

## **A BIOMETRIC STUDY OF GRAVID UTERI AND FETUSES DURING GESTATION IN SHEEP**

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**Abstract:** This study was conducted in sixty gravid uteri of Madras Red breed of sheep of different parity. The biometrics of the uteri and fetuses were recorded. The length and width of the gravid uterus showed a highly significant and progressive increase with the advancement of gestation. The number of cotyledons increased highly significantly from the first stage to the second stage. The diameter of the largest cotyledon increased highly significantly from the first to second stage and from the third to fourth stage. The fetal weight increased highly significantly and progressively with gestation. The weight of the placenta increased highly significantly from the first to third stage, but remained relatively unchanged in the third and fourth stages of gestation. The crown – anus length and weight of the fetus increased highly significantly and progressively throughout pregnancy.

**Keywords:** biometry, gravid uterus, fetus, sheep.

### **INTRODUCTION**

Comprehension of the physiological basis of fetal development is a major goal of prenatal biology. Studies on prenatal development of farm animals are useful to evaluate the normal variations and to precisely understand the specific effects of environmental factors in the development of embryos or fetuses *in utero* (Chinchkar *et al.*, 1990).

### **METHODS**

Sixty gravid uteri of Madras Red breed of sheep of different parity were collected from a slaughterhouse. The embryo or fetus was removed from the uterus. The umbilical cord was detached. The gonadal sex of the fetus was recorded. The crown anus length of the fetus from the vertex of the skull to the anus was measured. The fetus was weighed. The number of cotyledons in the placenta was counted and recorded. The diameter of the largest cotyledon was measured and recorded. The placenta was weighed. The stage of gestation was determined by applying the Richardson formula (1980).

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## RESULTS

The biometrics of the gravid uteri and fetuses during the four stages of gestation in sheep are presented in Table – 1.

**TABLE 1**  
**BIOMETRICS OF GRAVID UTERI AND FETUSES**

| Parameter            | Stage 1                  | Stage 2                   | Stage 3                   | Stage 4                    | F value  |
|----------------------|--------------------------|---------------------------|---------------------------|----------------------------|----------|
| Length of the uterus | 17.50 <sup>a</sup> ±     | 25.97 <sup>b</sup> ± 1.13 | 33.47 <sup>c</sup> ± 1.19 | 38.93 <sup>d</sup> ± 0.61  | 97.56**  |
| Width of the uterus  | 12.20 <sup>e</sup> ±     | 21.33 <sup>f</sup> ± 0.87 | 25.00 <sup>g</sup> ± 0.66 | 30.40 <sup>h</sup> ± 1.05  | 89.95**  |
| Number of cotyledons | 31.13 <sup>q</sup> ±     | 40.80 <sup>r</sup> ± 2.06 | 37.53 <sup>r</sup> ± 1.93 | 42.00 <sup>r</sup> ± 0.94  | 9.12**   |
| Diameter of largest  | 2.20 <sup>s</sup> ± 0.16 | 3.27 <sup>t</sup> ± 0.20  | 2.85 <sup>st</sup> ± 0.23 | 4.07 <sup>u</sup> ± 0.18   | 16.35**  |
| Placental weight (g) | 112.00 <sup>m</sup> ±    | 451.67 <sup>n</sup> ±     | 761.67 <sup>o</sup> ±     | 722.67 <sup>o</sup> ±      | 30.23**  |
| Fetal weight (g)     | 53.00 <sup>i</sup> ±     | 304.00 <sup>j</sup> ±     | 1002.70 <sup>k</sup> ±    | 1883.30 <sup>l</sup> ±     | 151.68** |
| Crown – anus length  | 7.57 <sup>a</sup> ± 0.62 | 18.53 <sup>b</sup> ± 1.27 | 29.97 <sup>c</sup> ± 0.94 | 42.53 <sup>d</sup> ± 0.33  | 300.97** |
| Fetal age (days)     | 54.07 <sup>c</sup> ±     | 75.00 <sup>t</sup> ± 2.71 | 100.80 <sup>g</sup> ±     | 127.73 <sup>h</sup> ± 0.98 | 280.09** |

Means in the same row bearing different alphabets differ significantly

n = 15 \*\* Highly significant (P< 0.01) \* Significant (P<0.05) <sup>ns</sup> Not significant

The length and width of the gravid uterus showed a highly significant (P<0.01) and progressive increase with the advancement of gestation. The number of cotyledons increased highly significantly (P<0.01) from the first stage to the second stage, after which there was no significant variation. The diameter of the largest cotyledon increased highly significantly (P<0.01) from the first to second stage, whereas there was a relative and insignificant decrease in the diameter from the second to third stage, but the diameter increased highly significantly (P<0.01) from the third to fourth stage.

The biometrics of the sheep fetuses during the four stages of gestation are displayed in Table – 1. The fetal weight increased highly significantly (P<0.01) and progressively with gestation. The weight of the placenta increased highly significantly (P<0.01) from the first to third stage, but remained relatively unchanged in the third and fourth stages of gestation. The crown – anus length and weight of the fetus increased highly significantly (P<0.01) and progressively throughout pregnancy.

## DISCUSSION

### Length and width of the gravid uterus

In the present study, the observations on the length and width of the gravid uterus showed a highly significant and progressive increase with the advancement of gestation. The changes

in gravid genitalia might be due to enormous increase in blood and lymph vessels with increase in size and number Cloete (1939).

### **Number and size of cotyledons**

The number of cotyledons in the present study ranged from 31.13 to 42. The number of cotyledons increased significantly from the first stage to the second stage, after which there was no significant variation, though the number continued to increase till term. The increase in the number of cotyledons seen in the first two stages may indicate the intensive placental growth in early gestation. The diameter of the largest cotyledon increased highly significantly from the first to second stage, and from the third to fourth stage. Glucocorticoids had profound effects on the placenta, the cotyledons tended to be larger, representing an overgrowth of the fetal component of the cotyledon (Tangalakis *et al.*, 1995).

### **Fetal weight**

The fetal weight increased significantly and progressively with gravidity. According to Greenwood *et al.* (2000) in sheep, the stage of pregnancy accounted for a large percent of the variation in the fetal weight from 85 to 130 days of gestation. According to Rattray *et al.* (1974) in sheep, the stage of pregnancy accounted for a large percent of the variation in the fetal weight from 70 to 140 days of gestation.

### **Placental weight**

The weight of the placenta increased significantly from the first to second stage, but remained unchanged during the third and fourth stages of gestation. Fetal growth during mid to late gestation was regulated by the mass and functional capacity (Ehrhardt and Bell, 1997) of the placenta. The weight of the placenta was found to have highly significant correlation with the birth weight of kid (Mishra and Ghei, 1987). It is suggested that the placental growth reached the maximum up to second stage of gestation.

In summary, this study has shown that the length and width of the gravid uterus, weight of the fetus crown – anus length of the fetus showed a significant ( $P < 0.01$ ) and progressive increase with the advancement of gestation. The number of cotyledons, diameter of the largest cotyledon and weight of the placenta increased progressively in the course of gestation.

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