EFFECT OF LATE PREGNANCY AND ONSET OF LACTATION ON SOME TRACE ELEMENTS AND ELECTROPHORETIC PATTERN OF SERUM PROTEINS IN FEMALE BALADI GOATS AND THEIR NEWBORNS

M.E. Azab\textsuperscript{1}, S.A. Hussein\textsuperscript{2}, S.A. Mahmoud\textsuperscript{3}\\
\textsuperscript{1}Department of Physiology, \textsuperscript{2}Department of Biochemistry, Faculty of Veterinary Medicine (Moshtohor), Zagazig University\\
\textsuperscript{3}Department of Physiology, Faculty of Veterinary Medicine, Tanta University

ABSTRACT □ Five healthy Baladi female goats and their newborn kids were used in this study. Blood samples were collected before pregnancy, prepartum (4,3,2,1 weeks before parturition), day of parturition and postpartum period (1,2,3 and 4 weeks after parturition) as well as from newborn kids before and after colostrum ingestion and at 1 and 2 weeks of age. Serum copper (Cu), manganese (Mn), selenium (Se), zinc (Zn) and cobalt (Co) were determined in the does. Meanwhile, total serum protein and fractions of serum protein were estimated in does and their newborn kids. The results obtained revealed that, serum Cu and Mn concentrations decreased during late pregnancy and continued to decrease until 3 weeks postpartum. Meanwhile, serum Se concentrations decreased at 2 weeks before parturition and remained low until 1 week postpartum. Serum Zn concentrations decreased during late pregnancy, then markedly increased at the day of parturition, followed by non significant decrease during postpartum period. Serum Co concentrations decreased during the last 2 weeks of pregnancy, day of parturition and remained low 4 weeks postpartum. Concerning total serum protein concentrations of does, the present study revealed significant decrease during late pregnancy followed by non significant increase during 3

weeks postpartum. Significant increase will be reported at 4 weeks postpartum. Serum α-globulin concentrations was significantly decreased during late pregnancy followed by significant increase on the day of parturition and during postpartum period, whereas β-globulin was significantly increased during late pregnancy and postpartum period. Serum γ-globulin concentrations were significantly decreased during late pregnancy and remained low until 3 weeks postpartum. Colostrum ingestion in newborn kids caused marked increase in total serum protein concentrations. This effect was apparently due to absorption of γ-globulins and β-globulins from the gut. Serum γ-globulin was markedly increased after colostrum ingestion followed by a significant decrease at 1 and 2 weeks of age.

It can be concluded that late pregnancy and onset of lactation were accompanied by marked changes in the levels of trace elements as well as total serum proteins and serum protein electrophoretic patterns. In addition total serum protein and protein electrophoresis showed marked changes in newborn kids after colostrum ingestion.

INTRODUCTION

Total serum proteins and protein electrophoretic patterns during different stages of reproductive cycle have been studied in cows (El-Baghda di, 1984), buffalo-cows (Eidaroos et al., 1988), and in ewes (Keay and Doxey, 1984; Gonzalez Montana et al., 1994). In goats, serum proteins and protein electrophoretic pattern have been studied in normal Pygmy goats (Castro et al., 1977), Wether goats (Blackwell and Libby, 1982) and in normal and ketotic Murcino-Granadina goats (Ceron et al., 1994).

Trace elements are involved in several aspects of body metabolism and required for normal growth and maintenance of domestic animals (Underwood, 1997). Changes in serum trace elements concentrations have been reported to occur during pregnancy in cows (Duffy et al., 1977; Ishak et al., 1983 and Abdel-Maksoud, 1991), buffaloe cows (Pathak et al., 1986; Anvar, 1990), she camel (Radwan, 1989) and ewes (Mohamed, 1986). Changes in trace elements concentrations during different reproductive stages in Baladi goats as well as protein electrophoretic pattern of does and their kids were not adequately studied.
EFFECT OF LATE PREGNANCY AND ONSET OF LACTATION ON SOME TRACE ELEMENTS AND ELECTROPHORETIC PATTERN OF SERUM PROTEINS IN FEMALE BALADI GOATS AND THEIR NEWBORNS

Thereby, the purpose of the present study was to investigate the changes that may occur in some trace elements concentrations in the serum of female Baladi goats during late pregnancy and onset of lactation as well as serum protein electrophoretic pattern in the does and their newborn kids.

MATERIAL AND METHODS

The present study was carried out in a private farm at Fakose, Sharkia Governorate. Five apparently healthy female Baladi goats, 2-4 years old were used in this study. Their weights ranged between 28 and 31 kg. The animals were clinically normal and free from any external and internal parasites. During the period of the experiment all animals were managed and kept at the same environmental and nutritional conditions.

Animals were fed a constant diet composed of berseem (Trifolium alexandrinum) and pelleted concentrate mixture was also provided which consisting of the following ingredients: bran 33%, Corn 22%, Cotton seed cake 35% sodium chloride 1%). About 0.5 kg of concentrate was distributed twice a day and 2 kg berseem for each doe. Water was offered ad-libitum. During estrus the does were exposed to fertile buck and the date of mating was recorded.

Doe were sampled before pregnancy during diestrous phase, then they were sampled at 4, 3, 2.1 weeks before parturition, day of parturition and 1, 2, 7, 4 weeks after parturition. Their newborn kids were also sampled before and after ingestion of colostrum, then at 1 and 2 weeks of age. Blood samples were collected from the jugular vein, then allowed to coagulate at room temperature, then centrifuged and the clear serum was separated and kept at -20°C until analysis.

Serum copper, manganese, selenium, zinc and cobalt were determined using atomic absorption spectrophotometer according to the method of Willis (1960). Meanwhile, total protein was determined as described by Henery (1968). Quantitative estimation of serum protein fractions was done using polyacrylamide gel electrophoresis as described by Laemmli (1970). Quantitation of the different protein fractions was made by using modified Beckman scanner.

Statistical analysis was done by student t-test as explained by Snedecor and Cochran (1982).
RESULTS

1- Trace elements in the serum of does:
Table 1 revealed that, serum Cu concentrations decreased during the late pregnancy, day of parturition, reached its minimum level 1 week postpartum and continued to decrease until 3 weeks postpartum compared with the values recorded before pregnancy. Concerning serum Mn concentration, there was a gradual significant decrease during late pregnancy, day of parturition and continued to decrease until 3 weeks postpartum. Meanwhile, serum Se concentration was significantly (P < 0.05) decreased at 1, and 2 weeks before parturition. This decrease became highly significant (P < 0.001) at the day of parturition. During the postpartum period serum Se was significantly (P<0.05) decreased at 1 week and non significantly decreased at 2 and 3 weeks, whereas at 4 weeks there was a non significant increase of serum Se concentrations compared with the values recorded before pregnancy. The same table showed that, serum Zn concentration was significantly (P<0.01 for 4 weeks and P < 0.001 for 3, 2, 1 weeks) decreased at 4,3,2,1 week before parturition. However at the day of parturition Zn level was significantly (P < 0.01) increased, then remain unchanged significantly at 1, 2, 3 week postpartum, whereas at 4 weeks postpartum there was non significant increase compared with the values recorded before pregnancy. Serum Cu concentrations were non significantly decreased at 4, 3 week before parturition. This decrease became significant (P<0.05) 2 and 1 weeks before parturition and continued to decrease on the day of parturition and during the postpartum period compared with its level before pregnancy.

II- Serum protein electrophoretic pattern of the does:
Table 2 revealed a significant (P < 0.01) decrease of total serum protein concentrations at 4 and 3 weeks before parturition and non significant decrease at 2 and 1 week before parturition compared with values recorded prior to pregnancy. This was followed by non significant increase on the day of parturition, and during 3 weeks after parturition. This increase became significant (P < 0.05) at 4 weeks after parturition. Serum albumin concentrations were decreased during the last 4 weeks before parturition, followed by non significant increase on the day of parturition and during the postpartum period compared with the val-
Table 1: Effect of late pregnancy, parturition and onset of lactation on serum copper, manganese, selenium and cobalt concentrations in female Baladi goats.

<table>
<thead>
<tr>
<th>Week before (-) and week after (+) parturition</th>
<th>Copper (µg/dl)</th>
<th>Manganese (µg/dl)</th>
<th>Selenium (µg/dl)</th>
<th>Zinc (µg/dl)</th>
<th>Cobalt (µg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before pregnancy</td>
<td>96.98 ± 6.36</td>
<td>4.24 ± 0.11</td>
<td>3.92 ± 0.12</td>
<td>109.42 ± 4.96</td>
<td>4.94 ± 0.52</td>
</tr>
<tr>
<td>-4</td>
<td>79.58 ± 1.83*</td>
<td>3.98 ± 0.09*</td>
<td>3.48 ± 0.25</td>
<td>81.16 ± 2.10**</td>
<td>4.54 ± 0.50</td>
</tr>
<tr>
<td>-3</td>
<td>76.89 ± 2.45*</td>
<td>3.80 ± 0.14**</td>
<td>3.63 ± 0.22</td>
<td>78.87 ± 2.46***</td>
<td>3.83 ± 0.32</td>
</tr>
<tr>
<td>-2</td>
<td>69.27 ± 2.31**</td>
<td>3.50 ± 0.11**</td>
<td>2.85 ± 0.20*</td>
<td>69.92 ± 2.10***</td>
<td>3.41 ± 0.26</td>
</tr>
<tr>
<td>-1</td>
<td>65.49 ± 2.61**</td>
<td>3.28 ± 0.13***</td>
<td>2.87 ± 0.30*</td>
<td>78.49 ± 2.78***</td>
<td>2.97 ± 0.23</td>
</tr>
<tr>
<td>Parturition</td>
<td>62.24 ± 2.73**</td>
<td>3.19 ± 0.12**</td>
<td>1.72 ± 0.24***</td>
<td>130.74 ± 3.19**</td>
<td>2.68 ± 0.27**</td>
</tr>
<tr>
<td>+1</td>
<td>58.33 ± 2.34***</td>
<td>2.90 ± 0.10***</td>
<td>2.86 ± 0.13*</td>
<td>100.84 ± 3.90*</td>
<td>2.92 ± 0.13***</td>
</tr>
<tr>
<td>+2</td>
<td>65.92 ± 3.94**</td>
<td>3.22 ± 0.08***</td>
<td>3.00 ± 0.27</td>
<td>97.88 ± 3.35</td>
<td>1.48 ± 0.17***</td>
</tr>
<tr>
<td>+3</td>
<td>74.09 ± 2.78**</td>
<td>3.58 ± 0.12**</td>
<td>3.64 ± 0.24</td>
<td>137.81 ± 5.36</td>
<td>2.15 ± 0.10**</td>
</tr>
<tr>
<td>+4</td>
<td>88.94 ± 4.81</td>
<td>4.13 ± 0.10</td>
<td>4.06 ± 0.07</td>
<td>112.78 ± 3.29</td>
<td>2.98 ± 0.28**</td>
</tr>
</tbody>
</table>

Results are presented as means ± S.E. (standard error). The values are significantly different at *P < 0.05, **P < 0.01, ***P < 0.001 compared with the values before pregnancy.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean (ppm)</th>
<th>Standard Error (ppm)</th>
<th><code>F</code>-test Value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1.25 ± 0.22</td>
<td>0.89 ± 0.12</td>
<td>1.33 ± 0.07</td>
<td>0.002</td>
</tr>
<tr>
<td>Treatment A</td>
<td>0.90 ± 0.10</td>
<td>0.75 ± 0.08</td>
<td>1.10 ± 0.06</td>
<td>0.012</td>
</tr>
<tr>
<td>Treatment B</td>
<td>1.15 ± 0.12</td>
<td>0.80 ± 0.07</td>
<td>1.45 ± 0.09</td>
<td>0.003</td>
</tr>
</tbody>
</table>

The results are significantly different at *p* > 0.05, *p* > 0.01, *p* > 0.005, and *p* > 0.001.
EFFECT OF LATE PREGNANCY AND ONSET OF LACTATION ON SOME TRACE ELEMENTS AND ELECTROPHORETIC PATTERN OF SERUM PROTEINS IN FEMALE BALADI GOATS AND THEIR NEWBORNS

... values recorded prior to pregnancy. Concerning α-globulin concentrations, Table 2 showed a significant (P < 0.05) decrease at 4 weeks before parturition and highly significant (P < 0.01) decrease at 3 and 2 weeks before parturition followed by nonsignificant increase at 1 week before parturition. On the day of parturition, 1 and 2 weeks postpartum there was a significant (P < 0.05) increase in the α-globulin concentrations, whereas at 4 weeks postpartum there was a highly significant (P < 0.01) increase compared with the values recorded prior to pregnancy. Meanwhile, β-globulin concentrations were significantly increased (P < 0.05 for 4, 3, 1 week before parturition and P < 0.01 for 2 weeks) increased during the last 4 weeks before parturition followed by nonsignificant increase on the day of parturition, then were highly significantly (P < 0.01) increased at 1 and 2 weeks postpartum beside a significantly (P<0.05) increase at 3 and 4 weeks postpartum compared with the values recorded prior to pregnancy. Table 2 also revealed that γ-globulin concentration was significantly (P < 0.01) decreased at 4, 3 and 2 weeks before parturition. The decrease became highly significantly (P < 0.001) 1 week before parturition, on the day of parturition and 1 week postpartum, which became significant at 2 and 3 weeks postpartum. At 4 weeks postpartum there was a non significant decrease in γ-globulin concentration compared with the values recorded prior to pregnancy.

III. Serum proteins and electrophoretic pattern of newborn kids

Table 3 revealed that serum total protein concentrations were significantly (P< 0.01) increased after colostrum ingestion followed by a non-significant decrease and then decreased at 1 week of age and increased insignificantly at 2 weeks of age. Serum albumin concentrations were non significantly increased after colostrum ingestion followed by non significant increase at 1 and 2 weeks of age compared with the values recorded after colostrum ingestion. Serum α-globulin concentrations was non significantly increased after colostrum ingestion followed by non significant decrease at 1 and 2 weeks of age was observed. Also serum β-globulin concentrations were non significantly increased after colostrum ingestion followed by non significant increase at 1 and 2 weeks of age compared with the values recorded after colostrum ingestion. Meanwhile, serum γ-globulin concentrations...
Table 1: Total mean values (n=12) and common percentage reductions (8%) of neonatal kidney of Baladi goats before and after weaning

<table>
<thead>
<tr>
<th>Week post-w</th>
<th>0.2 cm</th>
<th>0.4 cm</th>
<th>0.6 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week post weaning</td>
<td>1.2 ± 0.18</td>
<td>0.9 ± 0.13</td>
<td>1.16 ± 0.12</td>
</tr>
<tr>
<td>2 weeks post weaning</td>
<td>1.99 ± 0.10</td>
<td>1.00 ± 0.12</td>
<td>1.21 ± 0.17</td>
</tr>
<tr>
<td>3 weeks post weaning</td>
<td>2.3 ± 0.22</td>
<td>0.9 ± 0.20</td>
<td>1.29 ± 0.28</td>
</tr>
</tbody>
</table>

Note: n = number of animals, cm = centimeters.
Table 4 Mean relative (%) distribution of serum proteins during late pregnancy, parturition and onset of lactation in female Baladi goats.

<table>
<thead>
<tr>
<th>Week before (-) and week after (+) parturition</th>
<th>Albumin</th>
<th>α-globulin</th>
<th>β-globulin</th>
<th>γ-globulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before pregnancy</td>
<td>51.53 ± 1.46</td>
<td>14.06 ± 1.48</td>
<td>8.20 ± 1.14</td>
<td>26.38 ± 2.15</td>
</tr>
<tr>
<td>-4</td>
<td>52.19 ± 0.78</td>
<td>10.55 ± 1.08</td>
<td>6.33 ± 2.06*</td>
<td>21.33 ± 1.34</td>
</tr>
<tr>
<td>-3</td>
<td>52.79 ± 1.89</td>
<td>9.30 ± 1.15</td>
<td>7.20 ± 2.39*</td>
<td>20.10 ± 1.40</td>
</tr>
<tr>
<td>-2</td>
<td>51.30 ± 1.19</td>
<td>7.35 ± 0.97</td>
<td>8.78 ± 1.72**</td>
<td>20.57 ± 2.14</td>
</tr>
<tr>
<td>-1</td>
<td>51.56 ± 2.60</td>
<td>20.14 ± 1.64*</td>
<td>12.55 ± 1.55</td>
<td>15.63 ± 0.79**</td>
</tr>
<tr>
<td>Day of parturition</td>
<td>53.61 ± 2.40</td>
<td>18.62 ± 1.66</td>
<td>15.70 ± 2.97</td>
<td>11.26 ± 1.81**</td>
</tr>
<tr>
<td>+1</td>
<td>45.51 ± 0.74*</td>
<td>20.81 ± 1.53</td>
<td>12.96 ± 2.42**</td>
<td>9.71 ± 1.64***</td>
</tr>
<tr>
<td>+2</td>
<td>48.25 ± 2.61</td>
<td>19.87 ± 1.56</td>
<td>13.92 ± 1.96*</td>
<td>12.69 ± 1.72**</td>
</tr>
<tr>
<td>+3</td>
<td>51.42 ± 2.56</td>
<td>22.95 ± 2.09</td>
<td>13.66 ± 1.62</td>
<td>12.37 ± 1.90**</td>
</tr>
<tr>
<td>+4</td>
<td>50.34 ± 2.64</td>
<td>19.83 ± 1.57</td>
<td>11.45 ± 1.42</td>
<td>15.71 ± 2.17*</td>
</tr>
</tbody>
</table>

Results are presented as mean ± S.E. (standard error)

The values are significantly different at * P < 0.05, **P < 0.01, ***P < 0.001, compared with the values before pregnancy.
The values are significantly different at \( p < 0.05 \) and \( p < 0.001 \) compared with the values before pregnancy.

<table>
<thead>
<tr>
<th>Week</th>
<th>Mean</th>
<th>Standard Error</th>
<th>95% CI</th>
<th>10-week old</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.15</td>
<td>0.99</td>
<td>11.34 ( \pm ) 0.81</td>
<td>11.34 ( \pm ) 2.15</td>
<td>11.46 ( \pm ) 0.81</td>
</tr>
<tr>
<td>33.60</td>
<td>1.69</td>
<td>22.38 ( \pm ) 1.59</td>
<td>22.38 ( \pm ) 4.14</td>
<td>24.31 ( \pm ) 1.59</td>
</tr>
<tr>
<td>43.84</td>
<td>2.02</td>
<td>33.28 ( \pm ) 1.72</td>
<td>33.28 ( \pm ) 6.14</td>
<td>37.72 ( \pm ) 1.72</td>
</tr>
</tbody>
</table>

Table 5: Mean relative (\% ) difference of certain frequency components of buffalo kids of buffaloes before and after castrate.
were significantly (P < 0.001) increased after colostrum ingestion followed by significant (P< 0.05) decrease at 1 and 2 weeks of age compared with the values recorded after colostrum ingestion.

**DISCUSSION**

**1- Trace elements in the does:**
The present study showed that serum Cu concentrations decreased during late pregnancy, day of parturition and continued to decrease 3 weeks postpartum. Similar results were recorded by Butler and Barlow (1963) and Mohamed (1986), in ewes who found that, serum Cu was decreased with the advancement of pregnancy and returned again to the premating level after parturition. The observed decrease in the Cu concentrations during late pregnancy may be due to increased fetal demand for Cu for its development for quick storage of Cu in its liver during this short period (Dereast et al., 1982). The lowest levels of plasma Cu was observed at the day of parturition and 1 week postpartum. This finding is coincides with copious secretion of colostrum (Lactogenesis II) (Ruckebusch et al., 1991). Colostrum in all species richer is Cu than milk and there is a decline throughout lactation (Underwood, 1977). Therefore large amount of plasma Cu could be excreted through colostrum. In contrast, serum Cu level increased during late pregnancy as observed by Brandes et al. (1980), Abdel-Maksoud (1991) in cows, Pathok et al. (1986) in suck buffaloes and Rashwan et al. (1989) in she-camele and women (Hambidge and Droegemueller, 1974). There is no clear explanation to the observed different pattern of blood Cu in ewes and goats from the observed in cows, buffaloes, cows, she-camels and women. This may be attributed to the number of foal births and triplets are commonly present in ewes and goats.

The present study showed that serum Mn concentrations were decreased during late pregnancy, day of parturition and 3 weeks postpartum. Similar results were recorded in cows (Sloss and Dufty, 1980; Abdel-Maksoud, 1991), in buffaloes cows (Anwar, 1990; Setia et al., 1994), and she-camel (El-Tohamy et al., 1986). Such decrease in the level of Mn during late pregnancy may be attributed to increased demand of fetus for complete development in such critical period. Because of Mn is very important for protoglycan biosynthesis (Leach, 1986) and important for cartilage building.
Selenium level was decreased at 2,1 weeks prepartum, day of parturition and then returned to the level before pregnancy after 1 week postpartum. Similar results were observed in cows (Ishak et al., 1983; Abdel-Maksoud, 1991), buffaloes (Mohamed, 1989) and women (Levander, 1987; Arnaud et al., 1993). The significant decrease of Se level could be attributed to transfer of Se to colostrum as reported by Mahan et al. (1977). Who found that Se level began to increase at 2 and 4 weeks after parturition. This finding was also supported by Schimagoethe et al. (1982) who reported that, the concentration of Se in colostrum was higher than normal milk. The importance of transfer of Se to colostrum is to provide Se requirements of young animals and infants for their rapid growth (Bedwal et al., 1993).

The present study also showed that serum zinc was decreased during late pregnancy followed by significant increase at the day of parturition. The present findings during late pregnancy are nearly similar to earlier findings of Duffy et al. (1977) and Blood et al. (1979) in cows; Hicky (1974) in ewes, Yousef and El-Azab (1988) in she-camel. The increased Zn level at the day of parturition was also observed in cows by Abdel-Maksoud (1991). The observed decrease in Zn level during late pregnancy may be attributed to the altered binding affinity of Zn binding protein as well as the increased uptake of Zn by the fetus toward the end of gestation (Brandes et al., 1980). Also it may be related to the increased alkaline phosphatase activity toward the end of gestation (El-Tohamy et al., 1986) who reported an inverse relationship between Zn and alkaline phosphatase activity. Meanwhile, the increased Zn level at the day of parturition could be attributed to increased prostaglandins level at the day of parturition as prostaglandins bound Zn facilitate its transport as reported by Song and Adnam (1978). They observed the changes in serum Zn concentrations were secondary to the dramatic increase in the prostaglandins during parturition as prostaglandins bound to Zn facilitate its transport.

The results obtained also revealed that serum Co concentrations significantly decreased close to day of parturition and continued to decrease on the day of parturition and during the postpartum period. Similar results were also recorded in cows and buffaloes (Setia et al., 1994).
III - Total serum proteins and serum protein electrophoretic pattern of Baladi does:
Total serum protein concentrations decreased during late pregnancy followed by non significant increase during postpartum period. This non significant increase became significant at the 4th week postpartum. Similar results were observed in cows (Abdel-Maksoud, 1991 and Eidaroos et al., 1988) and in ewe (Gonzalez Montana et al., 1994). The observed decrease in total serum protein concentration could be attributed to decrease of albumin, α-globulin and γ-globulin concentrations as recorded in the present study, and/or increased plasma volume during late pregnancy may also cause decline of total plasma protein concentration (Jain, 1993). Meanwhile, the observed increase of serum total protein concentrations during the postpartum period is consistent with the observation of El-Nouby et al. (1984) in Baladi goats who reported that total serum protein concentration were higher in early lactation than during mid lactation and dry period. He attributed this result to the increase in albumin concentration during early lactation. Also Gonzalez Montana et al. (1994) observed an increase in total protein concentration at the beginning of lactation in ewes. The observed increase in serum total protein concentration at the onset of lactation would be attributed to metabolic changes that coincide with the copious milk secretion. These metabolic changes were the considerable increase in food and water intake accompanied by hypertrophy of the intestinal tract to allow rapid absorption of the nutrients as well as hypertrophy of liver in addition to mobilization of protein reserves (Swenson and Reece, 1993). The alpha globulins are mainly α1-globulins and α2-globulins. The α1-globulin type is monomeric and α2-globulins are composed of γ-globulins and haptoglobin. They are mainly albumin in native state and stress and inflammation. Moreover, cortisol circulates in the blood bound to a specific α-globulin (corticosteroid-binding globulin) or transcortin (Murray et al., 1996). In the present study α-globulin concentrations decreased during late pregnancy, followed by significant increase on the day of parturition and during postpartum period. Similar results were observed in cows (Eidaroos et al., 1988). The observed decrease in α-globulins during late pregnancy was followed by
an increase on the day of parturition and during postpartum period is coincident with the levels of cortisol, which remains low near full term, then undergo a significant rise close to parturition (Ruckebusch et al., 1991). This explanation was also confirmed by Jain (1993) who reported a decreased α2-globulin (haptoglobin) during pregnancy. Moreover, the observed increase in α-globulins during parturition and postpartum period may be due to stress and tissue injuries which occur during delivery.

In the present study, β-globulins concentrations increased during late pregnancy and during postpartum period. Beta globulins are mainly transferrin and lipoprotein. Transferrin transport iron and β-lipoprotein transport glycerides and other lipids (Jain, 1993). The serum transferrin concentration increases in iron deficiency states and pregnancy (Murray et al., 1996). Also the observed increase in β-globulins in the present study apparently due to increase of triglyceride concentrations during late pregnancy of Baladi goats as observed by (Hussein and Azab, 1998). Concerning γ-globulins, the present study revealed a significant decrease of γ-globulin concentrations during late pregnancy and remained low until 3 weeks postpartum. Several authors attributed the decrease of γ-globulins during late pregnancy to the transfer of immunoglobulins in particular the IgG fraction to colostrum (Stowe, 1975; William and Miller, 1979).

III- Total serum protein and serum protein electrophoretic pattern in newborn kids:
Serum total protein concentration in newborn kids before colostrum ingestion was 3.78 ± 0.11 g/dl. This result is less than the recorded values in sheep. The total serum protein in sheep fetuses in late gestation is below 4.0 g/dl and it increases to 4.0 to 5.0 g/dl at birth (Jain, 1993). After colostrum ingestion, total serum protein concentrations significantly increased. This increase due to absorption of γ-globulins, β-globulins from the gut. The present study revealed that γ-globulins concentration in the serum of newborn kids at birth was 0.31 ± 0.04 g/dl. Similar results were recorded in most newborn animals except rodents and primates (Swenson and Reece, 1993). However, the placenta is impermeable to these protein molecules. The latter author also reported that the fetus is not capable of synthesizing this type of protein. The obtained results also revealed significant decrease of
Fig. 1: Serum concentrations of copper, manganese and selenium before pregnancy, during late pregnancy, day of parturition and postpartum period {(-) week before (+) week after parturition}.
Fig. 2: Serum concentration of zinc and cobalt during before pregnancy, during late pregnancy, day of parturition and postpartum period (-) week before (+) week after parturition.
Fig. 3: Serum total protein and different protein fractions before pregnancy, day of parturition and postpartum period (14 weeks before and after parturition).

Fig. 4: Total serum protein concentration and different protein fractions concentrations in newborn kids before and after colostrum ingestion and at one week old and two weeks old.

serum γ-globulin concentrations at 1 and 2 weeks of age. This may be due to catabolism of maternal immunoglobulins (Jain, 1993).

REFERENCES


Ceron, J.J.; Garcia-Partida, P.; Sotillo, J.; Bayon, A.; Gutierrez-Panizo, C.; and Trenti, F. (1994):
EFFECT OF LATE PREGNANCY AND ONSET OF LACTATION ON SOME TRACE ELEMENTS AND ELECTROPHORETIC PATTERN OF SERUM PROTEINS IN FEMALE BALADI GOATS AND THEIR NEWBORNS

Serum protein and protein electrophoretic pattern variations in goats with ketosis during various stages of reproduction. Proceedings 18th Wold Buiatrics Congress: 26th Congress of the Italian Association of Buiatrics, Bolonga, Italy, August 29-September, 2: 1309-1312.


EFFECT OF LATE PREGNANCY AND ONSET OF LACTATION ON SOME TRACE ELEMENTS AND ELECTROPHORETIC PATTERN OF SERUM PROTEINS IN FEMALE BALADI GOATS AND THEIR NEWBORNS


Received: December 13, 1998.

Accepted for publ.: December 31, 1998.
تكرار فترة نهاية الحمل وبداية أفرزات الفيني في بعض العناصر النادرة والهجرة
tكول الفرونت التبشيري في مصل صفار الماعز، وصادر الماعز محتويات الولادة

مساء السد: عزر، سامي - الحياءي، احمد (1980)
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

يتأثر فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة. وقد تم اكتشاف هذه الظاهرة في عدد من الدراسات المبدعة حول الولادة، وقد تبين أن هذه الظاهرة تتأثر بعوامل مختلفة.

翁: أنان، شايمي (2019)
* بوسني البطن، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

وقد أُفتتحت نتيجة هذه الدراسة قائلةً: كيف يمكن تأثير فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة؟

1- البيانات تشير إلى أن الفترة النهائية لولادة الطفل قد تتأثر بعوامل مختلفة.
2- الدراسة أظهرت أن الفترة النهائية لولادة الطفل قد تكون مدماً على مدار فترة الحمل، مما قد يؤدي إلى تأثيرات سلبية على الولادة.
3- الدراسة أظهرت أن الفترة النهائية لولادة الطفل قد تتأثر بتغيرات في الولادة وتغيرات في الولادة بعد فترة الحمل، وعوامل مختلفة.

ولكن هذه الدراسة تؤكد على أن الولادة يمكن تأثيرها على فترة نهاية الحمل.

* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

وقد أُفتتحت نتيجة هذه الدراسة قائلةً: كيف يمكن تأثير فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة؟

翁: أنان، شايمي (2019)
* بوسني البطن، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

وقد أُفتتحت نتيجة هذه الدراسة قائلةً: كيف يمكن تأثير فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة؟

翁: أنان، شايمي (2019)
* بوسني البطن، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

وقد أُفتتحت نتيجة هذه الدراسة قائلةً: كيف يمكن تأثير فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة؟

翁: أنان، شايمي (2019)
* بوسني البطن، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

وقد أُفتتحت نتيجة هذه الدراسة قائلةً: كيف يمكن تأثر فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة؟

翁: أنان، شايمي (2019)
* بوسني البطن، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

وقد أُفتتحت نتيجة هذه الدراسة قائلةً: كيف يمكن تأثر فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة؟

翁: أنان، شايمي (2019)
* بوسني البطن، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

وقد أُفتتحت نتيجة هذه الدراسة قائلةً: كيف يمكن تأثر فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة؟

翁: أنان، شايمي (2019)
* بوسني البطن، وثيقة الحليب، وثيقة البطوق
* في السمية الكبيرة، وثيقة الحليب، وثيقة البطوق
* في الديكروبلاكسيميا، وثيقة الحليب، وثيقة البطوق

وقد أُفتتحت نتيجة هذه الدراسة قائلةً: كيف يمكن تأثير فترة نهاية الحمل وبداية أفرزات الفيني في مصل صفار الماعز، وصادر الماعز محتويات الولادة؟