EFFECT OF BIRTH NUMBERS AND PREGNANCY PERIODS ON SOME BLOOD PARAMETERES OF AWASSI EWES

A. T. Hussein[1] **R. I. Khalil[2]**
Researcher **Prof.**
[1] Direct. Agric. Diyala Govern., Ministry of Agriculture, Iraq.
[2] Dept. Anim. Prod., Coll. Agric., University of Diyala.
raaedibrahim@uodiyala.edu.iq

ABSTRACT

This study was conducted to investigate the effects of birth number, pregnancy stage (pre- and post-pregnancy), and their interaction on selected blood parameters in local Awassi ewes under grazing conditions. The experiment involved 33 local Awassi ewes, divided equally into three groups: the first group consisted of ewe lambs, the second group included ewes with one previous birth, and the third group comprised ewes with multiple births (2–3). Birth number showed no significant effect on any of the blood parameters. However, mean corpuscular hemoglobin concentration (MCHC), hemoglobin (Hb), and packed cell volume (PCV) were significantly higher at mid-pregnancy (12th week) compared with the 4th and 20th weeks of pregnancy. Serum total protein and cholesterol levels were significantly higher ($P \leq 0.01$) during the pre-pregnancy period compared with other stages. Serum calcium levels were significantly higher ($P \leq 0.01$) during the pre-pregnancy period and at the 4th week of pregnancy compared with the other stages. Phosphorus concentrations increased significantly ($P \leq 0.01$) at the 4th week of pregnancy compared with all other study periods. However, no significant interactions were observed between birth number and pregnancy stage. In conclusion, the pre-pregnancy period had a critical impact on certain blood parameters of local Awassi ewes.

Keywords: previous births, blood attributes, Hb, PCV, MCHC ,Sheep.

تأثير عدد الولادات ومدد الحمل في بعض معايير الدم للنعاج العواسي

أحمد طلال حسين رائد إبراهيم خليل
باحث أستاذ
مديرية الزراعة– محافظة ديالى / وزارة الزراعة العراقية قسم الإنتاج الحيواني– كلية الزراعة / جامعة ديالى

المستخلص

أجريت هذه الدراسة لبيان تأثير عدد الولادات السابقة ومدد ما قبل وبعد الحمل والتداخل بينهما في بعض معايير الدم للنعاج العواسي المحلية ضمن ظروف الرعي الطبيعية. أجريت الدراسة باستخدام 33 نعجة عواسي محلية قسمت الى ثلاثة مجاميع متساوية: الأولى حملان أنثوية، المجموعة الثانية نعاج والدة لمرة واحدة والمجموعة الثالثة نعاج والدة لأكثر من مرة (2–3 ولادات سابقة). لم يكن هنالك تأثير معنوي لعدد الولادات السابقة في معايير الدم المدروسة. وجدت زيادة معنوية في كل من PCV و Hb و MCHC عند منتصف الحمل (الأسبوع الثاني عشر) مقارنة بالأسبوعين الرابع والعشرين من الحمل. كان تركيز البروتين الكلي والكوليسترول في فترة ما قبل الحمل الاعلى معنويا ($P \leq 0.01$) مقارنة بجميع مدد الحمل، وكان تركيز الكالسيوم و الفسفور الأفضل معنويا أو حسابيا في فترة ما قبل الحمل والاسبوع الرابع من الحمل مقارنة بمدد الحمل الأخرى. كما لم تظهر أي فروق معنوية عند دراسة التداخلات بين عدد الولادات السابقة ومدد الحمل. يمكن الاستنتاج بوجود تأثيرات معنوية لمدة ما قبل الحمل للنعاج العواسي المحلية في معظم معايير الدم المدروسة.

الكلمات المفتاحية: ولادات سابقة، معايير كيمياحيوية، معايير دمية، أغنام.

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INTRODUCTION

Awassi sheep is the most common breed of sheep in Iraq which is classified within the multi-purpose sheep (meat, milk and wool) (38). The sheep sector in Iraq lacks its ability to compete in global markets through the low productivity of milk and meat (20). Local sheep (including Awassi) are distinguished by their ability to live in difficult environmental conditions such as high temperatures and lack of feed, spread of diseases and long walks during grazing (3,6). Many important factors have impact on reproductive capacity of sheep such as improvement of nutrition, body weight ,body condition score, photoperiod, climatic changes, estrous synchronization, hormonal treatments and management practices (4, 5, 7, 9, 12, 19, 23, 26, 31, 32, 34, 37, 39, 40). Determination of the blood parameters profile became an essential tool for diagnostic purposes in medical disorders, monitoring the nutritional and metabolic changes of the animals (14, 15). Reproductive capacity is related with blood values, therefore, studying these changes can be an accurate indicator of the health and physiological status of the animal. Many studies using blood parameters as indicators to the physiological, health and productivity of the animal (2, 20, 25). Therefore, this study was executed to explore the effect of the birth numbers, periods pre- and post-pregnancy as well as the interaction among them on some blood parameters for local Awassi ewes under grazing conditions.

MATERIALS AND METHODS

This experiment was carried out at the Canaan region located at Baqubah city of Diyala governorate during the period from 15 May, 2019 to 15 Jan. ,2020. Thirty three Awassi ewes were divided into three groups (11 ewes per group) according to the number of previous births. Ewes lambs were used in 1st group. One and multiple (2-3 birth) previous birth ewes were used in 2nd and 3rd groups respectively. Ewes were synchronized by treated with vaginal sponges (Progestin-impregnated vaginal sponges (Intervet company) containing 20 mg of Cronolone). The vaginal sponges were removed after 12 days, estrus occurred, 24 hr. post removal of sponges . The six fertile Awassi rams were used for mating. The first serve was occurred, 25.5 hr. post vaginal removal. Blood samples were collected before synchronization, 4, 8, 12, 16 and 20 of pregnancy (once every 28 days of pregnancy), blood samples were taken from jugular vein by sterile medical syringes (8 ml) in an anticoagulant test tube for measurement PCV and Hb (2ml), 6ml centrifuged at a speed of 3000 rpm /15 minutes to get the plasma which put in eppendorf tubes and kept in the freezer (-20ºC) until samples analysis of biochemical characteristics .

Statistical analyses

Data were analyzed according to the program (27) by complete random design(CRD).The statistical model for the analysis of variance was:

$Yijk= \mu + ti + rj + (tr)ij + \varepsilon ijk$

Where:

Yijk = Observation value.

μ = Overall mean

ti= Birth numbers.

rj = Effect of period .

(tr)ij = Effect of interaction

εijk = Error term.

To determine the significant of the differences between the average Dunkin's Multiple Range test was used (16).

RESULTS AND DISCUSSION

Effect of birth numbers on PCV, Hb and MCHC

Non- significant difference were noticed of the birth numbers on both PCV(30.94, 31.31 and 31.19%), Hb (9.61,9.73 and 9.69 gdl^{-1}) and MCHC (31.01, 31.04 and 31.05%) for ewe lambs, one and multiple previous birth ewes respectively (Table 1) . The absence of significant difference among ewe lambs, one and multiple birth numbers for both categories may be due to good management practices .These results were within reference values of sheep(PCV=27-45%, Hb=9-15gdl^{-1} and MCHC=31-34% (3,15).

Table 1. Effect of birth numbers on packed cell volume (PCV), hemoglobin (Hb) and mean corpuscle hemoglobin concentration (MCHC) of local Awassi ewes (Mean ±SE).

Birth numbers	PCV (%)	Hb (g dl^{-1})	MCHC (%)
Ewe lambs	30.94±0.62	9.61±0.21	31.01±0.05
One birth	31.31±0.61	9.73±0.21	31.04±0.06
Multiple birth	31.19±0.55	9.69±0.18	31.05±0.05
Level of significance	N.S	N.S	N.S

N.S= Non- significant .

Effect of pregnancy periods on PCV, Hb and MCHC: Table(2) revealed a significant difference (P≤0.01) in PCV at 12th week compared with the period pre and 4th and 20th weeks of pregnancy. The significance effect obviously in all pregnancy periods compared with pre- pregnancy. The current results are line with Peker et al (31), Helal et al (21) and Sultan and Mohammed (36), who indicated a significant differences for the mid-pregnancy period with the first and last periods of pregnancy. The Hb concentration (Table 2) was greater (P≤0.01) in mid-pregnancy period (12th week; 10.38mgdl^{-1}) compared with first period (4th week), being 9.76 mg dl^{-1} and last period of pregnancy (20th week; 9.48 mg dl^{-1}. Similar results have been obtained by EL-Sherif et al (17). The results also showed a significant increasing for all pregnancy periods compared with pre-pregnancy period in Hb (Table 2). Results have shown a significant increase in MCHC at 8th week (31.20%) and 12th week (31.18%) of pregnancy compared with pre- pregnancy, 4th and 20th week of pregnancy. The Results showed a significant decrease at pre-pregnancy period as compared to all pregnancy periods (Table 2). A significant differences were mentioned in PCV, Hb and MCHC at different pregnancy periods compared with pre-pregnancy (Table 2) may be due to the good management practices

Table2. Effect of pre-and post-pregnancy periods on packed cell volume (PCV), hemoglobin (Hb) and mean corpuscle hemoglobin concentration (MCHC) of local Awassi ewes (Mean ± SE).

Pregnancy periods (weeks)	PCV (%)	Hb (g dl^{-1})	MCHC (%)
Pre- pregnancy	26.50±0.70 d	8.12±0.24 d	30.59±0.09 d
4	31.39±0.90 bc	9.76±0.30 bc	31.04±0.07 bc
8	32.78±0.62 ab	10.23±0.21 ab	31.20±0.05 a
12	33.28±0.61 a	10.38±0.21 a	31.18±0.04 a
16	32.39±0.57 abc	10.10±0.19 abc	31.17±0.04 ab
20	30.56±0.44 c	9.48±0.15 c	31.01±0.03 c
Level of significance	P≤0.01	P≤0.01	P≤0.01

Means with different superscripts within each column indicated significant differences (P≤0.01) .

Effect of the interaction between birth numbers and periods on PCV, Hb and MCHC

No significant interaction was observed between birth number and the pre- and post-pregnancy periods on PCV, Hb, and MCHC (Table 3). However, within each group, the interaction between birth number and the pre- and post-pregnancy periods showed a gradual increase in all blood parameters until mid-pregnancy, followed by a progressive decline toward the final week of pregnancy.

Table 3. Effect of the interaction between birth numbers and periods on packed cell volume (PCV), hemoglobin (Hb) and mean corpuscle hemoglobin concentration (MCHC) of local Awassi ewes (Mean ±SE).

Birth numbers	Pregnancy periods (weeks)	PCV (%)	Hb (g dl^{-1})	MCHC (%)
Ewes lambs	Pre- pregnancy	27.00±1.44	8.28±0.48	30.63±0.17
	4	29.83±1.80	9.23±0.59	30.91±0.13
	8	31.83±1.33	9.92±0.44	31.13±0.08
	12	33.50±1.12	10.45±0.37	31.18±0.07
	16	33.50±0.99	10.47±0.33	31.23±0.06
	20	30.00±0.73	9.30±0.24	30.99±0.07
One birth	Pre- pregnancy	26.00±1.46	7.95±0.49	30.52±0.19
	4	33.00±1.63	10.30±0.55	31.18±0.12
	8	32.17±1.01	10.02±0.34	31.12±0.10
	12	33.33±1.09	10.42±0.36	31.23±0.08
	16	32.00±0.97	9.97±0.32	31.13±0.07
	20	31.33±0.76	9.73±0.25	31.06±0.04
Multiple birth	Pre- pregnancy	26.50±0.85	8.12±0.29	30.61±0.10
	4	31.33±1.15	9.73±0.39	31.04±0.09
	8	34.33±0.61	10.77±0.20	31.35±0.04
	12	33.00±1.18	10.28±0.39	31.14±0.08
	16	31.67±0.99	9.87±0.33	31.15±0.07
	20	30.33±0.84	9.40±0.28	30.98±0.06
Level of significance		N.S	N.S	N.S

N.S= Non- significant.

Effect of birth numbers on serum proteins The results in Table (4) showed no differences in the number of births or in the concentrations of total protein, albumin, and globulin. The lack of significant differences may be attributed to the standardized environmental conditions, which maintained homeostasis in blood protein levels across groups. Moreover, blood proteins generally remain stable when environmental conditions, including nutrition, are favorable.

Table 4. Effect of birth numbers on serum proteins of local Awassi ewes (Mean ±SE).

Birth numbers	Total protein (g dl^{-1})	Albumin (g dl^{-1})	Globulin (g dl^{-1})
Ewe lambs	4.84±0.15	2.31±0.10	2.53±0.10
One birth	4.97±0.19	2.42±0.11	2.55±0.12
Multiple birth	4.94±0.16	2.44±0.12	2.49±0.10
Level of significance	N.S	N.S	N.S

N.S= Non- significant.

Effect of pregnancy periods on serum proteins: A greater concentration ($P \leq 0.01$) of total protein was observed at pre-pregnancy period (5.91 mg dl^{-1}) in comparison with all pregnancy periods. The lesser concentration of total protein observed in the 20^{th} week of pregnancy (4.03 mg dl^{-1}). The results did not exhibit differences among the periods 4, 8, 12 and 16 week of pregnancy namely 5.27, 4.96, 4.70 and 4.64 mg dl^{-1} respectively (Table 5). The results of albumin concentration were shown in Table (5), a significant differences ($P \leq 0.01$) at pre and the 4^{th} week of pregnancy as compared with 12, 8, 16 and 20 weeks of pregnancy. The current results are also in line with Ishwar (23), and in contrast with Sultan et al (38). Pre-pregnancy period had a high significant ($P \leq 0.01$) increase in globulin (2.98 mg dl^{-1}) while, the 20^{th} week of pregnancy was observed the low significant in globulin concentration (2.15 mg dl^{-1}), as well as non-significant differences via the 4, 8, 12 and 16 weeks of pregnancy in globulin (Table 5). Similar results have been obtained by Ismaeel et al (24), who mentioned a decrease in globulins concentration during late-pregnancy period in comparison with the first periods of pregnancy.

Table 5. Effect of pre-and post-pregnancy periods on serum proteins of local Awassi ewes (Mean ±SE).

Pregnancy periods (weeks)	Total protein (g dl^{-1})	Albumin (g dl^{-1})	Globulins (g dl^{-1})
Pre- pregnancy	5.91±0.36 a	2.93±0.17 a	2.98±0.23 a
4	5.27±0.15 b	2.97±0.15 a	2.30±0.16 bc
8	4.96±0.17 b	2.24±0.08 b	2.70±0.13 ab
12	4.70±0.18 b	2.27±0.08 b	2.43±0.13 bc
16	4.64±0.16 b	2.07±0.13 b	2.57±0.10 abc
20	4.03±0.11 c	1.88±0.09 b	2.15±0.06 c
Level of significance	P≤0.01	P≤0.01	P≤0.01

Means with different superscripts within each column indicated significant differences (P≤0.01) .

Effect of the interaction between birth numbers and periods on serum proteins The results in Table (6) revealed non-significant differences in interaction between the birth numbers and pre- and post-pregnancy periods in total protein, albumin and globulins concentration for the experimental groups. Results indicated the existence of numerical preference in a total protein and globulin concentration for interaction between the birth numbers and pre-pregnancy periods compared with interaction between the pregnancy numbers and post-pregnancy periods. Similar results have been obtained by (1, 8, 28, 33).

Table 6. Effect of the interaction between birth numbers and periods on serum proteins of local Awassi ewes (Mean ±SE).

Birth numbers	Pregnancy periods (weeks)	Total protein (g dl^{-1})	Albumin (g dl^{-1})	Globulins (g dl^{-1})
Ewes lambs	Pre- pregnancy	5.65±0.52	2.79±0.24	2.86±0.38
	4	5.32±0.38	2.80±0.23	2.52±0.26
	8	5.03±0.27	2.22±0.22	2.81±0.22
	12	4.59±0.26	2.40±0.11	2.18±0.19
	16	4.45±0.23	1.93±0.27	2.52±0.17
	20	4.01±0.20	1.75±0.15	2.26±0.14
One birth	Pre- pregnancy	6.16±0.80	3.04±0.37	3.12±0.51
	4	5.07±0.15	2.84±0.23	2.22±0.20
	8	4.95±0.38	2.18±0.11	2.77±0.29
	12	4.81±0.43	2.16±0.18	2.65±0.28
	16	4.77±0.31	2.35±0.21	2.42±0.20
	20	4.08±0.19	1.95±0.15	2.13±0.11
Multiple birth	Pre- pregnancy	5.93±0.62	2.95±0.33	2.98±0.33
	4	5.43±0.19	3.26±0.32	2.17±0.35
	8	4.89±0.26	2.32±0.10	2.52±0.19
	12	4.69±0.27	2.23±0.12	2.46±0.19
	16	4.70±0.31	1.93±0.18	2.77±0.17
	20	4.01±0.20	1.95±0.20	2.06±0.07
Level of significance		N.S	N.S	N.S

N.S= Non- significant.

Effect of birth numbers on some serum biochemical traits The results showed no significant differences among the experimental groups in triglyceride, cholesterol, calcium, and phosphorus concentrations (Table 7). These values were within the normal reference ranges reported for sheep (9, 18, 25).

Table 7. Effect of birth numbers on some serum biochemical traits of local Awassi ewes (Mean ±SE).

Birth numbers	Triglycerides (mg dl^{-1})	Cholesterol (mg dl^{-1})	Calcium (mg dl^{-1})	Phosphorous (mg dl^{-1})
Ewe lambs	46.61±1.32	52.97±1.69	10.40±0.37	5.22±0.11
One birth	48.06±1.50	54.69±2.02	10.38±0.38	5.26±0.13
Multiple birth	49.18±1.09	56.25±1.61	10.76±0.41	5.36±0.13
Level of significance	N.S	N.S	N.S	N.S

N.S= Non- significant.

Effect of pregnancy periods on some serum biochemical trait: The results revealed non-significant differences in triglycerides concentration among periods pre- and all post-pregnancy periods (Table 8), with an numerical decrease of 20th week of pregnancy as compared with the pre-pregnancy and other periods. Similar results have been obtained by Sultan et al (20) and Azawi and Ismaeel (16) who indicated non-significant impact of pregnancy periods on triglycerides concentration in Awassi ewes. The results have shown significant increase (P≤0.05) in cholesterol concentration pre-pregnancy (61.90 mg dl^{-1}) compared with all other periods (4, 12, 16 and 20 a weeks of pregnancy) except the 8th week of pregnancy which did not differ significantly (Table 8). This result was agreed with Al-Robaie et al (9) and didn't agree with (10, 11,14,30). The results (Table 8) showed greater (P≤0.01) differences in calcium concentration pre-pregnancy and 4th week of pregnancy periods while, the lesser concentration of calcium observed at the 20th week of pregnancy was comparison with the other pregnancy periods, namely 13.39, 12.85, 10.91, 9.52, 8.66 and 7.73 mg dl^{-1} respectively for periods pre , 4, 8, 12, 16 and 20 week of pregnancy. Table (8) noticed significant differences (P≤0.01) in the phosphorus concentration for the fourth week of pregnancy compared with the weeks 12, 16 and 20 of pregnancy, being 4.95, 5.16 and 4.93 mg dl^{-1} respectively. Decrease in phosphorus and calcium concentration especially as the pregnancy progresses may returns for fetuses development, on the other hand, increase in mammary gland activity during late-pregnancy period.

Table 8. Effect of pre-and post-pregnancy periods on some serum biochemical traits of local Awassi ewes (Mean ±SE).

Pregnancy periods (weeks)	Triglycerides (mg dl^{-1})	cholesterol (mg dl^{-1})	Calcium (mg dl^{-1})	Phosphorous (mg dl^{-1})
Pre- pregnancy	50.37±1.96	61.90±3.27 a	13.39±0.30 a	5.43±0.25 abc
4	48.25±1.01	51.83±1.07 b	12.85±0.28 a	5.73±0.21 a
8	49.89±2.37	58.01±3.02 ab	10.91±0.24 b	5.47±0.09 ab
12	46.25±2.01	52.11±2.28 b	9.52±0.20 c	4.95±0.13 c
16	47.54±1.77	52.87±2.11 b	8.66±0.16 d	5.16±0.12 bc
20	45.39±1.73	51.12±1.94 b	7.73±0.15 e	4.93±0.12 c
Level of significance	N.S	P<0.05	P<0.01	P<0.01

Means with different superscripts within each column indicated significant differences
N.S= Non- significant.

Effect of the interaction between birth numbers and periods on some serum biochemical traits: The results in Table (9) showed no significant effects on the studied serum biochemical parameters (triglycerides, cholesterol, calcium, and phosphorus) from the interaction between birth number, pregnancy, and period. All values remained within the reference ranges reported for sheep (3, 7, 25).

Table 9. Effect of the interaction between birth numbers and periods on serum biochemical traits of local Awassi ewes (Mean ±SE).

Birth numbers	Pregnancy periods (weeks)	Triglycerides (mg dl^{-1})	cholesterol (mg dl^{-1})	Calcium (mg dl^{-1})	Phosphorous (mg/dl)
Ewes lambs	Pre- pregnancy	48.09±3.04	58.75±5.40	12.82±0.43	4.88±0.22
	4	48.59±1.83	53.83±1.08	13.36±0.31	5.85±0.37
	8	46.29±4.05	55.52±5.25	10.42±0.29	5.56±0.06
	12	46.59±4.14	50.42±4.51	9.41±0.35	4.72±0.20
	16	46.53±3.51	50.50±3.97	8.71±0.27	5.25±0.19
	20	43.59±3.48	48.84±3.50	7.72±0.28	5.04±0.22
One birth	Pre- pregnancy	51.17±4.17	63.40±6.27	13.37±0.57	5.67±0.49
	4	46.95±1.79	48.82±2.42	12.54±0.44	5.49±0.35
	8	51.10±5.16	59.51±6.42	10.77±0.31	5.53±0.15
	12	45.67±4.24	51.67±4.62	9.32±0.34	4.78±0.23
	16	48.75±3.62	53.25±4.16	8.65±0.30	5.10±0.26
	20	44.72±2.97	51.52±3.92	7.62±0.27	4.99±0.20
Multiple birth	Pre- pregnancy	51.86±3.31	63.54±6.13	13.99±0.54	5.74±0.50
	4	49.23±1.80	52.84±1.38	12.67±0.67	5.85±0.41
	8	52.28±3.17	59.00±4.74	11.56±0.50	5.32±0.24
	12	46.50±2.46	54.24±3.10	9.84±0.35	5.35±0.14
	16	47.33±2.45	54.85±3.21	8.64±0.30	5.13±0.21
	20	47.86±2.75	53.00±2.99	7.85±0.26	4.77±0.25
Level of significance		N.S	N.S	N.S	N.S

N.S= Non- significant.

CONCLUSION

The present study demonstrated that the decrease in serum biochemical parameters as pregnancy progressed may be attributed to the increasing metabolic demands of the growing fetus and the preparation of the mammary gland for milk production. The number of previous births had no effect in either category, which may be explained by the application of good management practices.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

DECLARATION OF FUND

The authors declare that they have not received a fund.

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