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## **SOME FACTORS AFFECTING FETAL GROWTH AND LAMB BIRTH WEIGHT IN THE RAHMANI EWES**

(With One Table and 2 Figures)

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**بعض العوامل المؤثرة على النمو الجنيني ووزن الحملان فى اغنام الرحمانى**

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أجريت هذه الدراسة بمحطة التجارب بقسم الإنتاج الحيواني كلية الزراعة جامعة الأزهر فرع أسيوط. كان الهدف من هذه الدراسة، معرفة تأثير موسم التلقيح وجنس المولود وعمر الأم وفترات الحمل على بعض المقاييس الخاصة بالجنين: منها قطر كلا من المشيمة والبطن وطول الكلية ووزن الحملان عند الولادة. اشتملت هذه الدراسة على عدد 36 نعجة رحمانى. تم متابعة هذه النعاج وفحصها كل اسبوعين بجهاز الموجات فوق الصوتية خلال الفترات ما بين (50-30)، (80-60)، (110-90) و(140-120) يوم من الحمل. قسمت النعاج على حسب العمر الى مجموعتين (المجموعه الاولى ضمت 16 نعجة كان عمرها (35-18) شهرا والثانية ضمت 20 نعجة كان عمرها (75-55 شهرا) لقت بعض النعاج فى موسم الصيف (n=18) والباقي لقت فى موسم الشتاء (n=18). أظهرت النتائج ان النعاج التي لقت فى موسم الشتاء اعلى من النعاج الملقحة فى موسم الصيف فى وزن الميلاد والمشيمة والكلية والبطن ومحيط الصدر وكانت الزيادة معنوية فى وزن الميلاد فقط إما باقي المقاييس كانت الزيادة غير معنوية. كان لجنس المولود تأثير معنويا على وزن الميلاد فكانت الحملان الذكور اعلى من الحملان الاناث، كذلك كان هناك تأثير لجنس المولود على المقاييس الخاصة بالجنين فكانت الحملان الذكور اعلى من الحملان الاناث فى حجم المشيمة بينما كانت الحملان الاناث اعلى من الذكور فى كلا من الكلية والبطن ومحيط الصدر ولكن هذا التأثير كان غير معنوي. كان لفترات الحمل تأثير معنوي على كلا من البطن والكلية فكان معدل النمو للكلية والمشيمة من المرحلة الأولى الى المرحلة الثانية اعلى من من باقى المراحل اما بالنسبة الى البطن كان معدل النمو اعلى من المرحلة الثاني الى المرحلة الثالثة عن باقى المراحل، كان التأثير لفترات الحمل على حجم المشيمة غير معنوي. أظهرت النتائج ان الامهات الأكبر فى العمر كانت اعلى فى كلا من وزن الميلاد وحجم المشيمة والكلية والبطن ومحيط الصدر ولكن هذا تأثير غير معنوي. ينصح بتلقيح الاغنام على مدار العام. حيث أكدت الدراسة ان موسم التلقيح ليس له تأثير معنوي على المقاييس التي تم دراستها باستثناء وزن الميلاد وحجم البطن.

### **SUMMARY**

The aim of the present study was to estimate the effect of breeding season, mother age, fetal sex and gestation period on the birth weight, placentome diameter (PLD), kidney length (KDL), chest depth (CHD) and abdominal diameter (ABD). A total of 36 ewes were included in this study, the ewes were introduced for breeding in winter and summer. Ultrasonographic examination was done each two weeks to measure the placentome diameter, abdominal, chest depth and kidney length. The parameters were estimated at 30-50, 60-80, 90-110 and 120 -140 days of gestation period. The lamb birth weight and mother birth weight were recorded just after parturition. Results showed that the male was significantly ( $p < 0.05$ ) heavier than female lambs ( $3.82 \pm 0.11$  vs  $3.35 \pm 0.07$ ). There was no effect of the breeding season on the mean PLD, CHD, KDL and ABD. The mother age has no effect on lamb birth weight, PLD, CHD, KDL and ABD. The diameters of fetal kidney, placentome, abdomen and chest depth increased with gestation period. The difference was significant ( $P < 0.05$ ), excepted placentome diameter was non significant. There was no significant effect of fetal sex on the diameter of placentome, fetal chest depth, fetal kidney and fetal abdominal.

Conclusion: It was found that the season of breeding had no significant effect on the studied parameters, except the birth weight and abdominal diameter. So it could be advised to breed the animals all over the year

**Key words:** Sheep, Fetus, Development, breeding, Season, Ultrasound

## INTRODUCTION

The Rahmani breed is generally characterized by low litter size (average 1.14kg and birth weight of the breed  $3.18 \pm 0.6$  and  $3.04 \pm 0.5$ kg in male and female respectively). The weaning breed body weight of the average  $12.62 \pm 0.28$  and  $12.04 \pm 0.2$ kg in male and female respectively, the mature body weight of this breed average  $50.73 \pm 1.3$  and  $35.31 \pm 0.54$  kg male and female respectively, (Elshennawy, 1996). Ali *et al.* (2008) found that the lamb birth weight was affected by season, ewe age litter size and dam body weight. The combined effect of season, age and postpartum interval and ewes fertility has been described in the fall and winter and anestrus period in the spring and early summer (Lewis *et al.*, 1996., Mitchell *et al.*, 1999 and Chemineau *et al.*, 2004).

Haibel (1990) consider of pregnancy diagnosis and gestation age are essential for maintenance high levels of reproductive efficiency.

Such information would allow producers to predict parturition dates and to group animals based on their nutrition needs especially during the last trimester of pregnancy. Accessibility of the different fetal organs and parts for ultrasonic examinations depended on day of gestation. The chest depth abdominal diameter and ruminal length, could be scanned during the second trimester placentome diameter and kidney length were within the ranged of the ultrasound beam during the second trimester, (Ali and hayder, 2007).

## **MATERIALS and METHODS**

### **1- Animals and management**

A total of 36 clinically healthy Rahmani ewes were included in this work. The ewes were divided according to the age into two groups. The first group included 16 ewes with average age of 18-35 months and weighting  $39.58 \pm 1.6$  kg. The second group included 20 ewes with average age of 55-75 months and weighting  $48.4 \pm 1.2$ kg. Before mating season, the ewes were randomly divided according to the breeding schedule in two groups. The first group were bred in July (summer, n=18). The second group were bred in November (winter, n=18). In each group 8 ewes were young (18-35 months) and 10 ewes were old (55-75 months) age. The ewes were bred naturally using two highly fertile Rahmani rams. The males left with the females for about two successive estrus cycles length (34 days). The animals were kept in the experimental Station of Animal Production Department of Agriculture, Al-Azhar University, Assiut Branch, Egypt. The animals were fed according to their body weight and the physiological state. All animals were fed on Egyptian clover (*Trifolium alexandrinum*) from December to May, while in summer season they were fed on green forage (Daraw). In addition, wheat straw and concentrated mixtures were added. The concentrated mixture consisted of 22% yellow corn, 33% wheat bran, 3% molase, 35% cotton seed meal, 4% sunflower, 2% stone and 1% salt.

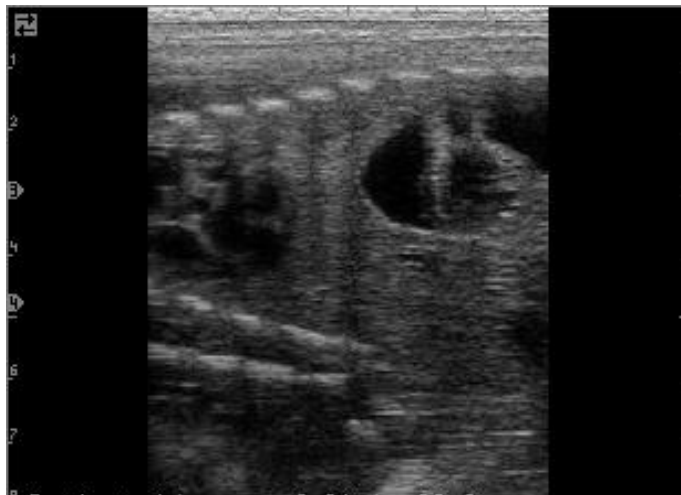
### **2- Ultrasonographic examination**

The ewes were examined ultrasonographically once each two weeks between 30<sup>th</sup> and 140<sup>th</sup> day of pregnancy. At the beginning of the pregnancy the ewes were examined transrectally by the advance of pregnancy the animals were examined transrectally and transabdominally. The equipment used for ultrasonography was a real time, B-mode scanner fitted with 6/8 MHz linear probe. Briefly, the fecal matter was removed and the probe was introduced using probe holder into the rectum using lubricant gel. The genital tract was scanned slowly and at each scanning occasion attempts were made to the measure

placentome diameter (PLD) Fig 1a, chest depth (CHD) Fig 1b, kidney length (KDL) and abdominal diameter (ABD).

### **3- Statistical analysis**

The analysis was carried out according to SAS (1988). The effect of season was analyzed by ANOVA, while the effect of fetal sex was analyzed by t-test. Correlation models were fitted to evaluate the relationship between gestation age, lamb birth weight, and each of the studied parameters.



**Fig 1b:** Sonogram showing the chest in pregnant ewe (120 days).



**Fig 1a:** Sonogram showing the placentome in pregnant ewe (80 days).

## **RESULTS**

### **1- Effect of breeding season:**

The weight of new born lambs which born in winter were heavier significantly ( $3.89\pm 0.16$  kg) than those born in summer breeding ( $3.28\pm 0.11$  kg). There was no effect of the breeding season on the mean placentome, fetal chest depth, kidney and abdominal diameter (Table1).

### **2- Effect of Mother age:**

The mean placentome diameter was bigger in old ewes than younger ( $2.69\pm 0.07$  vs  $2.29\pm 0.17$ cm) but the difference was not significant. The mother age has no effect on lamb birth weight, fetal chest depth, fetal kidney and abdominal diameter (Table 1).

### **3- Effect of gestation period:**

The placentomes increased with advanced the gestation period but the difference was not significant. The fetal chest depth increased significant ( $P<0.05$ ) progressively with increasing of gestation period and it was  $2.04\pm 0.5$ cm at 30-50 days of gestation and  $4.58\pm 0.41$ cm at 120-140 days (Fig 2).

The diameter of fetal kidney increased significantly ( $P<0.05$ ) with gestation period. It was  $1.62\pm 0.21$ cm at 30-50 days of gestation and increased to  $2.82\pm 0.16$ cm at 120-140 days (Fig 2).

The fetal abdominal diameter increased significantly ( $P<0.05$ ) steadily with the gestation period. It was  $1.56\pm 0.32$ cm at 30-50 days of gestation and increased to  $3.96\pm 0.26$ cm at 110-140 days (Fig 2).

### **4- Effect of fetal sex:**

Male lambs were significantly heavier than female lambs ( $3.82\pm 0.1$  VS.  $3.35\pm 0.07$ ,  $P<0.05$ ). There was no significant effect of fetal sex on the diameter of placentome, fetal chest depth, fetal kidney and fetal abdominal (Table 1).

A significant positive correlation was detected between placentome diameter ( $P<0.05$ ) at the same gestation age and the lamb birth weight ( $r = 0.41$ , and  $0.56$ , respectively). Also, a significant positive correlation ( $P < 0.05$ ) was detected between fetal abdominal diameter at the same gestation and the lamb birth weight ( $r = 0.54$  and  $0.40$ , respectively). Added, a significant positive correlation ( $P < 0.05$ ) was detected between mother age and birth weight ( $r=0.041$ ). There was no correlation effected between birth weight and kidney length and chest diameter

## **DISCUSSION**

In the present study it was found that, the breeding season affects the birth weight. The new born lambs in winter were heavier than those born in summer and difference between weight significant ( $P < 0.05$ ), which those recorded by Ashmawi *et al.*, 1984. There was no significant effect of the breeding season on the mean placentome diameter, fetal chest depth and kidney, while the effect of the season on the abdominal diameter was significant ( $p < 0.05$ ).

The heavier birth weight in this study, in winter may be referred larger abdominal diameter, these can be assured by the significant position correlation between birth weight and abdominal diameter.

Many studies reported significant effect of season of lambing on birth weight of lambs. Ali *et al.* (2008) found that the lamb birth weight was affected by season. The mean lamb birth weight was  $3.64 \pm 0.1$  kg. It was significant heavier ( $P = 0.001$ ) for winter mating ( $3.80 \pm 0.1$ ) and late spring ( $3.83 \pm 0.1$ ) compared to fall mating season ( $3.39 \pm 0.1$ ). Singh *et al.* (1982) reported seasonal differences on lamb birth weights show autumn lambing was heavier than spring lambing in lambs.

In the present work, there was no significant effect of breeding season on the mean placentome diameter, fetal chest and kidney, while such effect was significant on the abdominal diameter ( $P < 0.05$ ). The placentome increased with increasing the gestation period but the difference was not significant. The placentome diameter tended to increase with advancing the fetal age (Fig. 1). Ali and Fahmy (2008), found that the placentome growth rate was decreased with the progress of gestation period in bufflalo. The placentome increase in size until day  $82.73 \pm 7.7$ , then it began to collapse. During the last month of pregnancy, it became less echogenic, while its attached surface appeared more echo-intensive. By this time, it started to collapse with reducing its lumen, while in areas adjacent to the fetus it appeared flattened. Collapsing of the placentome might be an indication for occurrence of a degenerative process (Grunnert, 1980; Bjorkman and Dantzer, 1987 and Ali and Hayder, 2007)). On the other hand, these changes in the placentome may be associated with increased placental perfusion and tissue permeability during late pregnancy (Metcalf *et al.*, 1988).

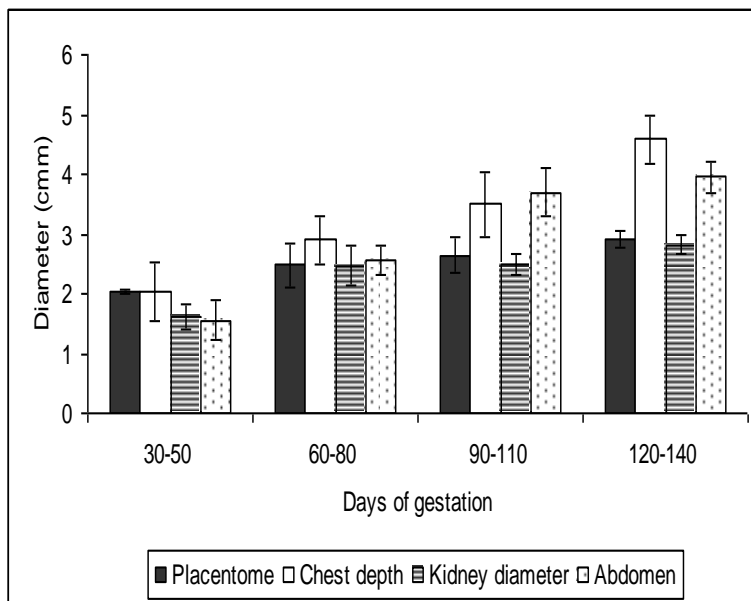
Gestation period had significant effected on kidney length, chest depth and abdominal diameter. In present study, kidney length, CHD and ABD tended to increase with advancing pregnancy. These results in agreement with the stement of Ali and Fahmy (2008). They found that the fetal ABD with increased growth rate with the progress of gestation period in bufflalo. The fetal kidney could be visualized first by day

73.2±6.3 (range 62.-76). The echo-poor fluid rumen served as a landmark for detection of the left kidney. Early in its detection, the kidney was ill distinct, had no sharp demarcation and its echogenicity resemble to large extend that of the liver. Later on (from day 90 onwards), differentiation may be made between the renal medulla containing the more transonic discrete pyramids separated by septa (columns of Bertin) and the cortex consisting of a uniform distribution of small discrete low level echoes, (Ali and Hayder 2007).

Male lambs were significantly ( $P<0.05$ ) heavier than female lambs ( $3.82 \pm 0.11$  vs  $3.35 \pm 0.07$ ) in birth weight. There was no significant effect of fetal sex on the diameter of placentome, fetal chest depth, fetal kidney and fetal abdominal. The different between male and female on birth weight may be due to the different in the foetal placentome, is in agreement with results by Alexander; (1964). They found that the differences in the weight of intact cotyledons between male and female lambs were small and not consistent, total cotyledons weight was greater for male than female On the other hand, in the foetal placentome, cotyledons of male lambs were consistently heavier than those of female, so that the difference between the overall means (100 and 80 g) was highly significant.

**Table 1:** Effect of breeding season, mother age and fetal sex on birth weight, placentome diameter, kidney length, chest depth and abdominal diameter on Rahmani ewes.

Factor	Parameters				
	Birth weight kg	PLD	KDL	CHD	ABD
Season winter	3.89±0.16 <sup>a</sup>	2.68±0.09 <sup>a</sup>	2.46±0.21 <sup>a</sup>	3.46± 0.18 <sup>a</sup>	3.45±0.13 <sup>a</sup>
Season summer	3.28±0.11 <sup>b</sup>	2.34±0.18 <sup>a</sup>	2.26±0.28 <sup>a</sup>	2.74± 0.45 <sup>a</sup>	2.31±0.23 <sup>b</sup>
Male	3.82±0.1 <sup>a</sup>	2.58±0.16 <sup>a</sup>	2.35±0.26 <sup>a</sup>	3.17± 0.38 <sup>a</sup>	2.46±0.33 <sup>a</sup>
Female	3.35±0.07 <sup>b</sup>	2.45±0.19 <sup>a</sup>	2.46±0.16 <sup>a</sup>	3.28± 0.3 <sup>a</sup> 1	3.7±0.42 <sup>a</sup>
Age 18-35 month	3.57±0.26 <sup>a</sup>	2.29±0.17 <sup>a</sup>	2.36±0.24 <sup>a</sup>	3.11± 0.22 <sup>a</sup>	3.31 2.64±0.24 <sup>a</sup>
Age 55-70 month	3.62±0.32 <sup>a</sup>	2.69±0.9 <sup>a</sup>	3.34±0.43 <sup>a</sup>	2.47±34 <sup>a</sup>	2.6±0. 34 <sup>a</sup>
Ovaroll means	3.58±0.07	2.51±0.08	3.22±0.19	2.31±0.10	2.96±0.25



**Fig. 2:** Changes in the placentome diameters, chest depth, kidney length and Abdominal diameters from 30-140 day gestation period in Rahmani ewes.

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