A STUDY OF BODY WEIGHT AND MILK TRAITS OF KARADI EWES – SULAIMANI GOVERNORATE, IRAQ

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Abstract. This study was carried out to investigate the effect of some factors on birth weight (BW), weaning weight (WW), marketing weight (MW), average daily gain (ADG), daily milk yield (DMY), total milk yield (TMY), protein and fat percentage. A 135 ewes from three flocks used, 114 of them were lambed. The mean ± SE of BW, WW, MW, ADG, DMY, TMY, protein percentage and fat percentage were 4.14 ± 0.65, 16.37 ± 2.87, 23.60 ± 4.42, 0.12 ± 0.02, 0.236 ± 0.10, 34.07 ± 5.94 kg, and 5.33 ± 0.62% and 5.30 ± 12.93%, respectively. All studied traits were significantly ($P \leq 0.05$) affected by flock except BW, protein and fat percentages. Month of lambing had significant effects ($P \leq 0.05$) on MW, ADG and Post daily gain. Stage of lactation had a significant effect ($P \leq 0.05$) on daily milk yield and protein percentage. The lowest and highest BLUP values for BW, WW, MW, ADG, DMY, TMY, protein and fat percentages were -1.6411, 1.6889kg, -6.5307, 10.1293kg, -9.9775, 13.1725 kg, -10.5293, 10.7504 kg, -31.02, 7.38kg, -2.0546, 2.0097%, -1.703, 1.40% respectively. These results indicated that there are high genetic variations among animals for all above studied traits. It means that selection can play a big role in improving economical traits.
Keywords: *Birth Weight, Weaning Weight, Marketing Weight, Milk Yield, BLUP, Fat %, Protein %*

Introduction

Small ruminants (sheep and goat) are important investments in Iraq. They play a major role in strengthening the backbone of the rural economy. The Karadi sheep which comprises about 18-20% of the total sheep population to the northeastern mountain, villages and undulating dry-farming plain of Kurdistan region of Iraq (Alkass and Juma, 2005). Sheep and goat population in Kurdistan region had been estimated to be around 3,500,000 (Ahmad, 2011). Productivity of this breed is low due to the fact that animals are naturally selected for survival under suboptimal environments. Assessment of the amount of milk produced by ewes provides information for the implementation of optimum management and feeding strategies for female sheep and their lambs (Cardellino and Benson, 2002).

Many studies analyzing the factors affecting ewes' growth performance, milk yield and milk composition were reported (Al-Barzinji and Hassan, 2005; Antonič *et al.*, 2013). The main factors were flock (Meraï *et al.*, 2014; Everett-Hincks, *et al.*, 2014; Rahimi *et al.*, 2014), ewes age (Ramakrishanappa *et al.*, 2015; Sezenler *et al.*, 2016; Siddalingamurthy *et al.*, 2017), sex of lamb (Al-Samarai *et al.*, 2016; Al-Bial *et al.*, 2016; Malik *et al.*, 2016), month of lambing (Al-Samarai *et al.*, 2016; Malik *et al.*, 2016). The effect of stage of lactation on milk yield and composition were also reported by (Kuchtik *et al.*, 2008; Komprej *et al.*, 2012).

In order to devise effective breeding plans for genetic improvement of Karadi ewes, information on the extent of genetic and environmental factors on performance traits is the pre-requisite. Therefore, this study was planned to generate information on the relative importance of genetic and environmental factors on the growth and milk traits of Karadi ewes in addition to estimating the Best Linear Unbiased Prediction (BLUP) for some growth and milk traits.

Materials and methods

The data were obtained from Karadi ewes in three private flocks (*Fig. 1*) at different location, Arbat District (Latitude, 35° 25’ 14”, Longitude, 45° 03’ 36”, W, elevation 681 m), Sharazoor District (Latitude, 35° 15’ 27”, Longitude, 45° 42’ 21”, W, elevation 614 m) and Mawat District (Latitude, 35° 52’ 34”, 45° 24’ 35”, W, elevation 858 m) around Sulamania governorate in Kurdistan Region of Iraq (*Fig. 2*). All animals were apparently healthy and were fed on pasture under open field conditions. In this study, 114 ewes were utilized. At lambing ewes and lambs were identified with spray in addition to the plastic tags with numbers. Lambing date, birth weight, sex of lambs, and other relevant information were recorded. Body weights of lambs at birth and at age of 90 (Weaning weight) and 150 (Marketing weight) days, were also recorded. Milk yield was recorded monthly starting from the second week of lambing until the 150 days (less than 50 gm milk/ewe/day) post partum using lamb-suckling technique plus hand milking (Mousa and Shetawi, 1994). Lambs were separated from dams at 7.00 pm on the day before measuring test milk production. In the following day, lambs were weighed at 7.00 am., and left to suckle their dams until satisfaction, then reweighed and kept away from their mothers, while the residual milk in the udder of each ewe were hand milked and weighted, and the amount of milk was recorded and then multiplied by 2 to calculate the daily milk yield, which multiplied by 30 then summed to calculate the total milk yield (ICARDA and FAO, 1995). Protein% and fat% of milk were estimated from the milk sample monthly using Milkoscan TM minor machine (P/N 6004 4208, Issue 1 GB, March 2010, FOSS Analytical, 69, Slangerupgade, DK 3400 Hillerod, Denmark).

The PROC GLM (General Linear Model) procedure in SAS programs (2010) was used to analyze the data for weights at different ages, average daily gain as well as milk yield traits. Fixed effects studies were: parity, sex of lamb, the month of birth, and age at weaning were fitted in the following model (1) and (2):

Model I for weight traits

$$Y_{ijklm} = \mu + V_i + N_j + O_k + H_l + E_{ijklm} \quad \text{(Eq.1)}$$

where Yijklm = Weights of lambs at different ages and average daily gain (ADG) of individual lambs; μ = Over all mean; Vi = Fixed effect of flock (i = 1,2,3); Nj = Fixed effect of age of dam (j = 1,2,3,4,5); Ok = Fixed effect of sex of lams (k = male, female); Hl = Fixed effect of month of lambing (l = November, December, January and February); Eijklm = Random/error effect.

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Figure 1. *Sheep photo with flocks*

Figure 2. *Study locations*

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Model II for milk traits

$$Y_{ijklmn} = \mu + Vi + Nj + Ok + Hl + Zm + E_{ijklmn} \quad \text{(Eq.2)}$$

The notation of the second model is similar to the first model except Zm = Fixed effect of stage of lactation (m = 1, 2, 3, 4, 5).

Tukey tests used to compare between means for all traits under study because its suitable test to comparing least square means with this program. For genetics evaluation of ewes for various performance traits, Best Linear Unbiased Prediction (BLUP) procedure described by (SAS, 2010) was applied. The model used for this purpose was the Mixed Model (fixed + random effects) of (SAS, 2010) software.

Results

Growth traits of Karadi lambs

Least square means ± SE of BW, WW, MW, ADG, pre-weaning and post weaning daily gain of the Karadi lambs are presented in *Table 1*. The overall means of BW, WW, MW, ADG pre-weaning and post weaning daily gain were 4.14 ± 0.65 kg, 16.37 ± 2.87 kg, 23.60 ± 4.42 kg and 0.12 ± 0.02 kg, 0.13 ± 0.02 kg and 0.12 ± 0.04 kg, respectively.

Milk traits of Karadi ewes

The least square means ± SE of to identify the effect of fixed effects on the observed milk production performance recorded such as daily milk yield, total milk yield, protein% and fat% are given in *Table 2*. The overall means were 0.236 ± 0.10 kg/day, 34.07 ± 5.94 kg/day, 5.33 ± 0.62% and 5.30 ± 12.93% for DMY, TMY, protein% and fat% respectively.

The BLUP values of ewes for some studied traits are shown in *Table 3*. The lowest BLUP values for BW, WW, MW, DMY, TMY, protein% and fat% were -1.641, -6.530, -9.977, -10.52, -2.054, -34.20 and -1.703 kg respectively. The corresponding values of highest BLUP values were 1.688, 10.12, 13.17, 10.75, 2.009, 7.380 and 1.406 kg.

Discussion

Growth traits of Karadi lambs

The mean of the BW (4.14 ± 0.65 kg) in current study was moderately high and the birth weight have significant effect on other last weights, for that the increase this trait is very importance in sheep breeding. This result was agreement with other studies reported earlier by several investigators in different breeds of sheep (Hussain *et al*., 2006; Jawasreh and Khasawneh, 2007). Also the mean of WW/lamb (16.37 ± 2.87 kg) and MW/Lamb (23.60 ± 4.42 kg) were moderately high and marketing weigh determines the outcome of sheep breeders, for that increases these traits necessary in sheep breeding. The effects of flock on WW, MW, ADG pre-weaning and post weaning were significant ($P \leq 0.05$). The significant differences in weaning weight due to flock was in agreement with results obtained by Baneh *et al*. (2010), Tariq *et al*. (2011), Everett-Hincks *et al*. (2014) and Rahimi *et al*. (2014). The significant differences due to flock on ADG and pre-weaning daily gain were in agreement with resulted reported earlier by Baneh and Hafezian (2009) and Tariq *et al*. (2013). Flock can have a significant effect on body weight at different ages and average daily gain and could be attributed mainly to differences in management and environmental conditions. This results show the good management and conditions have significant effect on lambs weight traits, because these type of trait classified as a quantification trait which controlled by each genotypic and environmental effect with interaction between them.

The ewe age seems to have no significant effect on all lambs body weight such effect of ewe age on lambs birth and weaning weight are in agreement with some earlier studies (Al-Barzinji, 2003; Jalil-Sarghale *et al*., 2014; Al-Bial *et al*., 2016). Similar results of pre-weaning daily gain in different breeds have been noticed by other (Khalaf *et al*., 2010; Gokdal, *et al*., 2006). Non significant effect of post-weaning gain due to the age found under the present study was disagreement with that reported by (Baneh and Hafezian, 2009; Marufa *et al*., 2017).

Male lambs were statistically heavier than females at birth, although, this difference was statistically no significant for other growth traits (*Table 1*). Similarly, many authors claimed that sex of lamb had no effect on birth and weaning weight of different breeds of sheep (Al-Bial *et al*., 2016; Siddalingamurthy *et al*., 2017). Moreover, the findings in this study for pre-weaning daily gain was also in agreement with those previously obtained by Gokdal *et al*. (2006) and Abbas *et al*. (2010). Likewise, daily weight gain after weaning stage by sex of lamb observed in the present study was in accordance with reported finding by Marufa *et al*. (2017). Although average daily gain was heavies for male than female lambs, differences between them lacked significance. Their averages were 0.15 ± 0.01 and 0.13 ± 0.00 kg, respectively.

The month of lambing also influences MW, ADG and post daily gain. Lambs born early in the lambing period (December and January) gained weight better than those born late (February) due to the accessibility to the pastures in spring season. Lambs born late will not be able to use pasture in spring because of their young age besides they may have higher exposure to internal parasites which thrive in the high temperature. Thus, their weaning and yearling weights will be lower than those lambed early (Elwakil *et al*., 2009). Heaviest lambs at birth and marketing weight were at December, whereas the lighter lamb's birth weight and marketing weight were at February. It is known that month of birth may cause variations in weight and performance of lambs due to climatic variations and/or management (Bathaei and Leroy, 1997). For weight at marketing age, lambs born at December and January were significantly ($p \leq 0.05$) heaviest than those lambs born at February. However, results of the present study were similar to those reported earlier claiming that month of lambing was not significantly affect birth weight in different breeds of sheep (Khalaf *et al*., 2010; Al-Bial *et al*., 2016) and weaning weight (Mohammed, 2008). The present results for pre-waning daily gain agreed with those reported by Abbas *et al*. (2010) who reported pre-weaning daily gain from birth to weaning did not significantly affected by month of lambing. The differences among different reports may be due to breed, size of the data set or method of estimation used in different studies, production system, climatic conditions and ecological zones, where sheep farming were practiced. The significant influences of environmental factors on body weight in the present study can be explained in part by differences in environment, feeding, grazing resources, male and female endocrine system, limited uterine space, and inadequate availability of nutrients during pregnancy, maternal effects and maternal ability of dam at different ages (Rashidi *et al*., 2008).

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Table 1. *Least square means ± SE (kg) for birth weight, weaning weight, marketing weight, average daily gain, pre-weaning daily gain and post weaning daily gain in Karadi lambs*

Fixed effects	Birth weight	Weaning weight	Marketing weight	Daily gain		
				Average	Pre-weaning	Post-weaning
Overall mean	4.14 ± 0.65	16.37 ± 2.87	23.60 ± 4.42	0.12 ± 0.02	0.13 ± 0.02	0.12 ± 0.04
Flock	NS	*	*	*	*	*
1	4.34 ± 0.13[a]	15.66 ± 0.60[a]	19.64 ± 0.93[a]	0.10 ± 0.01[a]	0.12 ± 0.01[a]	0.06 ± 0.01[a]
2	3.66 ± 0.37[a]	19.86 ± 1.66[b]	28.22 ± 2.58[b]	0.16 ± 0.01[b]	0.17 ± 0.01[b]	0.13 ± 0.02[b]
3	4.17 ± 0.22[a]	14.80 ± 1.00[a]	29.48 ± 1.53[b]	0.16 ± 0.00[b]	0.11 ± 0.01[a]	0.24 ± 0.01[c]
Ewes age (year)	NS	NS	NS	NS	NS	NS
2.5	4.15 ± 0.19[a]	16.49 ± 0.87[a]	25.52 ± 1.34[a]	0.14 ± 0.01[a]	0.13 ± 0.01[a]	0.15 ± 0.01[a]
3.5	3.95 ± 0.18[a]	16.81 ± 0.82[a]	25.54 ± 1.26[a]	0.14 ± 0.01[a]	0.14 ± 0.01[a]	0.14 ± 0.01[a]
4.5	3.73 ± 0.21[a]	15.56 ± 0.93[a]	24.01 ± 1.44[a]	0.13 ± 0.01[a]	0.13 ± 0.01[a]	0.14 ± 0.01[a]
5.5	4.38 ± 0.27[a]	18.24 ± 1.18[a]	28.04 ± 1.82[a]	0.15 ± 0.01[a]	0.15 ± 0.02[a]	0.16 ± 0.01[a]
Sex of lamb	NS	NS	NS	NS	NS	NS
Male	4.20 ± 0.25[a]	18.03 ± 1.12[a]	27.12 ± 1.73[a]	0.15 ± 0.01[a]	0.15 ± 0.01[a]	0.15 ± 0.01[a]
Female	3.91 ± 0.22[a]	15.53 ± 0.97[a]	24.44 ± 1.49[a]	0.13 ± 0.01[a]	0.12 ± 0.01[a]	0.14 ± 0.01[a]
Month of lambing	NS	NS	*	*	NS	*
November	4.06 ± 0.14[a]	15.60 ± 0.64[a]	25.06 ± 0.99[ab]	0.14 ± 0.01[ab]	0.12 ± 0.01[a]	0.15 ± 0.01[a]
December	4.35 ± 0.28[a]	16.68 ± 1.25[a]	29.99 ± 1.92[a]	0.17 ± 0.01[a]	0.13 ± 0.01[a]	0.22 ± 0.02[b]
January	4.11 ± 0.28[a]	18.06 ± 1.24[a]	27.02 ± 1.92[a]	0.15 ± 0.01[a]	0.15 ± 0.01[a]	0.14 ± 0.02[a]
February	3.70 ± 0.32[a]	16.75 ± 1.40[a]	21.04 ± 2.16[b]	0.11 ± 0.01[b]	0.14 ± 0.01[a]	0.07 ± 0.02[c]

Means in the same column for each factor with different letters are significantly ($p \leq 0.05$) different from each other. NS: non significant

Milk traits of Karadi ewes

The least square means ± SE of to identify the effect of fixed effects on the observed milk production performance recorded such as daily milk yield, total milk yield, protein% and fat% are given in *Table 2*. The overall means were 0.236 ± 0.10 kg/day, 34.07 ± 5.94 kg/day, 5.33 ± 0.62% and 5.30 ± 12.93% for DMY, TMY, protein and fat respectively. The average of daily and total milk yield observed in this study were lower than the range reported earlier by several investigators in different breeds of sheep (Oramari, 2009; Abd Allah *et al*., 2011). However, protein and fat percentage were similar to other studies reported earlier by several investigators in different breeds of sheep (Bendelja *et al*., 2009; Abd El-Fatah and Awad, 2014).

Flock significantly ($P \leq 0.05$) affected milk production traits. Daily milk yield and total milk yield produced by ewes that were in the third flock was higher (0.312 ± 0.01 and 45.59 ± 2.05 kg) than those produced by ewes from first and second flock (0.220 ± 0.01, 0.211 ± 0.02 and 32.32 ± 1.24, 33.45 ± 3.40 kg) respectively. Many results are in agreement with the significance effect of flock on daily milk yield (Gardi, 2008; Pérez-Cabal *et al*., 2013). Moreover, similar significance effect of flock on total milk yield was also reported by (Pérez-Cabal *et al*., 2013; Meraï *et al*., 2014).

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Table 2. *Least square means ± SE for daily milk yield (DMY), total milk yield (TMY), protein% and fat% in Karadi ewes*

Fixed effects	DMY (kg)	TMY (kg)	Protein %	Fat%
Overall mean	0.236 ± 0.10	34.07 ± 5.94	5.33 ± 0.62	5.30 ± 12.93
Flock	*	*	NS	NS
1	0.220 ± 0.01[a]	32.32 ± 1.24[a]	5.33 ± 0.06[a]	4.23 ± 1.27[a]
2	0.211 ± 0.02[a]	33.45 ± 3.40[a]	5.15 ± 0.16a	6.81 ± 3.48[a]
3	0.312 ± 0.01[b]	45.59 ± 2.05[b]	5.46 ± 0.10[a]	4.37 ± 2.09[a]
Ewes age (year)	NS	NS	NS	NS
2.5	0.261 ± 0.01[a]	39.77 ± 1.79[a]	5.37 ± 0.08[a]	5.31 ± 1.83[a]
3.5	0.245 ± 0.01[a]	36.75 ± 1.68[a]	5.30 ± 0.08[a]	6.07 ± 1.72[a]
4.5	0.241 ± 0.01[a]	35.90 ± 1.90[a]	5.20 ± 0.09[a]	4.71 ± 1.97[a]
5.5	0.244 ± 0.01[a]	36.06 ± 2.40[a]	5.39 ± 0.12[a]	4.45 ± 2.48[a]
Sex of lambs	NS	NS	NS	NS
Male	0.251 ± 0.01[a]	37.88 ± 2.32[a]	5.42 ± 0.11[a]	5.37 ± 2.36[a]
Female	0.245 ± 0.01[a]	36.36 ± 2.00[a]	5.21 ± 0.09[a]	4.90 ± 2.02[a]
Month of lambing	NS	NS	NS	NS
November	0.247 ± 0.01[a]	34.66 ± 1.26[a]	5.34 ± 0.06[a]	5.26 ± 1.34[a]
December	0.264 ± 0.01[a]	39.27 ± 2.57[a]	5.20 ± 0.12[a]	5.58 ± 2.60[a]
January	0.246 ± 0.01[a]	37.10 ± 2.57[a]	5.50 ± 0.12[a]	4.98 ± 2.59[a]
February	0.234 ± 0.02[a]	37.45 ± 2.89[a]	5.22 ± 0.14[a]	4.72 ± 2.95[a]
Stage of lactation (month)	*		*	NS
1	0.321 ± 0.01[a]	-------	5.33 ± 0.08[a]	4.83 ± 1.83[a]
2	0.339 ± 0.02[a]	-------	5.51 ± 0.08[a]	4.90 ± 1.84[a]
3	0.281 ± 0.01[b]	-------	5.32 ± 0.08[a]	7.62 ± 1.85[a]
4	0.201 ± 0.01[c]	-------	5.31 ± 0.08[a]	4.96 ± 1.84[a]
5	0.100 ± 0.01[d]	-------	4.94 ± 0.09[b]	5.21 ± 2.10[a]

Means in the same column for each factor with different letters are significantly ($p \leq 0.05$) different from each other. NS: non significant

In the present work no significant effect of ewe’s age on daily and total milk yield was found, There results were in agreement with those reported earlier by (Merkhan, 2014; Akreyi, 2015). Also, the effect of ewe’s age on protein and fat% lacked significance. Such results were also reported earlier by (Abd Allah *et al*., 2011; Oramari and Hermiz, 2012). The effect of sex of lamb and month of lambing on the DMY, TMY, protein and fat% was no significance, these findings were in agreement with those reported on DMY and TMY by (Al-Samarai and Al-Anbari, 2009; Merkhan, 2014 and Akreyi, 2015). Also, an author found that month of lambing had no effect on daily milk yield and total milk yield (Abd-Al-Noor, 2011). Moreover, differences in protein and fat percentage studied in ewes lambed in the four months were not significant (*Table 2*). In an earlier study in Iraq, Gardi (2008) did not detect a significant effect of month of lambing on protein and fat% in milk of Karadi, Awassi and Hamdani ewes. Also, Martini *et al*. (2008) and Augusta *et al*. (2008) observed no remarkable monthly changes in protein%. Stage of lactation has significantly ($P \leq 0.05$) effected DMY and

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protein%. Similar results were also obtained by Pavic *et al*. (2002) and Kuchtik *et al*. (2008). While stages of lactation had no significant effect on fat%, which the lowest percentage (4.83) was obtained in the first stage of lactation and highest (7.62%) during the 3rd stage of lactation. This result was in agreement with results obtained by Sevi *et al*. (2006) and Oravcova *et al*. (2007).

As in *Tables 2* and *3* there are variance differences among fixed effect on all traits under studies, it means there are ability to make selection process among sheep to choices the best parents and mated them altogether to speed up the weight and milk traits in the next generation. To removed the effect of fixed factors mixed model was used to calculate the BLUP value which is one methods used to evaluation the animal upon his performances to obtained the realized value for each animals under study to ranking them according to his BLUP values for each trait to select the best one among all animals to speed up the production in next generation.

Table 3 shows the BLUP values for BW, WW, MW, DMY, TMY, protein% and fat%. The lowest and highest BLUP value was (-1.6411 and 1.6889 kg) for BW, (-6.5307 and 10.1293) for WW, (-9.9775 and 13.1725) for MW, (-10.5293 and 10.7405) for DMY, (-31.02 and 7.38) for TMY, (-2.0546 and 2.0097) for protein% and (-1.7033 and 1.4067) for fat%, respectively. The wide range between the BLUP values of ewes for some above traits indicated that selection of elite ewe will improve all these traits in the present sample. Hussain *et al*. (2006) reported that BLUP value for weaning weight ranged from -1.799 to 2.421 kg/ewe in Thalli sheep. Al-Barzinji (2009) reported that BLUP values for ewes ranged from -12.338 to 11.6023 kg for total weight of lambs weaned. In Hamdani sheep predicted BLUP value for daily milk yield from two flocks was reported by Al-Barzinji (2003), from two flocks. Values ranged from -155.56 to 214.58 gm and from -162.46 to 240.39 gm in the two flocks respectively. BLUP values for top 10% of the ewes to be selected as dam of ram lambs ranged between 102.87 to 214.58 gm and 187.63 to 240.39 gm in first and second flocks, while the values for culling 20% ranged from -155.56 to -66.50 gm and from -162.46 to -98.44 gm for first and second flock, respectively. Al-Rawi *et al*. (2002b) revealed that BLUP values for total milk yield ranged from -28.29 to 82.61 kg in Awassi sheep respectively. In Awassi sheep Abdulnoor (2004) reported that BLUP values for total milk yield for selecting 90, 80, 70, 60 and 50% of ewes were 1.98, 3.64, 5.07, 6.62 and 8.15 kg, respectively. Al-Barzinji (2009) reported that BLUP values for total milk yield in ewes ranged from -68.160 to 139.951 kg.

These results show that the breeder can select 10% from top BLUP value (Male) and 70% from top BLUP value (Female) and mate these parents altogether can speed up improvement of weight and milk traits among this population of sheep under study.

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Table 3. *BLUP values (kg) of BW, WW, MW, DMY, TMY, protein% and fat% in Karadi ewes*

Ewe No.	BLUP (BW)	Ewe No.	BLUP (WW)	Ewe No.	BLUP (MW)	Ewe No.	BLUP (DMY)	Ewe No.	BLUP (TMY)	Ewe No.	BLUP (Protein%)	Ewe No.	BLUP (Fat%)
87	1.688	55	10.12	74	13.17	99	10.75	51	7.380	102	2.009	65	1.406
41	1.678	74	10.06	93	12.62	94	10.58	102	1.440	99	1.919	16	1.066
81	1.658	81	9.569	81	12.42	108	10.09	97	1.200	106	1.795	19	1.006
40	1.648	80	8.219	87	11.47	111	9.768	111	0.480	109	1.784	78	1.006
9	1.558	63	5.919	94	11.27	96	9.640	114	0	101	1.716	70	0.996
43	1.138	89	5.069	55	10.27	106	9.359	109	-0.600	107	1.660	15	0.956
73	0.958	24	5.019	71	10.22	91	8.745	94	-1.500	95	1.562	20	0.956
39	0.878	72	4.719	76	10.07	104	8.417	107	-1.980	97	1.525	27	0.956
1	0.808	69	4.669	90	9.122	105	8.090	108	-2.460	114	1.347	37	0.956
74	0.808	39	4.409	85	9.072	98	7.517	101	-3.300	111	1.338	12	0.916
37	0.778	31	4.219	92	8.672	107	7.272	110	-3.660	94	1.306	41	0.896
38	0.768	64	4.219	72	8.472	103	6.903	106	-4.200	108	1.255	74	0.846
6	0.758	71	4.219	73	8.322	109	6.862	112	-4.260	51	1.124	29	0.676
13	0.758	59	4.019	88	8.172	102	6.371	105	-4.980	92	1.111	88	0.646
42	0.758	73	3.969	80	7.872	17	6.131	88	-6.360	87	1.012	93	0.636
10	0.658	60	3.889	63	7.672	84	6.089	98	-6.420	113	0.914	81	0.596
85	0.658	68	3.819	68	7.622	85	5.430	100	-6.420	21	0.863	31	0.516
55	0.628	66	3.219	64	7.172	95	5.389	113	-6.540	22	0.863	32	0.516
93	0.618	95	3.219	31	6.572	97	5.389	37	-6.900	93	0.861	34	0.516
45	0.608	76	2.969	69	5.672	110	5.307	95	-7.320	112	0.833	35	0.516
46	0.558	79	2.819	41	5.422	37	5.062	99	-7.560	110	0.821	24	0.426
80	0.518	38	2.469	66	5.422	92	4.775	92	-7.860	37	0.807	9	0.406
26	0.468	47	2.469	89	5.422	51	4.734	13	-8.640	86	0.805	13	0.406
25	0.458	92	2.429	39	5.172	89	4.407	93	-9.480	105	0.732	76	0.406
82	0.458	41	2.369	95	4.622	13	3.875	12	-9.840	47	0.721	94	0.406
28	0.418	56	2.109	75	4.322	81	3.833	86	-9.960	33	0.709	38	0.296
31	0.418	15	1.519	91	4.322	39	3.499	47	-10.29	88	0.702	30	0.246
44	0.408	78	1.469	38	4.172	90	3.302	50	-10.47	39	0.646	5	0.216
34	0.378	87	1.469	56	4.172	8	3.081	34	-10.80	98	0.632	98	0.206
83	0.368	65	1.419	15	4.122	12	3.057	85	-11.22	18	0.617	23	0.176
5	0.358	5	1.369	42	3.622	83	2.975	38	-11.88	11	0.582	62	0.176
60	0.358	52	1.319	24	3.422	47	2.750	17	-12.60	34	0.518	10	0.086
92	0.328	29	1.269	86	3.372	86	2.580	87	-12.66	100	0.483	105	0.0667
103	0.288	54	1.219	59	2.672	42	2.454	19	-12.96	17	0.477	1	0
95	0.248	70	1.219	67	2.672	34	2.402	18	-13.02	89	0.375	2	0
23	0.208	42	1.169	62	2.622	82	2.115	30	-13.02	84	0.367	3	0
48	0.208	67	1.169	78	2.272	38	1.665	16	-13.26	8	0.270	6	0
71	0.208	82	1.169	101	2.022	28	0.950	21	-13.50	31	0.224	8	0
33	0.198	46	1.069	60	1.872	19	0.929	22	-13.50	12	0.212	11	0
24	0.178	58	0.919	6	1.472	6	0.909	31	-13.62	42	0.168	14	0
86	0.168	62	0.919	54	1.472	18	0.888	33	-13.62	79	0.121	17	0
97	0.168	75	0.919	70	1.162	30	0.888	24	-13.74	45	0.103	18	0
108	0.168	108	0.819	108	0.772	61	-0.789	29	-13.74	61	-0.185	21	0

Ewe No.	BLUP (BW)	Ewe No.	BLUP (WW)	Ewe No.	BLUP (MW)	Ewe No.	BLUP (DMY)	Ewe No.	BLUP (TMY)	Ewe No.	BLUP (Protein%)	Ewe No.	BLUP (Fat%)
112	0.168	112	-1.010	112	-0.877	11	-0.298	45	-13.80	103	-0.147	22	0
114	0.168	114	-1.030	114	0.122	9	-0.789	20	-13.98	36	-0.154	25	0
8	0.158	86	0.919	100	0.872	16	0.724	41	-14.22	6	0.084	26	0
27	0.158	6	0.819	79	0.772	21	0.560	46	-14.58	41	0.077	28	0
75	0.158	45	0.819	29	0.372	22	0.560	11	-14.76	16	0.058	33	0
109	0.158	109	0.819	109	0.372	60	0.233	15	-15.36	60	-0.016	36	0
77	0.138	61	0.819	26	0.322	31	0.478	9	-15.48	13	0.057	39	0
35	0.118	50	0.719	58	0.322	33	0.478	44	-15.54	20	0.042	42	0
30	0.088	101	0.719	65	0.272	52	0.449	83	-15.78	3	0.034	48	0
3	0.058	77	0.319	23	0.222	24	0.397	84	-15.90	19	-0.016	52	0
15	0.058	96	0.169	4	0.122	29	0.397	23	-16.08	30	-0.018	54	0
47	0.058	48	0.119	37	0.072	45	0.356	78	-16.14	85	-0.044	56	0
50	0.008	85	0.069	82	0.072	20	0.233	39	-16.38	50	-0.061	57	0
89	-0.011	107	0.019	107	-0.027	41	0.069	40	-16.38	28	-0.120	59	0
59	-0.021	49	-0.280	96	-0.127	44	-0.830	27	-16.56	83	-0.182	60	0
98	-0.021	91	-0.530	98	-0.327	25	-0.845	79	-16.62	104	-0.185	61	0
29	-0.031	27	-0.580	99	-0.427	64	-0.845	32	-16.80	96	-0.190	63	0
7	-0.041	97	-0.580	43	-0.627	80	-0.994	8	-16.98	57	-0.198	67	0
19	-0.041	13	-0.630	40	-0.877	50	-1.157	10	-17.04	25	-0.210	68	0
101	-0.061	83	-0.680	61	-0.877	23	-1.199	36	-17.52	29	-0.213	69	0
94	-0.081	2	-0.730	77	-0.877	75	-1.239	76	-17.52	24	-0.283	64	0
2	-0.091	94	-0.730	97	-0.927	40	-1.403	43	-17.58	78	-0.297	73	0
54	-0.091	100	-0.730	13	-0.977	27	-1.526	89	-17.70	67	-0.307	80	0
69	-0.091	57	-0.750	106	-1.427	76	-1.567	42	-17.88	76	-0.329	75	0
79	-0.101	44	-0.830	2	-1.477	32	-1.690	96	-17.88	27	-0.341	77	0
88	-0.101	1	-0.930	1	-1.727	14	-1.799	49	-18.27	38	-0.348	79	0
90	-0.101	93	-1.010	57	-1.727	10	-1.853	62	-18.48	48	-0.349	82	0
111	-0.101	111	-0.630	111	0.122	46	-0.175	74	-18.48	52	-0.130	71	0
4	-0.141	88	-1.030	103	-1.727	61	-2.015	35	-18.57	15	-0.381	72	0
12	-0.141	12	-1.430	12	-1.927	53	-2.222	73	-18.72	91	-0.394	84	0
20	-0.141	37	-1.130	105	-1.727	36	-2.181	7	-18.78	82	-0.382	86	0
49	-0.141	23	-1.380	5	-1.927	73	-2.181	54	-19.50	40	-0.382	87	0
53	-0.141	26	-1.430	34	-1.927	43	-2.222	65	-19.74	56	-0.394	90	0
96	-0.141	90	-1.430	27	-1.977	87	-2.307	103	-19.74	46	-0.407	95	0
110	-0.141	110	-0.580	110	-0.877	59	-0.830	57	-19.86	59	-0.190	99	0
113	-0.141	113	0.819	113	-1.727	15	-0.707	82	-19.86	1	-0.150	101	0
100	-0.161	10	-1.580	102	-2.377	3	-2.349	28	-20.04	75	-0.419	103	0
52	-0.241	98	-1.780	83	-3.177	93	-2.426	6	-20.10	44	-0.419	104	0
91	-0.251	11	-1.880	47	-3.427	49	-2.692	58	-20.10	73	-0.427	106	0
107	-0.261	43	-1.930	30	-3.477	59	-2.835	60	-20.11	32	-0.443	107	0
72	-0.301	105	-2.080	21	-3.727	71	-2.835	59	-20.12	69	-0.459	113	0
36	-0.321	28	-2.230	28	-3.877	35	-2.897	104	-20.52	71	-0.475	111	-0.033
11	-0.341	40	-2.230	19	-4.127	70	-2.999	52	-20.76	49	-0.507	83	-0.043
99	-0.361	21	-2.430	11	-4.327	7	-3.040	75	-21.12	54	-0.514	109	-0.043
21	-0.391	19	-2.830	52	-4.427	54	-3.531	56	-21.30	68	-0.517	66	-0.083

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Ewe No.	BLUP (BW)	Ewe No.	BLUP (WW)	Ewe No.	BLUP (MW)	Ewe No.	BLUP (DMY)	Ewe No.	BLUP (TMY)	Ewe No.	BLUP (Protein%)	Ewe No.	BLUP (Fat%)
104	-0.391	99	-2.830	25	-4.477	62	-3.695	66	-21.48	14	-0.562	55	-0.213
56	-0.441	106	-2.830	20	-4.527	100	-3.695	62	-21.48	62	-0.606	50	-0.263
65	-0.491	30	-2.980	46	-4.527	57	-3.777	48	-21.54	65	-0.621	91	-0.373
70	-0.491	53	-2.980	35	-4.577	79	-3.777	71	-21.96	9	-0.641	102	-0.413
64	-0.511	34	-3.080	36	-4.627	58	-3.940	5	-22.20	10	-0.651	44	-0.463
22	-0.541	36	-3.130	3	-4.977	1	-4.145	25	-22.62	23	-0.67	112	-0.463
57	-0.541	103	-3.280	50	-5.027	101	-4.227	55	-22.62	64	-0.676	108	-0.473
105	-0.541	102	-3.380	45	-5.127	65	-4.521	67	-22.62	26	-0.690	7	-0.483
102	-0.601	18	-3.430	10	-5.377	72	-4.636	81	-22.86	74	-0.702	97	-0.483
76	-0.631	25	-3.480	104	-5.677	56	-4.759	77	-22.92	72	-0.706	40	-0.593
51	-0.641	4	-3.530	33	-5.877	63	-4.882	90	-23.22	77	-0.832	85	-0.593
16	-0.741	20	-3.580	48	-6.327	48	-4.922	70	-23.94	35	-0.855	4	-0.683
106	-0.761	104	-3.580	53	-6.527	68	-5.209	64	-24.30	90	-0.864	49	-0.703
84	-0.831	51	-3.980	32	-6.877	5	-5.373	3	-24.78	80	-0.921	46	-0.773
14	-0.891	9	-4.380	16	-6.977	55	-5.659	72	-24.93	43	-1.055	114	-0.783
63	-0.901	3	-4.480	14	-7.277	78	-5.823	2	-25.20	2	-1.057	53	-0.793
62	-0.911	35	-4.480	51	-7.327	74	-5.864	69	-26.82	66	-1.057	92	-0.793
78	-0.921	16	-4.530	84	-7.527	60	-6.485	1	-27.36	58	-1.070	51	-0.933
66	-0.931	17	-4.930	8	-7.577	67	-6.559	4	-27.72	5	-1.123	110	-0.933
67	-0.981	14	-4.980	49	-7.727	69	-7.23	68	-27.90	7	-1.199	58	-1.053
61	-1.001	8	-5.030	7	-7.877	2	-7.419	80	-28.38	81	-1.250	47	-1.073
32	-1.121	33	-5.130	22	-7.977	66	-8.524	91	-29.76	70	-1.276	100	-1.093
17	-1.141	7	-5.530	18	-8.527	26	-8.908	63	-30.72	55	-1.386	96	-1.103
18	-1.291	84	-5.630	44	-8.877	4	-9.137	53	-30.78	63	-1.469	43	-1.113
68	-1.321	32	-6.080	9	-9.277	77	-9.588	14	-31.02	4	-1.683	45	-1.593
58	-1.641	22	-6.530	17	-9.977	88	-10.52	26	-34.20	53	-2.054	89	-1.703

Conclusion

In conclusion, some of the fixed effects including the flock and the Month of lambing affect lamb's body weights significantly, as well as, it appears that flock had a significant influence on daily milk yield and total milk yield and stage of lactation affects test-day milk yield as well as protein percentage significantly. The wide range between the BLUP values of ewes for many growth and milk traits and this indicate that selecting ewes according to their records at early ages will improve their later performance. The recording of data in sheep breeding from breeder side is necessary because the availability of large data and information's on animal's gives better and accurate values for animal evaluation in selection process and breeder must select his animals upon the accurate and analyzed data which obtained from good managements.

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