HAEMATOLOGICAL AND BLOOD BIOCHEMICAL PARAMETERS OF PRE- AND POST LAMBING PERIODS FOR IRAQI NUAEMIE EWES

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ABSTRACT

The present study designed to investigate the hematological and blood biochemical changes in pre and post lambing periods in Iraqi Nuaemie ewes. Ten Nuaemie ewes weighed 35-45 kg and aged between 2-3 years were reared in animal's house of Veterinary College / Tikrit University from October-2018 to March-2019, Ten ml of blood samples were collected from each animal during the periods of last gestation month, at lambing and 2 weeks thereafter, Two and half ml of blood samples were collected in EDTA-containing tubes to determine the hematological parameters and the remaining was used to separate serum and stored at -20 ºc for blood biochemical assessment.

The results revealed decreased in total red blood cells, haemoglobin and packed cell volume during post lambing period. The total white blood cells count and neutrophils were decreased during the post-partum period, while the lymphocyte was decreased at the day of lambing (50±5.8%). The biochemical parameters exhibited lesser total protein concentrations at the day of lambing (6.5± 1.85 g/dl ) while greater glucose, cholesterol and triglyceride concentrations during post-partum period. The concentration of urea and creatinine increased during the pre-partum period whereas, LDL and HDL concentrations increased in post-lambing period. The minerals concentrations revealed lesser concentrations of Zink and iron during the post-partum period while, copper concentration was greater during similar period. In conclusion, the physiological status of animals have clearly effects on the haematological and biochemical parameters in Iraqi Nuaemie ewes.

Key words: hematology, blood biochemistry, lambing, nuaemie ewes, Iraq.
INTRODUCTION
Pregnancy, parturition, and lactation represent a physiological state of the body, which activates adaptation mechanisms at maintaining normal homeostasis during the pre-partum period (23). The haemoglobin and packed cell volume values, were sequentially observed in goats and sheep during pre-partum period, generally reflect an increase in the stress reaction. Stress and neuroendocrine changes have a direct influence on the neutrophils, and lymphocytes counts during a per-partum period (31). Biochemical parameters vary during different physiological stages of animals (5). Pregnancy and lactation are two most important stages in the life of animals, which affect metabolism resulting in the alteration of the haematological profile (33). Hence, biochemical parameters including total protein, triglycerides, free fatty acids, and urea are important indicators of the metabolic activity in lactating animals (29). In ruminants, number of factors like season, and physiological variations such as those in pregnancy, and lactation can affect serum chemistry and minerals levels (49). The present study was designed to determine an alteration in the concentrations of haematological and some biochemical parameters during pre and post-partum periods in Iraqi Nuaemie ewes.

MATERIALS AND METHODS
Animals: Ten healthy adult ewes, aged between 2-3 years with an average body weight of 35±45 kg were used. All animals were apparently healthy on clinical examination, treated against internal parasite by (Ivomec®). The animals reared in semi closed pens in animal's house of Veterinary medicine College / Tikrit University.

Hematological examinations: Ten ml of blood samples were collected via jugular venipuncture from all ewes by disposable syringes, 2.5 ml were taken in tube containing EDTA to determine the total red blood cells (RBC) and white blood cells (WBC) by haemocytometer, while differential leukocyte counts were estimated by Giemsa-stained blood films. Haemoglobin (Hb) was determined by the Sahli method, while packed cells volume (PCV) was determined using microhaematocrit method as described by (15). The rest of blood samples were centrifuged at 3000 rpm for 10 minute then, serum was harvested and stored at -20 °C until assay. Blood biochemical parameters (total serum proteins, albumin, glucose, urea, creatinine, cholesterol, HDL-cholesterol, LDL cholesterol, and triglycerides), were measured by spectrophotometer with special kit (Biomeghrib Company (Maghrib) as described by (46, 21 and 24), iron, copper and zinc were estimated by spectrophotometer with special kit (BiolabSA/France) as described by (46, 16 and 25), at the Clinical Pathology Lab., Collage of Veterinary Medicine, University of Tikrit.

Statistical analysis: 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 present study revealed (Table: 1) significantly (P<0.05) increased in TRBCs at lambing (6933000± 3.66 cell/µl) and decreased in pre and post-partum (5944666± 1.05, 4568000±1.3 cell/µl respectively). The result of Hb was showed significant (P≤0.05) increased during the pre-partum period (9.2 ± 1.7 g/dl) compared with the day of lambing and post-partum period. The PCV was significantly(P≤0.05) decreased during the post-partum period (26.4 ± 10.7 %) compared with the pre-partum and at the day of lambing (29.3 ±6.3 and 28.9 ±3.7 % respectively). This agreed with those reported by Hassan et al., (20), who noticed a decrease PCV, and Hb values in lactating animals and postulated a negative association between PCV and milk production. Moreover, PCV was found to decrease in first month of lactation in Barki ewes (17), and it has been suggested that the elevated erythrocyte destruction in mammary cells are responsible for low PCV value along with mobilization of water to mammary gland (11). A similar findings were recorded in goats, where a decrease in
HB, RBCs and PCV were observed during lactation (12). Similar results for Hb content in lactating desert ewes determined (1). The increase in RBC volume during later pregnancy causing increased volume of water during advanced pregnancy (30). Increased Hb content in later pregnancy ewes are probably due to increased demand for oxygen and the requirements of higher metabolic rate for pregnancy. Increase in Hb content during pregnancy confirmed the results of (17). The fall of Hb in the blood of goats in lactation were found (12). Decrease in the number of RBC in the blood of ewes in the early lactation was also reported by (10). Decline in the number of RBC in the blood of ewes in the early lactation are similar to those of (12) in goats.

Table 1. Alterations in the red blood cells (RBC), haemoglobin (Hb) and packed cell volume (PCV) values during pre and post-partum periods in Nuaemie ewes (Mean ± SE).

<table>
<thead>
<tr>
<th>Periods</th>
<th>Parameters</th>
<th>pre-partum</th>
<th>Day of parturition</th>
<th>post-partum</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRBC cell/µl</td>
<td>594466± 1.05b</td>
<td>6933000± 3.66a</td>
<td>4568000±1.3c</td>
<td></td>
</tr>
<tr>
<td>Hb g/dl</td>
<td>9.2 ± 1.7a</td>
<td>7.94 ±2.11b</td>
<td>7.2±3.6b</td>
<td></td>
</tr>
<tr>
<td>PCV %</td>
<td>29.3 ±6.3a</td>
<td>28.9 ±3.7b</td>
<td>26.4 ± 10.7c</td>
<td></td>
</tr>
</tbody>
</table>

Means with different superscripts within each row differ significantly (P≤0.05).

Table (2) showed an increase of WBCs count (P≤0.05) at day of lambing (10660±2.56 cell/µl), then decreased during the post-partum period (8730±1.34 cell/µl). This notion was agreed with Iriadam (22) who showed decreasing in the number of WBC in goats in early lactation compared to pregnant goats. The decrease in WBC counts during lactation in goats blood indicated their migration from blood into milk for more efficient phagocytosis and mammary gland defence against pathogens (39). The increase of WBCs near parturition might be attributed to the antepartum elevated in cortisol (32). The differential count of leukocyte was presented in Table (2), the neutrophils percentage was significantly (P≤ 0.05) increased at the day of lambing (48±1.44%), while decreased during the pre- and post-partum periods (44±2.52%, 41±1.89% respectively). The results observed an elevation for lymphocyte count in post-partum period (58±1.09%) but decreased at the day of parturition (50±5.8 %). This is similar to what observed by (32). The increase in number of neutrophils near parturition is mediated by antepartum rise in cortisol (42). Similarly to these results Meglia et al., (35) recorded a higher WBC count at the day of lambing than pre- and post-calving. The explanation for these results may come from the migration of lymphocytes into different tissues in relation to neutrophils (41). High levels of cortisol detected at parturition have no effect on adhesion molecules of lymphocytes and for that reason they are able to penetrate in to the tissues (8).

Table 2. Alterations in the white blood cells (WBC) count and its differentiation values during pre- and post-partum periods in Nuaemie ewes (Mean ± SE).

<table>
<thead>
<tr>
<th>Periods</th>
<th>Parameters</th>
<th>pre-partum</th>
<th>Day of lambing</th>
<th>post-partum</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC 10³ cell/µl</td>
<td>9427± 1.6b</td>
<td>10660±2.56a</td>
<td>8730±1.34b</td>
<td></td>
</tr>
<tr>
<td>Neutrophils %</td>
<td>44±2.52b</td>
<td>48±1.44a</td>
<td>41±1.89c</td>
<td></td>
</tr>
<tr>
<td>Lymphocyte %</td>
<td>55±2.43b</td>
<td>50±5.8c</td>
<td>58±1.09a</td>
<td></td>
</tr>
<tr>
<td>Eosinophil %</td>
<td>1±4.7a</td>
<td>1±2.03a</td>
<td>1±0.66a</td>
<td></td>
</tr>
<tr>
<td>Basophils %</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Monocyte %</td>
<td>0</td>
<td>1±0.36a</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Means with different superscripts within each row differ significantly (P≤0.05).

The results of blood biochemical analysis as showed in Table (3) revealed significant decreasing of total protein concentration at the day of parturition and during the post-Partum period compared with the Pre-partum period (6.5± 1.85, 6.9 ±1.24, 7.8 ±1.08 g/dl respectively). This agreed with those observed by Kalasariya et al., (27) who found out decreasing in total protein at parturition in ewes and goat. These changes in plasma proteins might represent an adaptive response to higher need of water mobilization and protein by blood to mammary glands for milk synthesis. Similar to present findings, Vihan et al., (48) who also reported reduced total protein concentration at the day of calving of buffaloes as compared to their values at pre and post-partum period. In contrast,
Abdulkareem (2, 3) did not find any alterations in total protein concentrations at pre-partum, day of calving and post-partum periods of Iraqi buffaloes. Pandey et al., (40) Also reported the lower level of plasma total proteins after calving in cows. The lower of total protein at time of parturition indicated their high maternal requirements to get transfer towards colostrum synthesis (37). Abdul-Rahaman et al., (4) noticed similar increasing in concentration of total protein in pregnant camel than non-pregnant and they explained these increasing to an increase synthesis of proteins during pregnancy from the liver, and this is as a result of the higher energy requirement for fetal growth. Similar results were also reported by (26) in goat. The differences in albumin lacked significance during pre-patam, day at lambing and post-partum periods. In contrast, Al-Mujalli (7) reported reduction and subsequent elevated in plasma albumin during post-partum period in dairy cows, while similar findings to the current results was observed by Mohri et al., (37) also did not report any significant effect on plasma albumin levels between day of parturition and pre/post-parturient values. The concentration of glucose was increased (P<0.05) at the day of lambing (80 ±11.47 mg/dl), then decreased during the post-partum period (55.2 ±18.27 mg/dl). These results are in agreement with the findings of Vihan and Rai (48) and EL-Sherif and assad (17), who reported that blood glucose of pregnant ewes started to increase from the beginning of pregnancy and continued increasing to reach the peak at parturition. Moreover, the peak of plasma glucose levels was observed on the last day of pregnancy in dairy sheep (14). The current results were disagreed with theirs reported by Abdulkareem (2, 3) who did not noticed any changes in glucose concentrations during pre-partum, at calving and post-partum periods in Iraqi buffaloes. Schlumbohm and Harmeyer (43) previously stated that insulin responsiveness was significantly reduced in sheep during late gestation and lambing, which led to decrease glucose turnover and uptake by muscle and fat tissues. In spite of, the high need for glucose under stress such as pregnancy and parturition, the output of adrenocorticotropic hormone, glucocorticoids and epinephrine is increased for the breakdown of liver glycogen (13). Higher (P<0.05) concentrations of urea and creatinine were recorded during the pre-partum period (40±0.84 and 2.2±1.69 mg/dl respectively) compared with the day of lambing and post-partum period. This significant (P<0.05) increases in the levels of urea and creatinine during prepartum period compared with the day of lambing and post-partum periods may be due to the increased in cortisol concentrations that increases the catabolism of protein in the body. This result was in agreement with that found by (44), and Taghipour et al., (45) who stated that the decrease in serum blood urea nitrogen around parturition may be associated with the decline of feed intake due to stress and hormonal changes during lambing. Ozpinar et al., (38) explained the reason of creatinine rises during prepartum period to the using of creatinine in muscle tissue of fetus as well as mother. The current results showed decreasing in the cholesterol and triglyceride concentrations in the post-partum period (100±0.35 and 26±1.07 mg/dl respectively) compared with the day of lambing and pre-partum period. These results were in agreement with Zumbo et al., (51) who found significant decrease in both cholesterol and triglyceride concentrations after birth due to increased lipoprotein lipase activity, and proved that, the adipose tissue metabolism is strictly related to insulin, which stimulates lipogenesis in pregnant ewes. During lactation period the insulin stimulation of lipogenesis may become inefficient which is confirmed by the significant decrease in serum triglycerides and total cholesterol at post-partum period compared to pre-partum (28). The low-density lipoprotein (LDL) and high- density lipoprotein (HDL) were increased in post-partum period (59±2.06 and 29±1.8 mg/dl respectively) in comparison with the day of lambing and pre-partum period. These increasing occur to meet out the lactation demand, the concentration of lipoprotein increases by increasing the uptake of lipids in the liver through high tissue mobilization, food intake and synthesis of steroid hormones and lipoproteins (36).
Table 3. Alteration in some blood biochemical parameters of Iraqi Nuaemie ewes during pre- and post-partum periods (Mean ± SE)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Pre-partum</th>
<th>Day of lambing</th>
<th>Post-partum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein g/dl</td>
<td>7.8 ±1.08a</td>
<td>6.5± 1.85b</td>
<td>6.9 ±1.24b</td>
</tr>
<tr>
<td>Albumin g/dl</td>
<td>3 ±0.4a</td>
<td>3.8±0.6a</td>
<td>3.5±0.9a</td>
</tr>
<tr>
<td>Glucose mg/dl</td>
<td>66.7 ±13.4b</td>
<td>80 ±11.47a</td>
<td>55.2 ±18.27c</td>
</tr>
<tr>
<td>Urea mg/dl</td>
<td>40±0.84a</td>
<td>30.2±0.45b</td>
<td>31.35±0.9b</td>
</tr>
<tr>
<td>Creatinine mg/dl</td>
<td>2.2±1.69a</td>
<td>0.8±0.33c</td>
<td>0.9±0.29b</td>
</tr>
<tr>
<td>Cholesterol mg/dl</td>
<td>130±2.77a</td>
<td>113±1.52b</td>
<td>100±0.35c</td>
</tr>
<tr>
<td>Triglyceride mg/dl</td>
<td>48±0.17a</td>
<td>35±0.95b</td>
<td>26±1.07c</td>
</tr>
<tr>
<td>LDL mg/dl</td>
<td>30±0.46c</td>
<td>40±1.69b</td>
<td>59±2.06a</td>
</tr>
<tr>
<td>HDL mg/dl</td>
<td>12±1.7c</td>
<td>16±0.98b</td>
<td>29±1.8a</td>
</tr>
</tbody>
</table>

Means with different superscripts within each row differ significantly (P≤0.05).

The concentrations of zinc, copper and iron are represented in the Figure (1). The zinc, and iron concentrations were decreased significantly (P≤ 0.05) during post-partum period compared to the day of lambing and pre-partum periods while the copper concentration was increased during the pre-partum period and decreased at the day lambing and post-partum periods. These results were in line with those reported by Hadiya et al., (19) who recorded increases in copper concentrations during post-partum period in cattle. The lower concentration of copper recorded in pre and at parturition could be due to increased transfer of this nutrient across the placenta and haemodilution during late pregnancy and at calving, together with initiation of ovarian follicular activity postpartum, leading to high circulatory estrogens which stimulate binding of copper with the proteins in liver and thereby increased concentration in plasma (36). In conclusion, the physiological status of animals have clearly effects on the blood haematological and biochemical parameters in Iraqi Nuaemie ewes, the measuring of these parameters give good indicator for the healthy state of ewes.

Figure 1. Alteration in serum zinc, copper and iron concentrations of Iraqi Nuaemie ewes during pre- and post-partum periods (Mean ± SE)

Means with different superscripts within each columns differ significantly (P≤0.05).
REFERENCES
2. Abdulkareem, T.A. 2013. Some hematological and blood biochemical profile of Iraqi riverine buffaloes (Bubalus bubalis) during different gestation period. J. Buffalo Sci. (India), 2, 78-84


Bulletin of the Veterinary Institute Pulawy. 47, 177-182.


