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# VARIATIONS IN COLOSTRUM CONSTITUENTS AND BLOOD CHARACTERISTICS OF RAHMANI EWES IN RELATION TO DIETARY PROTEIN AND DAYS RELATIVE TO PARTURITION

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## SUMMARY

*Eighteen late pregnant multiparous Rahmani ewes (40.65 1.16 Kg, live body weight) belonging to the Agriculture Experimental and Research Station, Faculty of Agriculture, Cairo University were used to study the effect of different levels of dietary protein starting from 28 days prepartum till the 10th day post-lambing on colostrum composition, transitional milk and on some blood constituents. Treatments were 100% (control), 80% and 120% of NRC (1985) crude protein (CP) allowances of sheep, respectively. The effects of days relative to parturition were also studied.*

*Results indicated that ewes fed 120 % CP produced the best colostrum nutritionally relative to those fed 80 % or 100 % CP levels. Colostrum obtained immediately after lambing had the highest values of gross energy and concentrations of all constituents except lactose being the least. Total solids, protein, fat, solids not fat and gross energy of colostrum decreased by days post-lambing while lactose showed a reverse trend.*

*Changes in blood hematocrit (%) and hemoglobin (g%) of ewes due to dietary crude protein levels were not significant. Plasma total protein and globulin concentrations increased while plasma albumin and A/G ratio decreased due to decreasing or increasing dietary crude protein level by 20%. Plasma urea was not significantly affected by dietary CP meanwhile, plasma creatinine significantly decreased by feeding the low CP diet (80%). Increasing or decreasing dietary CP by 20% caused significant decreases in plasma GOT activity compared to the control group. Meanwhile GPT activity was not significantly affected by dietary CP levels. Time of parturition was accompanied by the lowest values of tested blood measurements except the values of albumin, A/G ratio, urea, creatinine and GOT activity.*

*It could be concluded that prepartum dietary CP affected the quality of colostrum of Rahmani ewes. Also, Days relative to parturition are a major factor that affect blood constituents and composition of colostrum and transitional milk.*

***Keywords:*** *Rahmani ewes, protein, blood constituents, colostrum and transitional milk*

# INTRODUCTION

Colostrogenesis starts in ewes at late pregnancy (3 weeks prepartum) and the formed colostrum is stored inside the mammary gland till parturition (Mepham, 1987). Nevile and Daniel (1987) reported that colostrum is rich nutritionally and immunologically, especially in protein (total immunoglobulins and casein, 6.0 and 4.8 %, respectively). Csapo *et al.* (1998) reported that ewe colostrum is characterized by its high content of total protein of high concentrations of essential amino acids. They also stated that the biological value of protein in ewes colostrum obtained directly after lambing was the highest (108.5%) but decreased to 70- 80% after the 5$^{th}$ day of lactation. In addition, Cronje (2000) reported that 80% of apparently digested crude protein in late pregnant ewes was partitioned to the gravid uterus, the remainder being used to support increased metabolism and net deposition of amino acids in the developing mammary gland and visceral organs. So, the increase of dietary protein starting the last third of pregnancy may have an effect on the galactopiotic function of the mammary gland through enhancing the availability of colostrum precursors in blood i.e. amino acids.

The objectives of this study was to investigate the changes in colostrum constituents and periparturient blood characteristics of Rahmani ewes in relation to different dietary protein levels (starting 4 weeks prepartum till the 10$^{th}$ day postpartum) and to days relative to parturition.

## MATERIALS AND METHODS

Eighteen late pregnant multiparous Rahmani ewes (40.65±1.16 Kg, live body weight) from the herd of Agriculture Experimental and Research Station, Faculty of Agriculture, Cairo University, Giza, Egypt were used in this study which started 28 days prepartum till the 10$^{th}$ day postpartum. Ewes were divided into three equal groups (6 each) according to live body weight and parity, then were assigned randomly to three treatments. Treatments were control (100%) of NRC (1985) recommended crude protein, low protein (80%) and high protein (120%) which represents three dietary levels of CP (13.39, 10.76 and 16.07 % on DM, respectively). All rations were iso-energetic and each of them was offered on a group feeding basis at a constant daily amount of 1.410 Kg DM/ ewe during the prepartum period while it was 1.920 Kg DM/ ewe during the first 10 days post-lambing. All groups consumed all the offered feed. The experimental ewes were fed during late pregnancy at the three tested levels assuming lambing rate of 124% for Rahmani ewes as reported by Karam (1957). At parturition, three ewes (one from each treatment) gave twin lambs and were excluded from the experiment and all the remainder experimental ewes (15) reared single lambs till the 10$^{th}$ day postpartum. Live body weights of ewes at the beginning of the experiment were 39.2±2.01, 39.7±1.9 and 39.5±2.16 Kg for control, low protein and high protein groups, respectively. Ewes and their born lambs were housed in large pens, each group in a separate pen.

Composition of the daily rations is given in Table 1. While the chemical analysis of feed ingredients and the calculated nutrients composition of the whole rations is presented in Table 2. The proximate analysis of rations' ingredients were determined according to AOAC (1996) methods. Egyptian clover (*Trifolium alexandrinum*) was

offered once daily at 8 a. m. while the concentrate feed was offered at 10 a.m. and rice straw was offered at 2 p.m. Fresh water was freely available all time.

**Table 1. Composition of the experimental rations (% on dry matter basis)**

| Component, % | Rations (CP % of NRC) | | |
|---|---|---|---|
| | 100 | 80 | 120 |
| CFM* | 23.63 | 18.08 | 24.13 |
| Barley | 27.10 | 39.00 | 19.42 |
| Soybean meal | 7.40 | 1.15 | 14.68 |
| Egyptian clover | 17.37 | 17.37 | 17.37 |
| Rice straw | 24.40 | 24.40 | 24.40 |

*Concentrate feed mixture consisted of (as fed): 36 % yellow corn, 12 % cotton seed meal, 5 % soybean meal, 6 % sunflower meal, 23 % wheat bran, 13 % rice bran, 3 % molasses, 1 % limestone, 0.5 % sodium chloride and 0.5 % mineral mixture.

**Table 2. Proximate analysis and nutritive values of feed ingredients and experimental rations (R)**

| Item | DM,% | Nutrients (% on DM basis) | | | | | | ME, M cal/Kg DM |
|---|---|---|---|---|---|---|---|---|
| | | OM | Ash | CP | CF | EE | NFE | |
| CFM | 90.56 | 92.60 | 7.40 | 16.33 | 9.90 | 3.42 | 62.95 | 2.54[a] |
| Barley | 91.67 | 96.60 | 3.40 | 9.60 | 8.51 | 1.96 | 76.52 | 3.15[a] |
| Soybean meal | 90.61 | 93.57 | 6.43 | 45.80 | 6.92 | 3.96 | 36.89 | 3.07[b] |
| Egyptian clover | 16.50 | 87.70 | 12.30 | 15.15 | 25.55 | 2.10 | 44.9 | 1.95[a] |
| Rice straw | 92.71 | 81.61 | 18.39 | 3.73 | 36.60 | 1.52 | 39.76 | 1.56[a] |
| R1 (100% CP) | 100 | 90.23 | 9.77 | 13.39 | 18.53 | 2.37 | 55.84 | 2.40 |
| R2 (80% CP) | 100 | 90.64 | 9.36 | 10.76 | 18.56 | 2.16 | 59.15 | 2.44 |
| R3 (120% CP) | 100 | 89.99 | 10.01 | 16.07 | 18.43 | 2.52 | 52.97 | 2.40 |

[a] Metabolizable energy, calculated using TDN values of Abou Raya (1967) and using a value of 3.608 Mcal ME / Kg TDN (NRC, 1985).
[b] NRC of sheep (1985)

Colostrum and transitional milk samples were obtained by hand milking of each ewe immediately after parturition (day 1) and thereafter at 2nd , 3rd, 4th, 7th and 10th days post-lambing and were frozen at -20 °C till analysis for total solids, fat, solids not fat, protein and lactose in g/ 100 ml using Milkoscan® (N. Foss electric, Denmark). The energy output as kcal / Kg in colostrum and milk was calculated using the percentages of lactose, protein and fat, and the factors of 16.54, 24.52 and 38.12 MJ/ Kg, respectively (McDonald *et al.*, 1995).

Blood samples were collected before morning feeding at 4 weeks before the expected date of parturition, just after parturition and thereafter at the 10th day postpartum using EDTA as anticoagulant. Blood hematocrit (Frankle and Reitman, 1963) and hemoglobin (Benjamin, 1985) were measured immediately using whole blood while the remainder of blood was centrifuged at 3000 rpm for 20 minutes to separate plasma which was frozen (-20 °C) till analysis. Plasma values of total protein and albumin were determined according to Doumas, *et al.* (1971) and Doumas (1975), respectively. Globulin and A/G ratio were estimated mathematically. Concentrations of Plasma urea (Fawcett and Scott, 1960) and creatinine (Bartles, *et al.* 1972) were measured. Activities of plasma glutamic oxaloacetic transaminase

(GOT) and glutamic pyruvic transaminase (GPT) were determined according to the method described by Reitman and Frankle (1957).

Statistical analysis of data was done using the general linear model of SAS (1998) while differences among treatment means were tested using Duncan test (1955). The statistical model was:

$Y_{ijk} = \mu + T_i + P_j + (T*P)_k + E_{ijk}$, where:

$Y_{ijk}$ = the observation, $\mu$= the overall mean, $T_i$ =effect of protein level no. i, $P_j$ =effect of period (days relative to parturition) no. j, $(T*P)_k$ = interaction between treatment and period, $E_{ijk}$ =error term.

## RESULTS AND DISCUSSION

Variations in the composition and calorific value of the 1st, 2nd, 3rd and 4th days colostrum as related to different levels of dietary protein are presented in Table 3. Ewes fed 120 % NRC CP produced the best colostrum in terms of the highest contents of the studied nutrients except lactose. Meanwhile, ewes fed low (80% CP) or the recommended (100% CP) produced colostrum of similar constituents concentrations and calorific values. Colostrum of the 120% CP ewes was rich ($P<0.05$) in total solids, solids not fat, total protein and gross energy than those of ewes fed 80 % CP or the recommended 100 %, being higher by 13.4, 16.5, 37.6 and 14.2 relative to low CP group colostrum, respectively and higher by 13, 14.4, 34.4 and 14 % relative to the 100 % CP group colostrum, respectively. At the same time, colostrum of the 120% CP ewes was the lowest in lactose content.

**Table 3. Colostrum and transitional milk constituents of Rahmani ewes as affected by different dietary protein levels**

| | Crude protein levels (% of NRC) | | |
|---|---|---|---|
| Items | 100 | 80 | 120 |
| Constituents, % | | Colostrum[1] | |
| Total solids | 17.86±0.69 [a] | 17.80±0.63 [a] | 20.18±0.69 [b] |
| Fat | 7.28±0.57 [a] | 7.38±0.52 [a] | 8.06±0.57 [a] |
| Solids not fat | 10.59± 0.44 [a] | 10.40±0.40 [a] | 12.12±0.44 [b] |
| Protein | 5.88 ±0.44 [a] | 5.74±0.40 [a] | 7.90±0.44 [b] |
| Lactose | 3.85±0.12 [a] | 3.76 ±0.11 [a] | 3.16± 0.12 [b] |
| Gross energy, kcal/ Kg | 1159.1±55 [a] | 1157.0±50 [a] | 1320.6±55 [a] |
| Constituents, % | | Transitional milk[2] | |
| Total solids | 14.82±0.60 [a] | 15.80±0.55 [a] | 15.75±0.60 [a] |
| Fat | 6.12±0.57 [a] | 7.60±0.52 [a] | 6.73±0.57 [a] |
| Solids not fat | 8.66±0.30 [a] | 8.34±0.28 [a] | 9.05±0.30 [a] |
| Protein | 3.77±0.16 [a] | 3.96±0.14 [a] | 4.03±0.16 [a] |
| Lactose | 4.60±0.18 [a] | 3.97±0.16 [b] | 4.15±0.18 [ab] |
| Gross energy, kcal/ Kg | 961.4±47 [a] | 1074.0±43 [a] | 1009.0±47 [a] |

Means with different superscripts are significantly different ($P<0.05$).

[1] Averages of 1st, 2nd, 3rd and 4th days postpartum.

[2] Averages of 7th and 10th days postpartum.

Nutritionally, the colostrum produced from ewes fed high CP was superior in terms of its high concentrations of total protein, fat and gross energy and its low content of lactose. The increase in calorific value of colostrum produced from ewes on 120% CP diet was mainly attributed to the increase in milk fat content, which is considered to be a biological advantage. Oyeniyi and Hunter (1978) and Jacobson and McGillard (1984) stated that the lower concentrations of lactose in colostrum is considered an advantage because lactose can induce the young to scour (diarrhea) with subsequent death or unthriftiness. Furthermore, D'Oherty and Crosby (1997) showed a positive relationship between ewes CP supplementation pre-lambing and colostrum production and IgG transfer to the newly born lambs. Also, Mazzon *et al.* (2000) found that ewes fed on 115% of their CP (soybean meal) requirements had greater (P=0.1) concentrations of IgG in colostrum than ewes fed 85% CP.

Data on milk constituents of the 7$^{th}$ and 10$^{th}$ days post-lambing are presented in Table 3. There were no significant effects of dietary CP fed to the ewes on the 7$^{th}$ and the 10$^{th}$ days milk composition.

Daily changes in composition of Rahmani ewes colostrum and transitional milk up to the 7$^{th}$ days are presented in Table 4. Results indicated that 1$^{st}$ day colostrum had the highest calorific value and concentrations of all constituents except lactose being the lowest. Days post-lambing significantly (P<0.05) affected the composition of colostrum except fat. Total solids of 2$^{nd}$ day colostrum decreased by 22.3 % relative to the 1$^{st}$ day colostrum, further decrease occurred in a descending rate, being 13.3, 7.5 and 3.2 % from 2- 3, 3- 4 and 4- 7 days, respectively. Similar trend was observed for SNF, its descending rates of reduction were 34.4, 16.7 and 5.2 from the 1$^{st}$ to 2$^{nd}$ , 2$^{nd}$ to 3$^{rd}$ and 3$^{rd}$ to 4$^{th}$ days postpartum, respectively. The highest decrease in colostrum constituents was observed for total protein from the 1$^{st}$ to the 2$^{nd}$ day (70.3 %), its descending rates of decrease after that were 36, 6.7 and 10.8 % from the 2$^{nd}$ to 3$^{rd}$ , 3$^{rd}$ to 4$^{th}$ and 4$^{th}$ to 7$^{th}$ days postpartum, respectively. Further decreases in colostrum quality occurred in its gross energy with the advancement of days postpartum with a descending rate of decrease, being 21.5, 13.2, 8.2 and 4.7 % for 1$^{st}$ to 2$^{nd}$ , 2$^{nd}$ to 3$^{rd}$, 3$^{rd}$ to 4$^{th}$ and 4$^{th}$ to 7$^{th}$ days postpartum, respectively. Meanwhile, fat content of colostrum decreased with the advancement of days postpartum in an ascending rate, being 5.2, 8.9, 10.6 and 7.7 % from the 1$^{st}$ to 2$^{nd}$ , 2$^{nd}$ to 3$^{rd}$ , 3$^{rd}$ to 4$^{th}$ and 4$^{th}$ to 7$^{th}$ days postpartum, respectively. The lowest concentration of lactose was in the 1$^{st}$ day colostrum just after lambing (2.88 %), but it increased gradually in an ascending order thereafter by days postpartum.

**Table 4. Changes in colostrum composition of Rahmani ewes as affected by days postpartum**

| Items | Days postpartum | | | | |
|---|---|---|---|---|---|
| | 1$^{st}$ | 2$^{nd}$ | 3$^{rd}$ | 4$^{th}$ | 7$^{th}$ |
| Constituents, % | | | | | |
| Total solids | 23.11± 0.7$^{a}$ | 18.90±0.8$^{b}$ | 16.69±0.8$^{c}$ | 15.53±0.8$^{c}$ | 15.05±7$^{c}$ |
| Fat | 8.37 ±0.6$^{a}$ | 7.96±0.6$^{a}$ | 7.31±0.6$^{a}$ | 6.61±0.6$^{a}$ | 6.14±0.6$^{b}$ |
| Solids not fat | 14.73 ±0.5$^{a}$ | 10.96±.5$^{b}$ | 9.39±0.5$^{c}$ | 8.93±0.5$^{c}$ | 8.99±0.4$^{c}$ |
| Protein | 10.66±0.5$^{a}$ | 6.26± 0.5$^{b}$ | 4.60±0.5$^{c}$ | 4.31± 0.5$^{c}$ | 3.89±0.4$^{c}$ |
| Lactose | 2.88± 0.2$^{a}$ | 3.66± 0.2$^{b}$ | 4.00± 0.2$^{b}$ | 3.90±0.2$^{b}$ | 4.49±0.1$^{c}$ |
| Gross energy, kcal/Kg | 1501± 62$^{a}$ | 1235± 62$^{b}$ | 1091±62$^{bc}$ | 1008±62$^{c}$ | 963±55$^{c}$ |

Means with different superscripts are significantly different (P<0.05).

These data indicated that the composition of colostrum (1st to 4th days) was considerably different from transitional milk (the 7th day). Colostrum was more highly concentrated in total solids, total protein and fat and hence its gross energy but was lower in lactose. On the other hand, the sharp change in colostrum constituents and its calorific value from just after parturition compared to the 2nd day colostrum may be attributed to its storage inside the mammary gland since the beginning of its biosynthesis prepartum.

Perrin (1958) considered secretions up to 6 days postpartum to be colostrum. While Peart *et al.* (1975) considered secretions up to 4 days postpartum to be colostrum. In contrast, Mellor and Murray (1986) used the term colostrum for mammary gland secretion produced within 18 hrs from birth. Recent research on colostrum of several breeds of ewes done by Csapo *et al.* (1998) stated that most of colostrum components were stabilized after the 5th day postpartum. From the present results the data revealed that there were massive changes in colostrum constituents and its calorific value after the 1st day postpartum till the 2nd day.

In agreement with the present results, Nowakowski, *et al.* (1992) found that levels of most components in colostrum decreased significantly ($P<0.01$) during 1st 24 hrs postpartum; content of fat decreased by 32 %, energy value by 21 %, dry matter by 32 % and total protein by 45 %, but lactose concentration increased from 15.4 to 33.1 g/ Kg colostrum. Also, Csapo *et al.* (1998) found that protein fractions in colostrum obtained from several breeds of ewes decreased considerably 1 to 2 days after lambing. Furthermore, Abdel-Moneim (1999) reported that the percentages of protein, total solids and SNF in colostrum of Rahmani ewes were higher in the first day postpartum and decreased thereafter ($P<0.05$) with a reversed trend for lactose content. In addition, Parveen and Ahuja (1999) reported that total protein and Ig content in the first colostrum of buffalo and cows was high and declined within 24 hrs after parturition.

The effect of dietary CP on blood constituents of Rahmani ewes are presented in Table 5. Values of hemoglobin (Hb, g %) and hematocrit (%) were almost similar in both the recommended (100%) and 120 % CP fed groups which were insignificantly higher than those of ewes fed 80 % CP diet. Both decreasing or increasing dietary protein by 20% resulted in increasing plasma total protein (g%) compared to the control group. Plasma albumin (g %) concentrations were almost similar for the three treatments, but globulin (g %) concentrations were increased by feeding the low or high CP diets. The A/G ratio was lower in plasma of ewes fed the low CP diet compared to the other two groups. Hatfield *et al.* (1998) reported a tendency of increasing serum proteins ($P=0.11$) with the decrease of dietary protein from 18% to 10% in lambs rations.

Plasma urea concentration (mg %) was not significantly affected by dietary CP levels. Meanwhile, creatinine concentration (mg %) was significantly lower in plasma of ewes fed 80 % CP than the other two groups. Increasing or decreasing dietary CP by 20% caused significant decreases in plasma GOT activity compared to the control group. Meanwhile GPT activity was not significantly affected by dietary CP levels. Al-Haboby *et al.* (1999) found that supplementation of ram diets with urea blocks enriched with cotton seed meal had no effect on Hb concentration. Also, Rekwot *et al.* (1999) working on bull calves agreed with the present results. They reported that Hb was significantly higher due to feeding a high protein diet (14.45 % CP) than those of a low dietary protein (8.51% CP). They also reported higher total

protein values in plasma with the high level of dietary protein. On the contrary with the present results, Roeder *et al.* (2000) fed pregnant ewes (21 days prepartum) on 75 % NRC restricted protein diet or a diet containing normal CP level with 34 % undegradable protein and found that blood albumin and urea concentrations were greater (P<0.05) in ewes fed the normal CP diets compared to ewes fed 75 % NRC CP. However, all blood constituents concentrations in the present study were within the normal physiological ranges reported by Nemi (1986), Reece (1991) and Frandson and Spurgeon (1992) for healthy sheep.

**Table 5. Blood characteristics of Rahmani ewes as affected by different dietary protein levels**

| Measures | Crude protein levels (% of NRC) | | |
|---|---|---|---|
| | 100 | 80 | 120 |
| Heamatocrit, % | 39.5±1.51 [a] | 38.72± 1.37 [a] | 40.60 ±1.51 [a] |
| Hemoglobin, g/dl | 14.07±0.44 [a] | 13.44 ±0.40 [a] | 14.07 ± 0.44 [a] |
| Total protein, g/dl | 5.95±0.26 [a] | 7.37 ±0.24 [b] | 7.11 ± 0.26 [b] |
| Albumin, g/dl | 2.75 ±0.07 [a] | 2.69± 0.06 [a] | 2.75 ± 0.07 [a] |
| Globulin, g/dl | 3.21±0.20 [a] | 4.69 ±0.26 [b] | 4.36 ± 0.28 [b] |
| A/G ratio | 0.97 ±0.08 [a] | 0.58± 0.07 [b] | 0.63 ± 0.08 [b] |
| Urea, mg/dl | 43.93±2.3 [a] | 43.44± 2.1 [a] | 43.60 ± 2.3 [a] |
| Creatinine, mg/dl | 0.92 ±0.06 [a] | 0.61 ±0.05 [b] | 0.77 ± 0.06 [a] |
| GOT, U/L | 99.44± 3.6 [a] | 85.71 ±3.3 [b] | 76.97 ± 3.6 [b] |
| GPT, U/L | 19.73 ±1.6 [a] | 21.32± 1.4 [a] | 17.22 ± 1.6 [a] |

Means with different superscripts are significantly different (P<0.05).

Changes in blood constituents as affected by days relative to parturition are presented in Table 6. The lowest blood values of Hb, Ht, total protein and globulin in ewes were observed just after parturition, while the highest values were those measured 28 days prepartum. On the other hand, the highest concentrations of plasma albumin and A/G ratio were noticed just after parturition. Urea concentrations were the lowest on day 28 prepartum and increased on day of parturition and almost stabilized thereafter. Creatinine value was the highest in plasma taken just after lambing (1.04 mg %). Activities of GOT and GPT did not show regular trend. In agreement with the present results, Parveen and Ahuja (1999) working on buffaloes and cows found that up to 60 to 40 hrs prepartum, there was an increase in plasma protein which then declined up to 20 hrs postpartum. They suggested an accumulation of protein in the plasma of buffaloes in late gestation and then the secretion to the mammary gland initiated 20 to 10 hrs prepartum and continued until 24 hrs postpartum.

The present results agree well with those reported by Bhat (1999) working on cattle and buffaloes. He found that Hb values were higher during the prepartum period and decreased after calving, but in contrary he reported an opposite trend for plasma total protein. Purohit *et al.* (1999) reported that values of HB and serum total protein at the end of the 3$^{rd}$ and 4$^{th}$ month of pregnancy in ewes were significantly (P<0.01) lower than those of non-pregnant ewes.

**Table 6. Changes in blood constituents of Rahmani ewes as affected by days relative to parturition**

| Measures | Days relative to parturition | | |
|---|---|---|---|
| | -28 | 0 | +10 |
| Heamatocrit, % | 50.19±1.46 [a] | 33.88 ±1.46 [b] | 34.63 ±1.46 [b] |
| Hemoglobin, g/dl | 14.25± 0.42 [a] | 13.31± 0.42 [a] | 14.94 ± 0.42 [a] |
| Total protein, g/dl | 6.99 ± 0.25 [ab] | 6.31 ± 0.25 [b] | 7.23 ± 0.25 [a] |
| Albumin, g/dl | 2.36 ± 0.07 [a] | 2.98 ± 0.07 [b] | 2.85 ± 0.07 [b] |
| Globulin, g/dl | 4.60 ± 0.28 [a] | 3.34 ± 0.28 [b] | 4.33 ± 0.28 [a] |
| A/G ratio | 0.44 ± 0.08 [a] | 0.99 ± 0.08 [b] | 0.73 ± 0.08 [c] |
| Urea, mg/dl | 35.94 ± 2.2 [a] | 46.19± 2.2 [b] | 48.81 ± 2.2 [b] |
| Creatinine, mg/dl | 0.63 ± 0.05 [a] | 1.04 ± 0.05 [b] | 0.63 ± 0.06 [a] |
| GOT, U/L | 70.02 ± 3.5 [a] | 87.81± 3.5 [b] | 103.98± 3.5 [c] |
| GPT, U/L | 19.53 ± 1.5 [ab] | 16.65± 1.5 [b] | 22.44 ± 1.5 [a] |

Means with different superscripts are significantly different (P<0.05).

## CONCLUSION

It could be concluded that both tested levels of dietary CP and days relative to parturition had marked effects on colostrum and transitional milk composition and blood constituents of Rahmani ewes. Increasing dietary CP by 20% over the recommended starting from day 28 pre-lambing significantly improved colostrum quality as a reflection to increasing the availability of its precursors in blood.

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**الاختـــلافات في مكونات السرسوب و بعض مكونات الدم كانعكاس لاستخدام مستويات مختلفة من البروتين في علائق الأغنام الرحماني و الأيام حول الولادة.**

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اســتخدم في هذه الدراسة عدد ١٨ نعجة رحماني عشار (٤٠,٦٥ ١,١٦ كجم وزن حي قائم) من مزرعة محطــة الــتجارب و الــبحوث الزراعية - كلية الزراعة جامعة القاهرة. لدراسة تأثير اختلاف مستوي البروتيــن ( ٢٠% عــن مقــررات البروتيــن ، NRC, 1985 ) علي تركيب السرسوب و اللبن الانتقالي وبعــض مكونات الدم و قد درس أيضا تأثير الأيام حول الولادة علي نفس الصفات. و قد بدأت التجربة قبل ميعاد الولادة المتوقع بأربعة أسابيع و استمرت حتى اليوم العاشر بعد الولادة.

وقــد أظهرت النتائج أن النعاج المغذاة علي + ٢٠% بروتين قد أنتجت افضل سرسوب من الناحية الغذائية بدرجة معنوية مقارنة بباقي المجاميع. وأن سرسوب اليوم الأول كان يتميز بأعلى محتوي من المادة الجافة و البروتيــن و الدهــن و كذلــك طاقــته الكلية مع اقل محتوي من اللاكتوز. و قد انخفضت جميع مكونات السرسوب و كذلك طاقته الكلية معنويا بتقدم الأيام بعد الولادة حتى اليوم العاشر باستثناء اللاكتوز الذي اظهر اتجاه معاكس.

و قــد أشارت النتائج أن التغيرات في مستوي الهيموجلوبين و النسبة المئوية للمكونات الخلوية بدم النعاج كانعكاس لمستوى البروتين المأكول كان غير معنويا مع ميل للانخفاض مع انخفاض مستوي بروتين العليقة بمقــدار ٢٠% عــن المقررات. ازداد تركيز كل من البروتين الكلي و الجلوبيولين بينما انخفض مستوي الألبيومين و نسبة الألبيومين : الجلوبيولين ببلازما الدم نتيجة لخفض مستوي بروتين العليقة بنسبة ٢٠%.

لــم يــتأثر تركيز اليوريا ببلازما الدم بمستوي بروتين الغذاء بينما انخفض مستوي الكرياتينين معنويا مع خفض مستوي بروتين الغذاء بمقدار ٢٠% عن مستوي مجموعة المقارنة.

أدى خفــض أو زيادة مستوى بروتين الغذاء بمقدار ٢٠% الى حدوث انخفاضات معنوية فى مستوى نشاط إنزيم GOT ببلازما الدم بينما لم يتأثر نشاط إنزيم GPT معنويا بمستوي بروتين الغذاء.

اقترنت الولادة بأقل قيم لكل القياسات المدروسة بالدم باستثناء قيم الألبيومين و نسبة الألبيومين : الجلوبيولين و اليوريا و الكرياتينين ونشاط أنزيم (GOT).

من هذه النتائج يمكن استخلاص أن زيادة مستوي بروتين العليقة للنعاج الرحماني ابتداء من الأسبوع الرابع قــبل الولادة المتوقعة بنسبة ٢٠% عن NRC له تأثير معنوي إيجابي علي السرسوب. و ان الأيام حول وقت الولادة تعد عامل مهم و مؤثر في تركيب السرسوب و مكونات الدم.