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# Some placental factors and their relevance to variation in birth weight of Karadi lambs

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## Abstract

At the animal farm, college of Agriculture, University of Duhok, foetal placenta of 77 karadi ewes shed from normal parturitions were collected within 24 hours. The foetal cotyledons were separated from the placenta, counted and weighed. Also, the weights of lambs were recorded within 24 hours post lambing. The overall mean number and weight of cotyledons were 64.39±1.51 and 123.08±4.23 gm, respectively. Ewes with male lambs and single birth had significantly heavier cotyledons than females (130.51 vs. 116.41 gm) and twin birth (134.48 vs. 112.44 gm). A highly significant positive correlation between birth weight and each of number (0.34) and weight of cotyledons (0.64) was observed. Also, the regression of birth weight of lambs on cotyledons weight was significant. A significant positive correlation between ewe body weight at lambing and cotyledon weight (0.41) was noticed. It can be concluded that weight of cotyledons had the major role in influencing the birth weight of lambs.

**Key words:** Cotyledons, Birth Weight, Karadi Lambs

## Introduction

The survival and growth of young lambs depends largely on their birth weights and the milking ability of their dams (Eliya and Juma, 1970). Moreover, the development of placenta is associated with vivi parity. The placenta functions as a multi-organ performing many functions and substituting for the fetal gastrointestinal tract, lung, kidney, liver and endocrine glands. In addition, the placenta separates the maternal and fetal organism, thus ensuring the separate development of the fetus (Hafez and Hafez, 2000).

In sheep and goat, a positive correlation was found between birth weight and the weight of cotyledons (Alexander, 1964; Alkass et al., 1999). Moreover, the total weight of cotyledons per fetus decreased by about 12% for each increase of one in number of fetuses as compared with a 20% decrease in number of cotyledons but only a 7-11% decrease in the weight of individual fetuses (Rhind et al., 1980). Also, it has been indicated that the number of cotyledons per foetus varies between and within breed, litter size, sex and environmental conditions (Alexander, 1964). Therefore, the aim of the present work was to evaluate some placental factors as affected by some maternal traits and to investigate the effect of weight and number of cotyledons in new born birth weight of Karadi lambs.

## Materials and Methods

Seventy seven foetal placenta delivered at normal parturition were collected from Karadi ewes raised at Animal Farm, College of Agriculture, University of Duhok during lambing season 2007-2008. The foetal cotyledons were separated from the placenta, counted and weighed. When two cotyledons were fused they were counted as one. The weights of lambs were recorded within 24 hours post lambing. The data were statistically analyzed by using SAS (2005) according to the following model:

$$Y_{ijklm} = \mu + A_i + S_j + T_k + b_{(xl-x)} + e_{ijklm}$$

Where:

$Y_{ijklm}$= Measurements on $m^{th}$ observation;
$\mu$ = Overall mean;
$A_i$ = Effect of $i^{th}$ Age group of dam (i = 2.5, 3.5, 4.5, 5.5);
$S_j$ = Effect of $j^{th}$ Sex (j = Male, Female);
$T_k$= Effect of $k^{th}$ Type of birth (k = Single, Twin);
$b_{(xl-x)}$= the regression of lambs birth weight on cotyledons weight.
$e_{ijklm}$ =Experimental error assumed to be NID with (0, $\sigma^2 e$ ).

## Results and Discussion

In the current work, the overall mean number and weight of cotyledons for Karadi ewes was 64.39±1.51 and 123.08±4.23 gm, respectively (Table 1). The mean number of cotyledons is close to those reported earlier by Alexander (1964) for Merino sheep (73), but it is higher than those reported for Iraqi native Awassi (Al-Rawi et al., 2002) (53.2) and Awassi ewes in Jordon (51.1) (Jawasreh et al., 2009).

The total number of cotyledons for males and females were 66.07±2.40 and 67.55±2.37, respectively, and the corresponding total weight of cotyledons were 130.51±5.60 and 116.41±5.55 gm (Table 1); the difference between sexes was significant (P<0.05) only for weight of cotyledons (Table 2). Similarly, Rhind et al. (1980) and Al-Rawi et al. (2002) noticed that the mean cotyledon number was almost the same for males and females. However, the mean of cotyledon weight were higher in case of males, as were the corresponding birth weight of lambs. The explanation of the sex differences as suggested by Alexander (1964) could be due to differences in the vascularity of the placenta or in the placental transfer mechanism. Also, Rhind et al. (1980) noticed that the cotyledons were 10.5% heavier for males than for their litter mates. Similar observations have been made by Alkass et al. (1999), Dwyer et al. (2005) and Jawasreh et al. (2009).

Although single born lambs had more cotyledons number (69.60±2.27) than twin born lambs (64.41±2.70), however, the differences between them were not significant (Table 2). Similarly, in ewes having 4-5 ovulations, Rhind et al. (1980) indicated that the number of cotyledons/foetus was 49, 27 and 18 for 1, 3 and 5 viable foetuses in each uterus, respectively. Also, Alkass et al. (1999) and Al-Rawi et al. (2002) noticed similar finding in Iraq native goats and in different genetic groups of ewes, respectively.

The weight of cotyledons of single born lambs was significantly (P<0.01) heavier (134.48±5.32 gm) than twin born lambs (112.44±6.32 gm) (Table 1). Associated with the fall in cotyledons attached to each foetus, was a compensatory rise in the weight of individual cotyledons. In this study, the overall effect was a decline of 16.4% in total cotyledon weight for twining born lambs. The corresponding decrease in lamb birth weight was 22%. Similar conclusion was drawn earlier by Rhind et al. (1980), Dwyer et al. (2005), Konyali et al. (2007) and Ocak et al. (2009).

In the present work, Although 3.5 year old ewes attained the highest number (68.23±3.73) and weight of cotyledons (139.73±8.71) (Table 1). However, the effect of age of ewe on both traits was not significant (Table 2). Such result is in contrast to those observed by Al-Rawi et al. (2002), Dwyer et al. (2005), Konyali et al. (2007), Jawasreh et al. (2009) and Ocak et al. (2009), who shows that the number of cotyledons tended to increase gradually as the age increased. This difference between studies could be attributed to the number of observation involved and particularly in our study the number of ewes aged 2.5 years is very limited.

**Table 1: Least square means ± SE for the effects on birth weight, number and weight of cotyledons in Karadi sheep**

| Factors | Birth weight (kg) | | Cotyledons number | | Cotyledons weight (gm) | |
|---|---|---|---|---|---|---|
| | No. | Means ± S.E. | No. | Means ± S.E. | No. | Means ± S.E. |
| Overall mean | 77 | 4.81 ± 0.15 | 77 | 64.39±1.51 | 77 | 123.08±4.23 |
| Age of dam (years) | | | | | | |
| 2.5 | 5 | 4.98 ± 0.36$^{a}$ | 5 | 74.25 ± 5.76$^{a}$ | 5 | 117.56 ± 13.46$^{b}$ |
| 3.5 | 14 | 5.07 ± 0.23$^{a}$ | 14 | 68.23 ± 3.73$^{ab}$ | 14 | 139.73 ± 8.71$^{a}$ |
| 4.5 | 34 | 4.65 ± 0.13$^{a}$ | 34 | 61.69 ± 2.17$^{b}$ | 34 | 117.35 ± 5.06$^{b}$ |
| 5.5 | 24 | 4.71± 0.16$^{a}$ | 24 | 63.87 ± 2.64$^{ab}$ | 24 | 119.20 ± 6.18$^{b}$ |
| Sex of lamb | | | | | | |
| Male | 42 | 5.08 ± 0.15$^{a}$ | 42 | 66.07 ± 2.40$^{a}$ | 42 | 130.51 ± 5.60$^{a}$ |
| Female | 35 | 4.62 ± 0.15$^{b}$ | 35 | 67.95 ± 2.37$^{a}$ | 35 | 116.41 ± 5.55$^{b}$ |
| Type of birth | | | | | | |
| Single | 40 | 5.45 ± 0.15$^{a}$ | 40 | 69.60 ± 2.27$^{a}$ | 40 | 134.48 ± 5.32$^{a}$ |
| Twin | 37 | 4.25 ± 0.17$^{b}$ | 37 | 64.41 ± 2.70$^{a}$ | 37 | 112.44 ± 6.32$^{b}$ |
| Regression on | | | | | | |
| Dam weight at lambing | 77 | 0.044 ± 0.012 | 77 | 0.280 ± 0.18 | 77 | 1.809 ± 0.42 |
| Cotyledons number | 77 | 0.007 ± 0.003 | - | - | - | - |
| Cotyledons weight | 77 | 0.005 ± 0.007 | - | - | - | - |

$^{ab}$Means having different letters within each factor/column differ significantly (P<0.05) according to Scheffe's test

**Table 2: Mean squares and test of significance for factors affecting birth weight, number and weight of cotyledons in Karadi sheep**

| Factors | Birth weight | | Cotyledons number | | Cotyledons weight | |
|---|---|---|---|---|---|---|
| | d.f. | Mean squares | d.f. | Mean squares | d.f. | Mean squares |
| Age of dam(years) | 3 | $0.518^{NS}$ | 3 | $277.507^{NS}$ | 3 | $1455.493^{NS}$ |
| Sex of lamb | 1 | 3.53* | 1 | $64.233^{NS}$ | 1 | 3605.356* |
| Type of birth | 1 | 18.570** | 1 | $389.953^{NS}$ | 1 | 7041.405** |
| Regression on | | | | | | |
| Dam weight at lambing | 1 | 7.514** | 1 | $383.316^{NS}$ | 1 | 16014.476** |
| Cotyledons weight | 1 | 2.893* | - | - | - | - |
| Cotyledons number | 1 | $0.293^{NS}$ | - | - | - | - |
| Residual | 68 | 0.586 | 70 | 157.349 | 70 | 860.237 |

** = P<0.01 * = P<0.05 NS = P>0.05

**Table 3: Simple correlation between ewe weights (EWT), birth weight (BWT), weight (CWT) and number (CNO) of cotyledons in Karadi lambs.**

| | BWT | CWT | CNO |
|---|---|---|---|
| EWT | 0.39** | 0.41** | 0.16 |
| BWT | | 0.64** | 0.34** |
| CWT | | | 0.64** |
| CNO | | | |

Simple correlation coefficient results reveal a highly significant positive correlation between birth weight and each of number (0.34) and weight of cotyledons (0.64) (Table 3). Also, the regression of birth weight of lambs on cotyledons weight was significant but not with cotyledon numbers (Table 3). Both cotyledon number and weight was correlated significantly and positively with the litter weight. This result agreed with the finding of Konyali et al. (2007) and Jawasreh et al. (2009), who indicates a similar relationship between the same studied traits. A significant and positive correlation between ewe body weight at lambing and cotyledon weight (0.41) was noticed, while the correlation of ewe weight at lambing with cotyledon number was positive but not significant (0.16).

The overall mean of birth weight of Karadi lambs is 4.81±0.15 (Table 1). Males born heavier than females (P<0.05) (Table 2). The sex differences in growth and development are the result of the operation of sex hormone (Owen, 1976), higher secretion of growth hormone (Davis et al., 1977), and according to our results the weight of cotyledons is higher for males compared to females. Also, singles born lambs are significantly (P<0.01) heavier than twin born lambs (Table 1). Such effect could be attributed to growth competition between twins for a fixed amount of nutritive materials from their dams during pre-natal period. Alkass et al., (1996), Mohammed (2008) and Oramari (2009) previously observed the superiority of males and singles in their birth weight over females and twins, respectively. Age of dam was found to have a non significant effect on birth weight of Karadi lambs. This result could be attributed to the limited numbers of ewes aged 2.5 years. Similarly, Oramari (2009) noticed a similar finding. The regression coefficient of lamb's birth weight on their dam weight at lambing was 0.044±0.012 kg/kg (P<0.01). Also, many authors claimed that the weight of dam at lambing was significantly correlated with birth weight of their lambs (Mohammed, 2008 and Oramari, 2009). Such results are related to an increase in uterine size associated with heavier weight and more nutrients are supplied to her embryos (Bhadula and Bhat, 1980). It can be concluded that weight of cotyledons had the major role in influencing the birth weight of lambs.

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