Determination the serum oestrogen Concentrationand Alkaline phosphatase activity during pregnancy and parturition in oestrus synchronized goat

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Summary

This study was designed to investigate the oestrus activity, oestrogen profile and enzymatic change Alkaline phosphatase (ALP) at different stage of gestation and parturition in shami and Iraqi goat. A total of 30 mature female goats of two different breed (fifteen animals / each) were used, their reproduction was followed from January upto July -2013. The investigation included studying oestrus synchronization and allowing the animal to be mated naturally by proven buck. Blood sample were collected before gestation then every fifteen days until parturition. Results showed 100 % of female express estruse after synchronization and (73% and 67%) in shami and Iraqi goats respectively, became pregnant. Regarding the activity of oestrogen, the concentration increase gradually after day (60) of pregnancy and highest value was detected at parturition.Alkaline phosphatase (ALP) rose significantly ($p<0.05$) at 2nd and 3rd month of pregnancy. Conclusion of the changes, determination of estrogen level and ALP activity will serve as a base line data for monitoring the change during pregnancy and parturition.

Keywords: Estrogen, Alkaline phosphatase, pregnancy, estrous synchronization.

Introduction

Goats are among earliest species of animals to be domesticated and one of the most important animals in tropic and sub-tropical area (1). Goat has many unique biological features, highly fertile animal, having the ability to produce multiple birth, resist different diseases and eat simple food (2). Estruse synchronization in livestock is one of the important method in assisted reproductive technologies in goat reproduction; it focuses on the manipulation of either the luteal or the follicular phase of estrous cycle and in doe, the opportunity for control is great during luteal phase which is a long duration and a more responsive to manipulation (3 and 4). Reproductive status of the animals (pregnancy and parturition) have an effect on the hormonal and biochemical parameters (5). Metabolic and functional changes between conception and termination of pregnancy are brought about balance and interaction of hormones and enzymes (6). Oestrogen is one of the key hormones in pregnancy and parturition in most mammals, the placenta is considered a steroidogenic organ for synthesis of estrogen and progesterone during pregnancy and plays an active role in pregnancy recognition (7), determination the viability of female (8), udder development and timing the parturition (9). Serum oestradiol profiles during pregnancy was recorded in Iraqi sheep and goats (10). Serum enzyme is a useful tool in clinical diagnosis of various state of reproduction and ALP determination can provide fundamental information on placental maturation, bone ossification of the fetus and integrity of muscular tissue and liver (11). In view of this, and since little information is available concerning various aspects of estrogen hormone concentration and ALP activity during pregnancy and parturition in goat, the study was conducted to evaluate fertility rate after synchronization and to determine serum values of estrogen hormone and ALP activity in pregnancy and parturition in shami and Iraqi goat.

Materials and methods

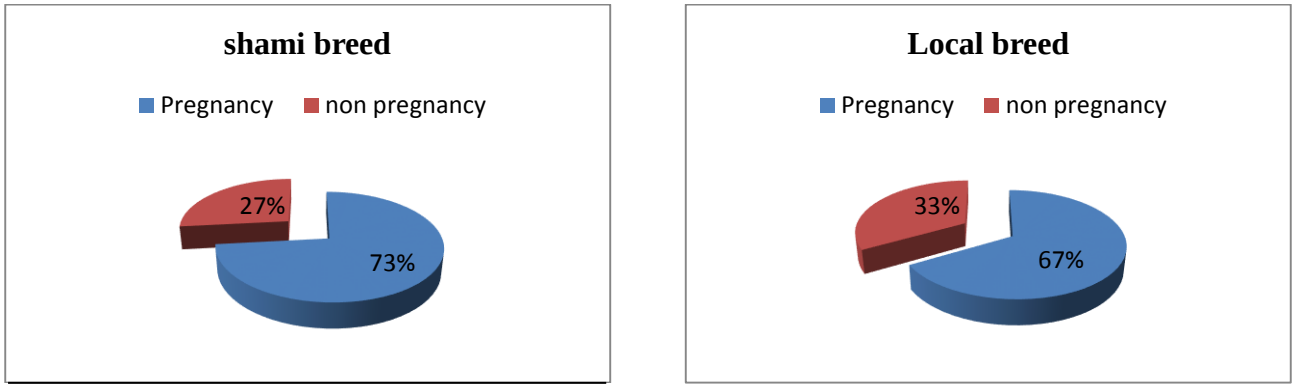
Two breed of female goat (shami and Iraqi) selected randomly from a farm belonging more to Agurgof goat station. They were housed in semi opened shade provided with concentrated diet in two daily occasion supplement with straw and green food presented to the animal along with water adlibidum. Thirty goats were used in the study (fifteen animals / breed) on basis of age (2-2.5 years) reared at the farm of

Agurgofing goat station. The animals were subjected to careful general and special clinical examination and with preventive health measures. The study extended for seven months from beginning of January up to end of July 2013. An intact two male goats (Apronized bucks) were selected as a teaser animals for oestrous detection and natural insemination. Oestrous was synchronized using vaginal sponge impregnated with 60 mg of medroxy progesterone acetate (MAP) (Esponjavet - Spain) under strict hygienic measures followed by im injection of 400 IU of pregnant mare gonadotropin (PMSG) (Esponjavet – Spain) at the time of sponge withdrawal. Estrus detection was done and each doe expressed estrouse signs serviced by buck of proved fertility. Blood sample was collected from jugular vein by vacutainer tube. Throughout the gestation period at two weeks interval and at parturition.Blood sample left to clot then centrifuged at 3000 rpm/ 10 minute, sera obtained were kept frozen (-20) until assay. Estrogen hormone was measured by radioimmunoassay (RIA) Kit from Abeckman Coulter Company.while Alkaline phosphatase activity (ALP) was done by kit from Biolabo Company.

The least significant difference (LSD) was used to compare the significant differences between mean. SAS/STAT users guide for personal computers SAS (12).

Results and Discussion

Percentage of animals showed estural activity after manipulating and synchronization of estrus cycle was 100% in two breeds of goat. These finding suggest the (MAP) doses of commercial formulation (60 mg) followed by (PMSG) was sufficient to synchronize estrus and no differences were observed in the percentage of the does exhibiting estrus in two breed of study. These result in general agreement with similar observation in goats (13, 14 and 15). Fertility result in this study was evaluated by kidding rate and the result was that 11 does out of 15 (73%) in shami goat and 10 out of 15 (67%) in Iraqi breed give birth. However the percentage of does returning to estrus was (27%) from shami breed and 33% from local breed) (Figure, 1) which may be attributed to fertilization failure or early embryonic mortality. These findings agree with (15) but dis agree with the findings of (16).



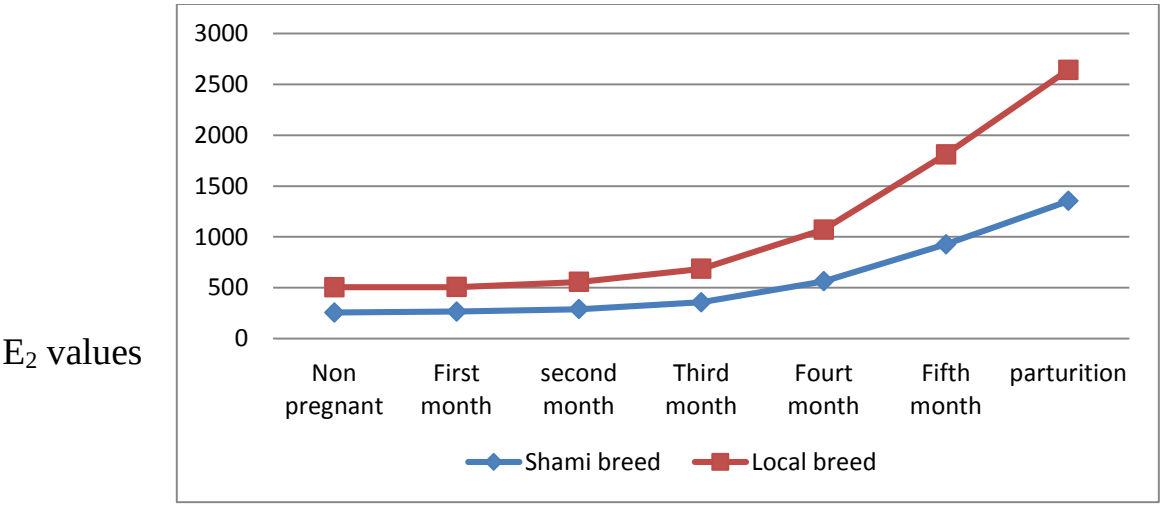
Figure, 1: the percentage of pregnant does.

Concerning oestrogen (E_2) values during pregnancy and parturition, there is no significant ($p>0.05$) difference in the mean value of E_2 between two breed (256±4.17pg/ml and 248.00±11.77) in shami and Iraqi goats, respectively (Table, 1) and (Fig. 1).This result is dis agreement with (17). During pregnancy the E_2 concentration increases gradually until parturition and this increase is almost in agreement with (10 and18). In parturition the E_2 concentration reaches to the highest value at the time of parturition (Table, 1 and Fig. 1).This result is in agreement with (10)

Table, 1: The mean value of oestrogen(E_2) in non-pregnancy, pregnancy and parturition inShami and Iraqi goats.

Period	Mean ± SE (pg/ml)	
	Local breed	Shami breed
Non pregnant	256.20 ± 4.17 e	248.00 ± 11.77 d
Month 1	265.00 ± 21.96 e	240.60 ± 9.69 d
Month 2	289.00 ± 15.89 e	267.00 ± 10.78 d
Month 3	357.30 ± 27.49 d	328.20 ± 15.97 d
Month 4	562.50 ± 22.48 c	508.40 ± 26.39 c
Month 5	926.80 ± 23.55 b	884.20 ± 13.88 d
Parturition	1352.40 ± 57.46 a	1290.20 ± 173.79 a

Different small letters represented significant different at the level of (P<0.05) with in breed.



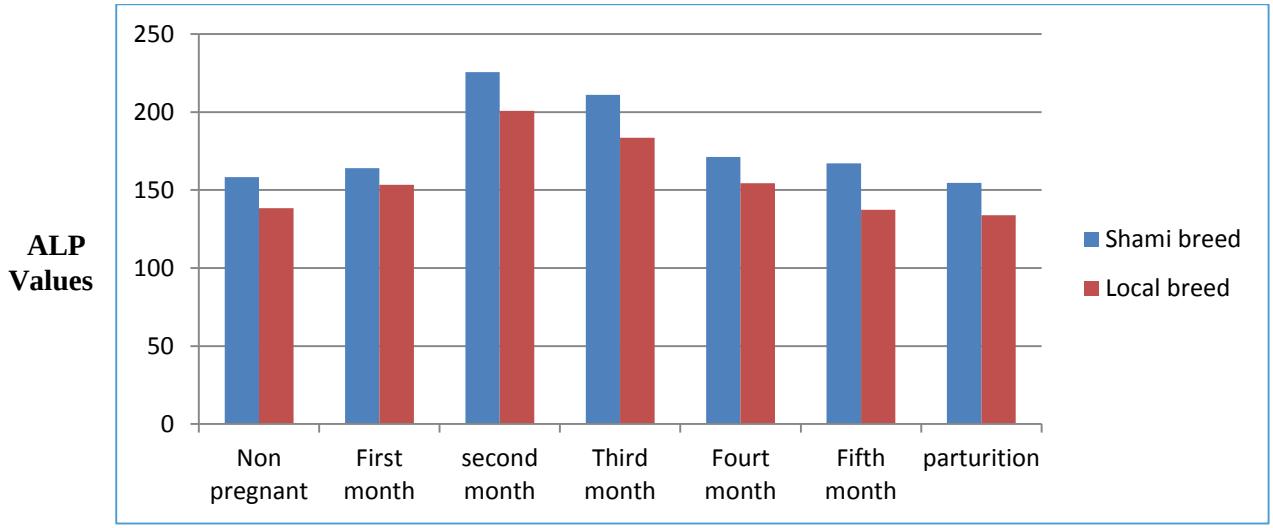
Figure, 1: Oestrogen (E_2) values during non-pregnancy, pregnancy and parturition in Shami and Iraqi breed

Table (2 and fig2) illustrates the ALP activity during different months of gestation and parturition in shami and local dipicted breed. The result showed in non-pregnant animals, no significant (P>0.05) differences in mean values of ALP between two breed (158.20±7.73I.U, 138.40±15.02) in shami and Iraqi goats, respectively. This result is disagreement with (6, 19 and 20) who showed no effect of goat breed on ALP activity. But it is agrees with (21), during a study, three different breeds of Iraqi sheep. The result of this study proved that in pregnant animals, there were significant (p< 0.05) increases in ALP value in two breeds during second and third months of gestation and reached to highest value and then decreased gradually during the last two months of pregnancy. The result of this study is almost in agreement with (22). This increase in ALP is attributed to the need of this enzyme for maturation of the bone tissue of fetus and placental maturation (22). Also, the study disagrees with (23 and 24), who recorded that pregnancy had no significant (P<0.05) effect on ALP value. Regarding the parturition, there were no significant differences (P> 0.05) in ALP values in comparison with non-pregnant animals in both breed of animal. This result is in agreement with (21 and 23), but in disagreement (25) who reported significant (P<0.05) increase in value of (ALP) at the parturition. The explanation was due to the (ALP) have a role in absorption of protein and calcium from body tissue to produce the milk.

Table, 2: The mean value of (ALP IU/L) in non-pregnancy, pregnancy and parturition in Shami and Iraqi goats.

Period	Mean ± SE (IU/L)	
	Local breed	Shami breed
Non pregnant	158.20 ± 7.73 b	138.40 ± 15.02 c
Month 1	164.0 ± 6.19 b	153.3 ± 8.07 bc
Month 2	225.60 ± 12.74 a	200.80 ± 12.21 a
Month 3	211 ± 13.38 a	183.60 ± 3.38 bc
Month 4	171.2 ± 11.35 b	154.30 ± 10.44 bc
Month 5	167.00 ± 10.48 b	137.4 ± 11.08 c
Parturition	154.6 ± 11.38 b	133.80 ± 12.30 c

Different small letters represented significant different at the level of (P<0.05) with in breed.



Figure, 2: ALP values during non-pregnancy, pregnancy & parturition in Shami and Iraqi goats.

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قياس تركيز هرمون الاستروجين وفعالية انزيم الفوسفاتيز القاعدي خلال الحمل والولادة في المعز الموحد الشبق

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الخلاصة

اجريت الدراسة لقياس تركيز هرمون الاستروجين ونشاط انزيم الفوسفاتاز القاعدي خلال مراحل الحمل المختلفة والولادة في (30) معزة (15 معزة من النسل الشامي و 15 معزة من النسل العراقي) تمت متابعة التناسل من شهر كانون الاول ولغاية شهر تموز, شملت الدراسة توحيد الشبق بإستعمال الاسفنجات المهبلية الحاوية على 60 ملغم ميدروكسياسيتيت بروجيسترون مع حقن 400 وحدة دولية من هرمون مصل الفرس الحامل, وسفدت الاناث طبيعيا من ذكور خصبة. تم اخذ عينات الدم من الوريد الوداجي قبل وضع الاسفنجات ثم كل اسبوعين بعد التسفيد لغاية الولادة. اظهرت النتائج بان نسبة الاستجابة للعلاج الهرموني 100% اما نسبة الحمل كانت 73% في المعز الشامي و 67% في المعز العراقي. بينت نتائج التحليل الهرموني ظهور ارتفاع تدريجي في مستوى هرمون الاستروجين من اليوم 60 بعد الحمل ولغاية الولادة وبلغ اعلى مستوى خلال الولادة. فضلا عن ارتفاع مستوى انزيم الفوسفاتاز القاعدي خلال الشهر الثاني والثالث من الحمل .تستنتج الدراسة ان هناك زيادة معنوية (أ < 0.05) في تركيز هرمون الاستروجين وانزيم الفوسفاتاز القاعدي في مصل لدم خلال الاشهر الثلاثة الاخيرة قبل الولادة.

الكلمات المفتاحية: هرمون الاستروجين، انزيم الفوسفاتيز القاعدي، الحمل، توحيد الشبق.