the total milk yield and to investigate the effect of some factors on some productive traits in addition to estimate their heritability.

### MATERIALS AND METHODS

This study was conducted at the Improvement of Sheep and Goats Station, Abu Gharib, Ministry of Agriculture, Iraq.

A total of 344 records of 187 Awassi ewes daughters of 29 sires were analyzed in this study. The flock was kept in semi-shaded houses, grazed mainly on natural pastures and some green forage legumes and cereals during March-May. During June-November, the

flock grazed on crop residues post harvesting with access to grazing a triplex shrubs, in addition to some supplements (250-500 gm/head) of feed concentrates according to their physiological status. In winter, the flock was fed 0.5-1.0 kg concentrate of mixed grain in addition to 0.5-1.0 kg of hay and straw.

Milk yield was measured weekly (Twice-daily). On the milk recording day, lambs were isolated from their dams, and dam's udders were evacuated handily from the surplus milk post lambs suckling, and milk produced was weighed and recorded. This method was routinely repeated till lambs were weaned at 60 days of age.

Statistical analysis

The productive traits analyzed in this study are: total milk yield, average daily milk yield and lactation period.

General Linear Model (GLM) in SAS program [22] was submitted to investigate the effect of some fixed factors on the mentioned traits in Awassi sheep according to the following linear model:

$$Y_{ijklm} = \mu + P_i + X_j + W_k + G_l + e_{ijklm}$$

Where  $Y_{ijklm}$  is age at puberty,  $\mu$  is the overall means,  $P_i$  the fixed effect of  $i^{\text{th}}$  parity ( $i = 1 - 2$ ),  $X_j$  the fixed effect of  $j^{\text{th}}$  birth year ( $j = 2006-2007$ ),  $W_k$  the  $k^{\text{th}}$  effect of litter size ( $k = 1 = \text{single}, 2 = \text{twins}$ ),  $G_l$  the fixed effect of the  $l^{\text{th}}$  sex of lamb and  $e_{ijklm}$  is the residual effect.

Mixed model was used to estimate variance components using Minimum Variance Quadratic Unbiased Estimation (MIVQUE) method [19] as following model:

$$Y_{ijklmn} = \mu + P_i + X_j + W_k + G_l + S_m + e_{ijklmn}$$

Where  $Y_{ijklm}$ ,  $\mu$ ,  $P_i$ ,  $X_j$ ,  $W_k$ ,  $G_l$  and  $e_{ijklm}$  are the same in the first model, whereas  $S_m$  is the random effect of sires. The same model was also used to estimate Best



Linear Unbiased Prediction (BLUP) for sires according to the total milk yield of their daughters [9].

## RESULTS

The overall mean of TMY, ADMY and LP (73.16 kg, 0.81 kg and 85.78 days) are presented in Table-1. Table-2 shows that the differences between parities are statistically significant ( $P < 0.01$ ) for all traits. The results of the present study also showed that the productive traits increased significantly ( $P < 0.01$ ) with advancing year of production for each of, TMY (38.95 to 97.40 kg), ADMY (0.48 to 1.05 kg) and LP (82.72 to 88.96 days).

The effect of litter size was significant ( $P < 0.01$ ) on LP whereas the effect was not on TMY and ADMY. The effect of lamb sex was not significant on all traits.

Heritability was estimated from the paternal half sib's correlation for TMY, ADMY and LP to be 0.47, 0.44 and 0.33 respectively (Table-3).

Table-4 shows the BLUP values of sires for TMY. The highest and lowest value of BLUP was 48.49 and -39.17 kg, respectively.

**Table-1.** The Least Square Mean of total milk yield (TMY) kg, average daily milk yield (ADMY) kg and lactation period (LP) days in Awassi sheep.

Source of variation	No.	Least Square mean $\pm$ SE		
		TMY	ADMY	LP
Overall means	344			
Parity				
1	157	41.83 $\pm$ 4.51	0.68 $\pm$ 0.03	68.88 $\pm$ 2.27
2	187	94.53 $\pm$ 4.06	0.86 $\pm$ 0.03	102.80 $\pm$ 2.05
Production year				
2006	157	38.95 $\pm$ 4.52	0.48 $\pm$ 0.03	82.72 $\pm$ 2.28
2007	187	97.40 $\pm$ 4.04	1.05 $\pm$ 0.03	88.96 $\pm$ 2.04
Litter size				
Single	235	67.56 $\pm$ 3.51	0.79 $\pm$ 0.02	80.81 $\pm$ 1.77
Twins	109	68.80 $\pm$ 5.18	0.75 $\pm$ 0.03	90.87 $\pm$ 2.62
Gender				
Male	170	66.85 $\pm$ 4.32	0.75 $\pm$ 0.03	84.87 $\pm$ 2.18
Female	174	69.50 $\pm$ 4.23	0.78 $\pm$ 0.03	86.81 $\pm$ 2.14

**Table-2.** Analysis of variance for some factors affecting total milk yield (TMY), Average daily milk yield (ADMY) and lactation period (LP) in Awassi sheep.

Source of variation	d.f.	Mean squares		
		TMY	ADMY	LP
Parity	1	234965.46 **	2.72 **	97698.24 **
Prod. year	1	288793.24 **	27.30 **	3309.03 *
Litter size	1	113.83	0.10	7491.47 **
Gender	1	602.32	0.10	325.04
Residual	339	2880.65	0.16	737.26

\* ( $P < 0.05$ ), \*\* ( $P < 0.01$ )



**Table 3.** Heritability ( $h^2$ ) of total milk yield (TMY), average daily milk yield (ADMY) and lactation period (LP) in Awassi sheep.

Trait	Heritability ( $h^2$ )
TMY	0.47
ADMY	0.44
LP	0.33

**Table 4.** Best Linear Unbiased Prediction (BLUP) values (kg) of rams for total milk yield in Awassi sheep.

Rank of ram	Ram No.	BLUP (kg)
1	11924	48.49
2	11908	30.98
3	11996	30.13
4	11909	24.60
5	11989	23.11
=	=	=
=	=	=
25	11877	- 19.91
26	1214	- 20.97
27	1203	- 21.14
28	1167	- 25.24
29	1259	- 39.17

## DISCUSSIONS

All estimates of productive traits were lower than results reported by numerous researchers [7, 11, 18]. These lower estimates are attributed to many reasons such as: hot climate of Iraq, which could affect the sheep productivity, particularly, several researches [14, 15, 23] reported that: in tropical and sub-tropical areas, indigenous sheep affected by high ambient temperature which is the major constraint on animal productivity. Other important reason for that's low productivity is that, Awassi bred mainly for mutton and not for milk in Iraq. In other words there is no improvement in Iraqi Awassi for milk production. Hence, the average milk yield seems to be normal according to what Mason [16] stated "Awassi sheep possess a high potential for milk production although the annual yield of ewes in unimproved flocks has been estimated at only 40 kg, to which about 20 kg taken by the lamb must be added".

Ewes in second parity had higher estimates for TMY, AVDM and LP compared to first parity. This is interpreted by the increment of maturity with advancing age or parity [13]. The same trend was observed by Dario and Carnicella [4] and Kassem *et al.*, [12]. The significant effect of production year in this study reflect the differences between years in management and nutrition (quality and quantity), which seem to be in the same stream of that obtained by Reuiz *et al.*, [20] and Pacinovski *et al.*, [17].

However, LP affected significantly by litter size, the effect of this factor was not on TMY and ADMY. These results disagree with those of Al-Azzawi *et al.*, [2] and Pollott and Gootwine [18] who revealed that productive traits increased with high twinning rate as the simulation effect being higher in ewes having birth to twins compared to those of singles.

The high estimate of heritability for TMY (0.47) was in consistence with 0.53 and 0.41 reported by Hossamo *et al.* [10] and Kassem *et al.*, [12] respectively. Heritability of ADMY was high also (0.44). These results provide good evidence that selection will improve the productive performance in Awassi sheep in Iraq. The heritability of LP in this study (0.33) was similar to 0.38 reported by Sanna *et al.* [21].

The wide range between the BLUP values of rams for TMY (48.49 and -39.17 kg) indicated that selection of elite rams will improve the total milk yield in Awassi sheep. These results support the previous results which revealed that Awassi sheep possess a high potential for milk production.

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