

EFFECT OF DEFERENT GESTATION PERIOD ON SERUM ESTROGEN, PROGESTERONE AND SOME BIOCHEMICAL PARAMETERS IN AWASSI EWES

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ABSTRACT

This study was designed to investigate the influence of different gestation periods on serum estrogen, progesterone and biochemical attributes levels in Awassi ewes. Ten ewes of 2-5 years old and 35-50 kg live body weight were used currently during the period from September 2019 to February 2020. Estrogen concentration seemed to decline since 2nd month and reached its lesser level at 4th month and re-increased at 5th month of gestation. The progesterone level increased ($P \leq 0.05$) at 2nd and 3rd months and decreased at 5th month of gestation. Serum Cholesterol, glucose, total protein, albumin and glubulin were decreased ($P \leq 0.05$) at the last gestation period. AST, ALT, and ALP activities take similar trend being decreased at the last gestation period. In conclusion estrogen, progesterone and other blood biochemical parameters were changed obviously during different gestation periods of Awassi ewes.

Keywords: reproductive hormones, cholesterol, total protein, pregnancy.

اسماعيل وآخرون

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تأثير مدد الحمل المختلفة في مستويات هرمون الاستروجين والبروجسترون وبعض المعايير الكيمياءحيوية في مصل الدم في

النعاج العواسية

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المستخلص

صممت هذه الدراسة لمعرفة تأثير فترات الحمل المختلفة على مستويات الاستروجين والبروجسترون والمعايير البيوكيميائية في مصل النعاج العواسية. استخدمت عشرة نعاج بعمر 2-5 سنوات و 35-50 كجم من وزن الجسم الحي خلال الفترة من سبتمبر 2019 إلى فبراير 2020. بدأ أن تركيز الأستروجين قد انخفض منذ الشهر الثاني ووصل إلى أقل مستوى له في الشهر الرابع ثم عاود زيادته عند الشهر الخامس من الحمل. زاد مستوى البروجسترون ($P \leq 0.05$) في الشهرين الثاني والثالث وانخفض في الشهر الخامس من الحمل. انخفض مستوى الكوليسترول والجلوكوز والبروتين الكلي والألبومين والكلوبيولين ($P \leq 0.05$) في المصل في الفترة الأخيرة من الحمل. اظهر نشاط AST و ALT و ALP اتجاهًا مشابهًا حيث انخفض في الفترة الأخيرة من الحمل. الاستنتاج، الاستروجين والبروجسترون ومعايير الدم الكيمياءحيوية تتغير بشكل واضح خلال فترات الحمل المختلفة للنعاج العواسية.

الكلمات المفتاحية: هرمونات التكاثر، كولسترول، البروتين الكلي، الحمل.

INTRODUCTION

The Awassi breed's adaptability to harsh environmental conditions in arid and semi-arid areas has been acknowledged (3). The changes in the physiological status of animals can definitely have significant effects on the hematological and biochemical parameters in ewes (4). Pregnancy is the one of the most important physiological events throughout life of female animals that leads to reproduce its progeny and preserve the continuity of the species (2). The evaluation of reproductive hormones during pregnancy would be useful for pregnancy detection, nutritional management to prevent pregnancy toxemia and effective flock management to know number of fetuses and the precise stages of pregnancy (33). Progesterone is often called the 'pregnancy hormone' and it's considers the key hormone for pregnancy maintenance in all animals (24). During pregnancy, low progesterone level in the ewe can lead to unfortunate development of embryo (27, 30). Estrogen concentration increases during late gestation in ewes and this this increases could be refer to increase estrogen requirement during last stage of pregnancy for the rapid growth of mammary gland and to support the beginning of parturition (33). Pregnancy can affect metabolism resulting in biochemical changes. It is well known that through the pregnancy all the metabolic pathways are involved in sustaining of fetus growth (17). Therefor the present study conducted to investigate the alteration in estrogen, progesterone and some of biochemical parameters profile throughout pregnancy in Iraqi Awassi ewes.

MATERIALS AND METHODS

Experimental animals

Ten Awassi ewes aged 2-5 years were used in the current study. All animals were raised in animal house belong to the College of Veterinary Medicine/Tikrit University during the period between September -2019 to February-2020. Blood samples were monthly collect throughout gestation period by jugular venipuncture. Blood serum samples were separated by centrifugation as ten minutes

3000 rpm, and all serum samples were stored under -20°C till analysis (21).

Serum hormones assay

Concentrations of estrogen and progesterone were assayed using Enzyme Linked Immunosorbent Assay (ELISA) technique (5), with a spicial kit (estrogen Enzymes Immunoasay Test Kits and progesterone Enzymes Immunoasay Test Kits, Medix. Biotech. Inc.,C.A.).

Biochemical analysis

serum cholesterol, glucose, total protein, albumin, globulin, ALT, AST and ALP were assayed using spectrophotometer with special kit (Maghrib, biomeghrib Company) according to (15 and 36) .

Statistics analyses

Data were analysed using paired t-test (a Repeated Measures ANOVA) in SPSS (Version 19; SPSS). The differences were set at $p < 0.05$ (6).

RESULTS AND DISCUSSION

The results of the present study (Figure 1) revealed that the level of estrogen concentration seemed to decline since the 2nd month of pregnancy, reaching its lesser level at the 4th month (112.58 ± 5.378 pg/ml), then it significantly ($P < 0.05$) increased at the 5th month of gestation (62.41 ± 6.272 pg/ml). Similar trend was reported by Thompson and Wagner (35), Sharma *et al.* (32), Alwan *et al.* (7) and Shwetha *et al.* (33) who reported increased estradiol levels during late pregnancy period in ewes. Bazer *et al.* (8) hypothesized that the expression of estrogen receptors on which tissues will rise as the pregnancy progressed. Also, the current result was in agreement with Sharma *et al.* (32) who noticed that the cortisol secreted from fetal adrenal gland during last three weeks of gestation stimulates estrogen production. Shwetha *et al.* (33) pointed out that the increasing of estradiol levels during late gestation could be attributed to estradiol demand for rapid growth of mammary gland at the late stage of gestation as well as to support the beginning of parturition.

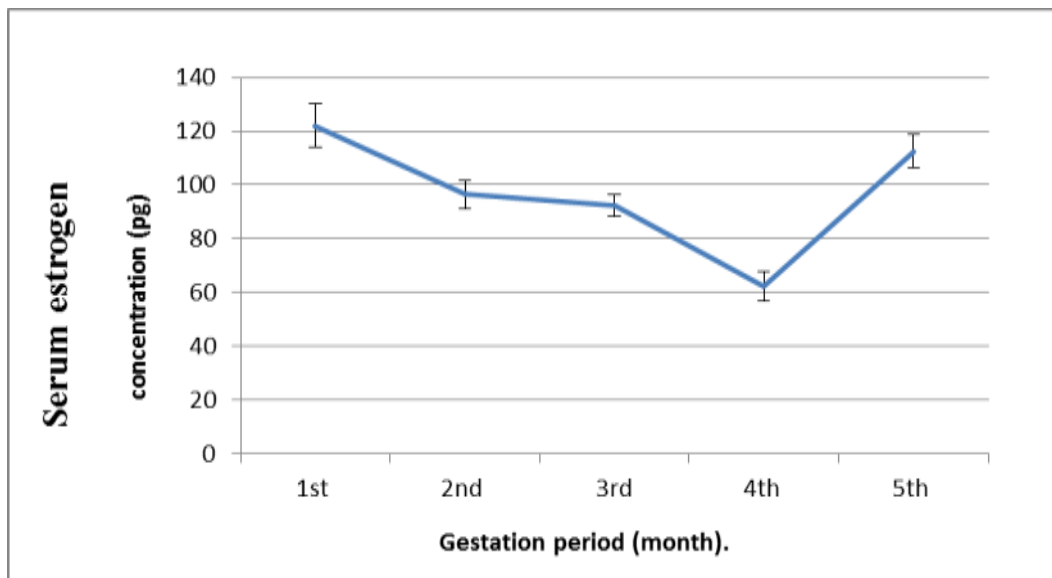


Figure 1. Estrogen concentration during different gestation periods in Awassi ewes (Mean + SE)

Maximum serum level of progesterone in Awassi ewes in the present study reached to 16.72 ± 1.46 ng/ml, these level was lesser than levels recorded by (7) in Iraqi ewes, (38) in Syrian Awassi ewes, (14) in Barbary sheep and (22) in Kari ewes. These differences in progesterone levels may contributed to different breed (9), Mitchell *et al.* (25) reported that the variation in progesterone concentration is affected by season, age of the animal, ovulation rates and the analytical method. Significantly ($P \leq 0.05$) higher progesterone levels (Figure. 2) were observed in serum of pregnant ewes as pregnancy

advanced in 2nd and 3rd months of gestation being 16.72 ± 1.46 and 16.61 ± 2.88 ng/ml respectively compared with 1st month of gestation (11.20 ± 1.43 ng/ml) then decreased ($P \leq 0.05$) in the last month of pregnancy (13.34 ± 0.43 ng/ml). These results was in line with Alwan *et al.* (7) and Mugerwa and Viviani (26) who reported higher progesterone levels during mid-gestation and lowered as parturition progressed. The increasing of progesterone concentration at the mid gestation period, is attributed to additional secretion from extra ovarian sources (placenta) (22, 33).

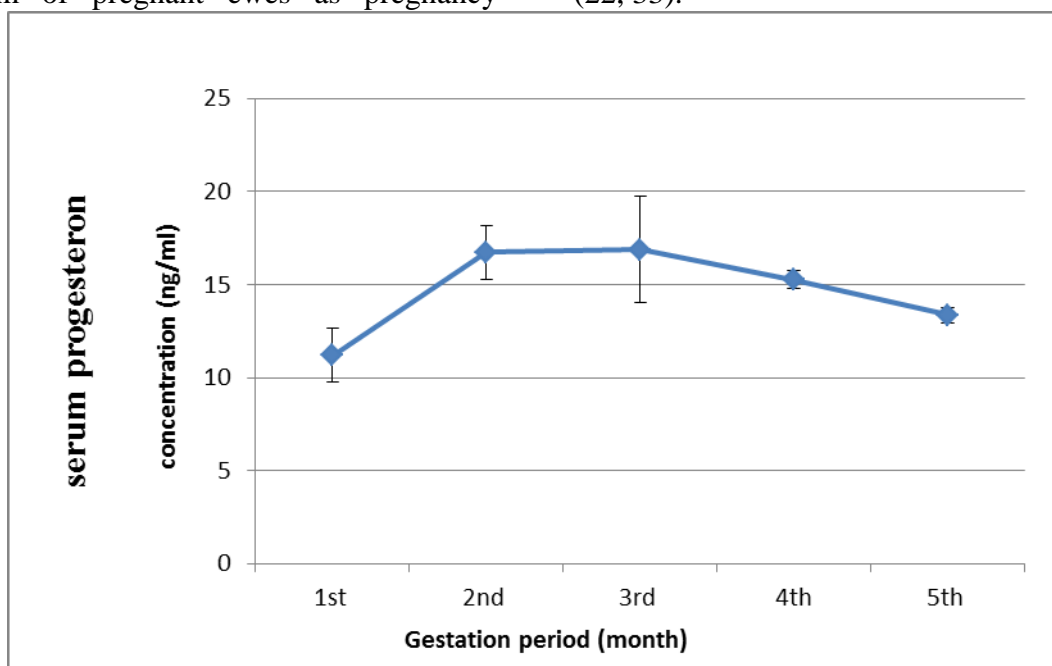


Figure 2. Serum progesterone concentration during different gestation periods in Awassi ewes (Mean ± SE)

The results of present study (Table 1) revealed significant decreasing in cholesterol concentration at 5th month of pregnancy (73.63± 0.88 mg/ml) compared with early and mid-gestation period (110.273 ± 2.123 and 80.50 ± 3.435 respectively). This result was compatible with (18, 23, 28, 29) These decreasing in blood cholesterol concentration in the late pregnancy may return to the increased requirement of cholesterol to utilize steroid hormones at the last period of gestation for pregnancy maintenance and lactation development (29). Glucose level decreased ($P \leq 0.05$) at late period of pregnancy (60.73 ± 2.54 mg/dl) compared to early and mid-gestation (68.3 ± 2.55 and 66.1 ± 2.13 mg/dl respectively). Similar results were reported by Ismaeel et al. (18) in Iraqi ewes and Waziri et al (39) in goat. This result may be caused by an increased fetus need for glucose due to increased fetal development during the last gestation period (13). In agreement with previous study (19, 18) total protein concentration in the current study decreased gradually with the progression of pregnancy till it reached its lowest levels ($P \leq 0.05$) at the late pregnancy (6.27 ± 0.32 g/dl). The variations reflect the maternal requirements of proteins need for milking and providing immunoglobulins (31). Serum total proteins usually decreased as parturition advanced due to the increased fetal requirements for proteins needed to build muscle in late pregnancy (19). Albumin was decreased ($P \leq 0.05$) at the late pregnancy (2.91 ± 0.21 g/dl) compared with

early and mid-pregnancy (3.35 ± 0.13 and 3.33 ± 0.43 g/dl respectively). The liver synthesizes 80% of all albumins and the significant decrease in the level of albumin indicates a deficiency of amino acid and proteins in the organism of pregnant ewes (12). Globulin also decreased at the late pregnancy (3.36 ± 0.21 g/dl), might associated with the production of colostrum that rich in antibodies derived from γ -globulins and other immunological changes occurred around parturition (20). The activity of ALT, AST and ALP increased significantly ($P \leq 0.05$) at the late pregnancy being 39.76 ± 1.34, 122.3 ± 2.14 IU/L and 134.06 ± 2.25 IU/L in ALT, AST and ALP respectively compared with other periods. similar results were recorded by Gurgoze et al. (11) in Awassi ewes, El-Sherif and Assad, (10) in Barki ewes and Abdul-Rahaman et al. (1) in she camel. The high ALP activity noticed in pregnant ewes may return to the rising of metabolic rate or increased bone metabolism due to the lack of dietary minerals of pregnant ewes (34). The amine transporter enzymes increases in pregnancy due to increased liver weight and reaches the highest levels when there is a lack of protein concentration and fat depletion to manufacture energy (37). In addition, the increases in level of these enzymes is affected by feeding deficiency causes and negative energy balance due to increase of energy requirement at the late pregnancy period and its reached highest concentration during the last period of pregnancy (16).

Table 1. Serum biochemical parameters (Mean ± SE) throughout different gestation periods in Awassi ewes

Parameters	Period Early pregnancy (1 - 2 months)	Mid pregnancy (3 - 4 months)	Late pregnancy (5 months)
cholesterol (mg/ml)	110.273 ± 2.123 ^a	80.50 ± 3.435 ^b	73.63± 0.88 ^c
Glucose (mg/dl)	68.3 ± 2.55 ^a	66.1 ± 2.13 ^a	60.73 ± 2.54 ^b
Total protein (g/dl)	7.24 ± 0.12 ^a	7.02 ± 0.15 ^a	6.27 ± 0.32 ^b
Albumin (g/dl)	3.35 ± 0.13 ^a	3.33 ± 0.43 ^a	2.91 ± 0.21 ^b
Globulin (g/dl)	3.88 ± 0.13 ^a	3.66 ± 0.43 ^a	3.36 ± 0.21 ^b
ALT (IU/L)	32.38 ± 1.45 ^b	35.3 ± 1.32 ^b	39.76 ± 1.34 ^a
AST (IU/L)	91.83 ± 2.23 ^c	99.20 ± 1.87 ^b	122.3 ± 2.14 ^a
ALP (IU/L)	110.93 ± 2.34 ^b	115.63 ± 2.03 ^b	134.06 ± 2.25 ^a

Means with different superscripts within each row differ significantly ($P \leq 0.05$)

CONCLUSION

The current study revealed that the gestational periods have clear effect on estrogen and progesterone concentrations and these effects

are related with maintenance of pregnancy, prepare normal parturition and development of mammary gland. Blood biochemical levels changed throughout different gestation period

and these changes may reflect the health status of animals.

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