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CHANGES IN BLOOD CONSTITUENTS, COLOSTRUM AND TRANSITIONAL MILK OF RAHMANI EWES IN RELATION TO BARLEY RADICLE FEEDING AND DAYS RELATIVE TO PARTURITION.

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ABSTRACT

A total of 15 multiparous pregnant Rahmani ewes (38.9 ± 1.21 kg) belonging to the Agriculture Experimental and Research Station, Faculty of Agriculture, Cairo University were used in this research. The objectives were two folds: 1-Studying the effect due to substitution of the concentrate feed mixture crude prctein of a control ration (no barley radicle, T1) by barley radicle crude protein (BRP) at 20 % (T2) or 40 % (T3) levels on some blood characteristics and composition of colostrum and transitional milk. 2-Investigating the changes in blood characteristics and composition of colostrum and transitional milk over different days relative to parturition. The experiment started 4 weeks before expected lambing date and continued till the 10th day post-lambing.

Results indicated that 40% BRP feeding did not significantly affect any of blood PCV% and Hb or plasma albumin or urea. Meanwhile, plasma total protein (TP) and globulin values decreased by 20% BRP inclusion while increased by the 40% BRP. Plasma creatinine and ALT activity tended to increase with BRP inclusion while plasma AST activity increased with the 20% BRP level and decreased with the 40% BRP.

Values of PCV%, Hb, TP, globulin and ALT were the highest at the 28th day prepartum and greatly declined just after parturition and stabilized thereafter. In contrast plasma albumin, albumin: globulin ratio (A/G), urea, creatinine and AST values were the minimum at the 28th day prepartum and elevated to their maximum levels just after parturition and decreased again thereafter at the 10th day post-lambing.

Results also indicated that 40% BRP feeding improved colostrum and transitional milk composition and their calorific values than the control or those fed 20% BRP. The 1st colostrum, just after parturition and before suckling, was the richest in all studied nutritive constituents and calorific value, except lactose. All the studied colostral constituents and gross energy significantly decreased with days post-lambing till the 10th day, except lactose which showed a reversed trend.

It is concluded that inclusion of barley radicle in the rations of Rahmani ewes as a source of protein up to 40% of the concentrate feed mixture (24.64% of the total dietary CP), starting 4 weeks pre-lambing, improved colostrum and transitional milk composition. Also, days after parturition significantly affected the constituents of mammary gland secretions. The first colostrum (before suckling) was the richest in all studied constituents and calorific value, except lactose.

Keywords: barley radicle, Rahmani ewes, colostrum, transitional milk, blood constituents.

INTRODUCTION

Barley radicle i.e. malt culms or barley rootlets are considered untraditional protein source produced in Egypt by Al-Ahram beverages company (estimated production of 500 ton/ year). Pereira *et al.* (1998) reported that barley rootlets contain from 42.8 to 53.7 g N/ Kg DM with estimated amount of digestible bypass N reached to 17.1%.

Late pregnancy, colostrum period and early lactation needs special feeding requirements due to the high demands for developing fetus, colostrogenesis and lactogenesis. Cronje (2000) stated that 80% of digested CP in late pregnant ewes was partitioned to the fetus and the rest being utilized by the mammary gland for mammogenesis and colostrogenesis. Abdel-Moneim (1999) reported that Rahmani ewes colostrum had a high concentration of total protein, estimated by 8.9% as an average of the first three days post-lambing. Furthermore, good quality colostrum depends mainly on the availability of its precursors in blood, particularly amino acids which in turn comes from good dietary protein sources.

The objectives of the present study were therefore two folds:

1-Studying the effect of partial using of barley radicle as a source of protein in the rations of late pregnant Rahmani ewes on constituents of blood, colostrum and transitional milk.

2-Investigating the changes in constituents of blood, colostrum and transitional milk over different days relative to parturition.

MATERIALS AND METHODS

Fifteen multiparous pregnant Rahmani ewes (38.9 ± 1.21 Kg, at 28 days prior to expected lambing date) belonging to the Agriculture Experimental and Research Station, Faculty of Agriculture, Cairo University were used in this trial. Ewes were divided into three similar groups according to live body weight and were housed in large separated pens while born lambs (single lamb for each ewe) were left with their dams all time.

Three iso-calorific and iso-nitrogenous experimental rations were formulated by replacing the concentrate feed mixture CP of a control ration (no barley radicle, T1) by barley radicle CP (BRP) at 20% (T2) or 40 % (T3) levels. These levels of BRP inclusion in the rations of T2 and T3 represented 12.32 and 24.64% of the total CP of the control ration, respectively (Table 1). In addition, such substitution represented 50 or 100 g BR/ Kg DM of T2 and T3 rations, respectively. Ewes were fed on a group basis according to NRC allowances for sheep (1985). The daily rations included two portions, the concentrate and roughage (Table 1). Chemical analysis of feed ingredients and experimental rations were determined according to AOAC (1996) and was given in (Table 2).

Ewes were offered the tested rations starting four weeks prior to the expected lambing date and continued till the 10th day postpartum. The experimental ewes were fed during late pregnancy their tested rations

assuming lambing rate of 124% for Rahmani ewes as reported by Karam (1957). Egyptian clover (*Trifolium alexandrinum*) was offered once daily at 8 a.m. while the concentrate was offered at 10 a.m. Rice straw was offered at 2 p.m. meanwhile fresh water was available all time.

Table 1. Experimental rations on dry matter basis.

Component, %	Rations (%BRP)		
	Control (0)	20	40
CFM*	50	40	30
Barley	15	14	17
Barley radicle	--	5	10
Egyptian clover	18	17	15
Rice straw	17	28	28

***Concentrate feed mixture consisted of (as fed): 36 % yellow corn, 12 % cotton seed cake, 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: Chemical analysis and calorific value of feeds and experimental rations (R).

Item	DM	Nutrients, % on DM						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]
Barley Radicle	94.02	91.82	8.18	31.95	13.28	1.23	45.35	2.68[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]
R 1 (control)	100	90.45	9.55	12.97	17.05	2.64	57.79	2.36
R 2 (20% BRP)	100	92.92	11.09	13.09	20.41	2.49	56.93	2.36
R 3 (40% BRP)	100	89.39	10.61	13.09	19.83	2.22	54.30	2.30

[a] Using TDN values of Abou Raya (1967) and using a value of 3.608 M cal ME / Kg TDN (NRC, 1985).

[b] According to McDonald, *et al.* (1995)

Blood samples were withdrawal from all ewes before morning feeding (at 7:30 a.m.) at four weeks prepartum, just after delivery and at the 10th day postpartum thereafter using EDTA as anticoagulant. Values of blood packed cell volume (PCV%, Frankel and Reitman, 1963), and haemoglobin (Benjamin, 1985) were determined immediately using the whole blood, while the rest of blood samples were centrifuged at 3000 rpm for 20 minutes to separate plasma which was frozen (-20°C) till analysis. Plasma was analyzed colorimetrically for total protein (Henry *et al.*,1974), albumin (Doumas *et al.*, 1971), globulin and A/G ratio by calculation, urea (Fawcett and Scott, 1960), creatinine (Bartles *et al.*, 1972) and AST and ALT (Reitman and Frankel, 1957).

Colostrum and transitional milk were collected (milking and mixing) from each ewe just after parturition and before suckling (1st day) and thereafter at 2nd, 3rd, 4th, 7th and 10th days postpartum which were frozen (-20^{0}C) till analyzed for total solids (TS), fat (F), Solids not fat (SNF), Protein

(P) and lactose (L) in g% using Milkoscan®, 133 B, N. Foss Electric, Denmark. The calorific value of colostrum and transitional milk (Kcal/ Kg) was calculated according to energy values of fat (38.12), protein (24.52) and lactose (16.54) MJ/ Kg (McDonald *et al.*, 1995).

Data were subjected to analysis of variance as repeated measurements (split plot in time) according to Neter *et al.* (1985) using SAS (1998), while differences among means were tested using Duncan (1955).

The statistical model was:

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

Y_{ijk} = the observation ijk, μ= the overall mean, T_i =effect due to treatment i (barley radicle level), e_{ik} = the random error due to the treatment for the ik^{th} observations.

P_j =effect of days relative to parturition no. j, $(T*P)_{ij}$ = the effect due to the interaction between treatment (i) and days relative to parturition (j), E_{ijk} =experimental error associated with Y_{ijk} observation, assumed to be normally distributed (0, σ^2).

RESULTS AND DISCUSION

Data of blood measures of Rahmani ewes due to different levels of BR inclusion are given in Table 3. All blood values reported in this study were within the normal physiological ranges reported for healthy sheep by Reece (1992) except both liver enzymes (AST and ALT) which were higher due to pregnancy and lactation.

Values of blood PCV% was not significantly affected by 40% BRP ration but a slight increase (6.3%) associated the 20% BRP ration compared to the conventional ration. On the other hand there was a tendency for the decrease in Hb values with increasing level of BRP in ewes rations, but still within the normal physiological level reported by Frandson and Spurgeon (1992). This might be due to the relatively low iron content of barley rootlets i.e. BR (0.10 g/Kg DM) as reported by Salama *et al.* (1997). However in the present study total calculated iron content of T1, T2 and T3 were 166.5, 147.5 and 129.76 mg/day which fulfill the daily requirement of sheep according to NRC, 1985 calculated for foreign sheep breeds. Ambatkar *et al.* (1998) found that Hb level in heifers either before or after calving was not affected by level of nutrition (no concentrates, 0.25 % or 0.50% of body weight concentrates) at each physiological periods.

Plasma total protein and globulin concentrations decreased by 16.4 and 29.1% due to 20% BRP inclusion while increased by 14.7 and 18.1% due to 40% BRP ration compared to the traditional ration. Plasma albumin and urea concentrations were almost similar for all groups. The ratio of A/G increased ($P<0.05$) with the 20% BRP while decreased ($P<0.05$) by the 40% BRP compared to the control. Plasma creatinine was the lowest in the control ewes being increased with BR feeding. Plasma AST activity increased with the 20% BRP level but decreased with the 40 % BRP compared to the control. Plasma ALT activity tended to increase due to BR inclusion in ewes

diets. In agreement with the present results, Yousef and Zaki (2001) found that plasma total protein and GPT of Friesian calves significantly increased when 30% of the concentrate mixture of the daily ration was substituted by barley radicle. They attributed such increase in plasma total protein to the increase in CP digestibility of the ration that contained BR (68.2 *vs* 65.2%). They also attributed the increase in plasma GPT to the increase in CF digestibility of the ration containing 30% BR (54.5 *vs* 39.3%) which in turn was reflected on increasing the energy source for biosynthesis of protein. In contrast, the same authors found no significant effect on plasma creatinine or GOT of Friesian calves related to substitution of 15 or 30% of the concentrate mixture of the daily ration by BR.

Changes in blood measures as affected by days relative to parturition are given in table 4. Values of PCV%, Hb, total protein, globulin and ALT were the highest at the 28th day prepartum and greatly declined just after parturition as to be stabilized thereafter, except for plasma globulin which showed further decrease at the 10th day after lambing. In contrast, plasma albumin, A/G ratio, urea, creatinine and AST showed minimum values at the 28th day prepartum and elevated to maximum levels just after parturition, thereafter decreased again at the 10th day post-lambing but never reach their levels that detected at the 28th day before lambing.

In agreement with the present results, Flores *et al.* (1993) collected blood samples 15 days before and 15 days after parturition from cows. They found that total protein increased by 7g/ L after parturition while there were no significant differences in blood values of urea and Ht. Furthermore, Guy *et al.* (1994) found that serum immunoglobulin G1 (IgG1) concentrations averaged 8.4 in beef cows and 5.7 mg/ ml in dairy cows between 28 d. and 24 d. prepartum and subsequently declined to 6.7 in beef and 1.4 mg/ml in dairy cows between the 4th day prepartum and calving and that the greater disappearance of IgG1 from serum suggested that more IgG1 was transferred into colostrum. They further added that serum IgG1 concentration decreased in association with colostrogenesis. This might explain why plasma globulin and total protein in the present study were the lowest just after parturition compared to their corresponding values at 28 d. prepartum. The same authors also found that serum alpha lacta-albumin concentrations of beef and dairy cows began to increase 14 d. prepartum and continued to rise through parturition. These findings also may explain why plasma albumin in the present study was highest just after parturition compared to the corresponding values at 28 d. prepartum. In addition, Korhonen, *et al.* (2000) reported that bovine serum immunoglobulins are selectively transported from the serum into the mammary gland and its secretions after that. Dedo, *et al.* (1998) reported that plasma total protein showed a moderate to strong positive correlation during lactation with milk protein levels of ewes.

Klos (1993) reported that total protein of 2.5 to 3.5 years old ewes was greater (76.7 g/ L) in non-pregnant ewes decreasing slightly during pregnancy and lactation. Also, they reported that plasma albumin was significantly decreased compared with non-pregnant ewes on day 90 of pregnancy and increased on day 135, while its level stabilized during lambing and lactation. The same author also reported that on day 135 of pregnancy

and during lambing and lactation beta 1-globulins were 3 times lower than in non-pregnant ewes. Firat and Ozpinar (1998). Found that plasma urea was lower in pregnant than in the non-pregnant ewes.

Table 3: Blood measures of Rahmani ewes as affected by barley radicle inclusion.

Measures	Barley radicle (%)		
	0	20	40
PCV, %	36.60 [a] ± 1.9	38.90 [a] ± 1.7	35.40 [a] ± 1.5
Haemoglobin, g/dl	14.50 [a] ± 0.4	14.07 [a] ± 0.4	13.60 [a] ± 0.3
Total protein, g/dl	7.00 [a] ± 0.3	5.85 [b] ± 0.3	8.03 [c] ± 0.28
Albumin, g/dl	2.57 [a] ± 0.1	2.69 [a] ± 0.1	2.64 [a] ± 0.05
Globulin, g/dl	4.43 [a] ± 0.3	3.14 [b] ± 0.3	5.23 [a] ± 0.26
A/G ratio	0.73 [a] ± 0.1	.95 [b] ± 0.06	0.52 [c] ± 0.06
Urea, mg/dl	40.80 [a] ± 2.0	41.6 [a] ± 1.8	41.20 [a] ± 1.6
Creatinine, mg/dl	0.57 [a] ± 0.07	0.91 [b] ± 0.1	0.73 [a] ± 0.06
AST, U/L	88.3 [ab] ± 5.7	99.2 [a] ± 5.1	73.60 [b] ± 4.6
ALT, U/L	16.14 [a] ± 2.1	20.4 [a] ± 1.9	19.70 [a] ± 1.7

Means in the same row with different superscript are significantly different (P<0.05).

Table 4: Blood measures of Rahmani ewes as affected by days relative to parturition.

Measures	Days relative to parturition		
	-28	0	+10
PCV, %	44.50 [a] ± 1.46	33.40 [b] ± 1.46	32.70 [b] ± 1.46
Haemoglobin, g/dl	14.30 [a] ± 0.42	13.80 [a] ± 0.42	13.90 [a] ± 0.42
Total protein, g/dl	7.77 [a] ± 0.25	6.45 [b] ± 0.25	6.86 [b] ± 0.25
Albumin, g/dl	2.38 [a] ± 0.07	2.89 [b] ± 0.07	2.64 [c] ± 0.07
Globulin, g/dl	5.39 [a] ± 0.28	3.47 [b] ± 0.28	4.10 [b] ± 0.28
A/G ratio	0.47 [a] ± 0.08	0.99 [b] ± 0.08	0.70 [c] ± 0.08
Urea, mg/dl	35.70 [a] ± 2.2	48.60 [b] ± 2.2	39.30 [a] ± 2.2
Creatinine, mg/dl	0.64 [a] ± 0.05	0.89 [b] ± 0.05	0.71 [ab] ± 0.06
AST, U/L	80.89 [a] ± 3.5	92.03 [a] ± 3.5	85.30 [a] ± 3.5
ALT, U/L	21.60 [a] ± 1.5	18.90 [a] ± 1.5	16.30 [a] ± 1.5

Means in the same row with different superscript are significantly different (P<0.05).

Changes in composition of colostrum and transitional milk of Rahmani ewes due to different levels of barley radicle (BR) feeding are given in Table 5. Ewes fed 20% BRP ration gave colostrum of similar composition and calorific value to that from ewes fed the conventional ration. However, ewes on the 40% BRP ration produced better quality colostrum that characterized by higher TS, Fat, protein and calorific value and lower content of lactose by 7.3, 13.9, 1.7, 9.2 and – 5.6 %, respectively over those in colostrum of the control ewes. However, these differences were not significant. This lack of significancy despite of the large differences may be due to the large variations among individual ewes within groups.

The lowest lactose content in the colostrum of 40% BRP fed group is considered as an advantage. Snowder and Glimp (1991) reported that reduced levels of lactose in colostrum is considered as an advantage due to decreasing the incidence of scour in new born lambs. In contrast, the highest protein content in the colostrum of 40% BRP fed group is considered as another advantage. Naylor and Ralston (1991) reported that 1st milking cow colostrum is significantly different nutritionally and immunologically compared to milk and contains 14% total protein, 6% of it is total immunoglobulin (42.9% of the total protein). Furthermore, the benefits of the high fat content in colostrum are not only due to the fact of being a source of energy but also it is a source for fat soluble vitamins which involved in the development of specific aspects of immune function during the 1st week postpartum (Rajaraman *et al.*, 1997)

The 40% BRP fed ewes produced transitional milk with non significantly higher calorific value and concentrations of TS, fat, SNF and lactose by 4.7, 3.6, 6.4, 2.2 and 14.7, respectively over those of the control.

The better colostrum and transitional milk composition of 40% BRP fed group might reflect better plasma pool of nutrient precursors which in turn reflects a better quality of BR crude protein. Moss and Givens (1994) found that CP digestibility of malt culms (BR) was 83% with estimated N degradability at an estimated rumen outflow of 0.08 h^{-1} being 66%. Furthermore, Pereira *et al.* (1998) reported that N intestinal digestibility of barley rootlets (BR) determined on 8 hrs rumen incubated residues ranged from 67.3 to 81.3 %. They further added that this high intestinal digestibility resulted in estimated amounts of digestible by-pass N can be reached to 17.1 %. In addition, Salama *et al.* (1997) reported that the essential amino acids represented about one third of total amino acids in malt sprouts (BR). Hence, the increase in the available essential amino acids in blood pool when BR was fed is expected. Consequently, more nutrients were partitioned from blood to the mammary gland resulting in better colostrum and transitional milk composition.

Variations in colostrum composition and its transformation into milk over different days post-lambing are given in Table 6. First colostrum (before suckling) had the highest ($P<0.05$) calorific value and concentrations of all studied nutritive constituents except lactose being the lowest. This composition is of great importance nutritionally and immunologically for the newly born lambs.

Sharp declines ($P<0.05$) in colostrum calorific value, TS, SNF and protein with a slight non-significant decline in its fat content occurred just at the 2nd day after lambing being 17.3, 21.2, 32.1, 43.2 and 3.5 %, respectively compared to those in colostrum taken just after parturition and before suckling. On the contrary, a 9.7% increase in lactose content of colostrum was recorded at the 2nd day postpartum compared to the 1st day. Further decreases in ascending rate occurred in calorific value, TS and fat of colostrum with the advancement of days post partum till the 7th day. Meanwhile, solids not fat decreased gradually and non-significantly by days post-lambing. In addition, colostrum total protein decreased by 11.1, 6.3 and

13.3% from 2- 3, 3- 4 and 4- 7 days post-lambing, respectively. A reversed trend was observed for lactose content.

Table 5: Colostrum and transitional milk constituents of Rahmani ewes as related to barley radicle inclusion in the rations.

Items	Barley radicle levels (%)		
	0	20	40
Composition, g%	**Colostrum[1]**		
Total solids	17.86^{a} ± 0.61	17.88^{a} ± 0.54	19.16^{a} ± 0.50
Fat	7.49^{a} ± 0.56	7.31^{a} ± 0.50	8.53^{a} ± 0.45
Solids not fat	10.37^{a} ± 0.37	10.58^{a} ± 0.33	10.64^{a} ± 0.30
Protein	6.05^{a} ± 0.33	5.95^{a} ± 0.30	6.15^{a} ± 0.27
Lactose	3.60^{a} ± 0.14	3.74^{a} ± 0.12	3.40^{a} ± 0.11
Calorific value, Kcal/ Kg	1172^{a} ± 41	1162^{a} ± 46	1280^{a} ± 42
Composition, g%	**Transitional milk[2]**		
Total solids	14.89^{a} ± 0.72	14.53^{a} ± 0.64	15.43^{a} ± 0.58
Fat	6.09^{a} ± 0.69	5.89^{a} ± 0.62	6.48^{a} ± 0.57
Solids not fat	8.79^{a} ± 0.42	8.63^{a} ± 0.38	8.98^{a} ± 0.35
Protein	4.40^{a} ± 0.44	3.58^{a} ± 0.39	4.29^{a} ± 0.36
Lactose	3.46^{b} ± 0.23	4.55^{a} ± 0.20	3.97^{ab} ± 0.18
Calorific value, Kcal/ Kg	952^{a} ± 61	929^{a} ± 55	997^{a} ± 50

Means in the same row with different superscript are significantly different (P<0.05).
[1] Averages of 1st, 2nd, 3rd and 4th days postpartum.
[2] Averages of 7th and 10th days postpartum.

Table 6: Colostrum composition of Rahmani ewes as affected by days post-lambing.

Items	Days post-lambing					
Component,%	1st	2nd	3rd	4th	7th	10th
Total solids	22.6^{a} ± 0.6	17.8^{b} ± 0.6	17.2^{b} ±0.6	16.0^{b} ±0.6	14.5^{c}±0.5	15.5^{c}±0.5
Fat	8.6^{a} ±0.6	8.3^{ab} ±0.6	7.7^{ab} ± 0.6	6.8^{b} ± 0.6	5.5^{c}±0.5	6.9^{c} ±0.5
SNF	14.0^{a} ±0.4	9.5^{b}± 0.4	9.5^{b} ± 0.4	9.2^{b} ± 0.4	9.0^{b}±0.3	8.6^{b} ±0.3
Protein	9.5^{a} ±0.4	5.4^{b} ± 0.4	4.8^{b} ± 0.4	4.5^{b} ± 0.4	3.9^{c}±0.3	4.2^{c} ±0.3
Lactose	3.1^{a} ± 0.1	3.4^{a} ± 0.1	3.8^{b} ± 0.1	4.0^{b} ± 0.1	4.2^{b}±0.2	3.8^{b} ±0.2
Calorific value[1]	1461^{a} ±53	1208^{b}±53	1138^{bc}±53	1040^{c} ±53	898^{d}±45	1027^{d} ±45

Means in the same row with different superscript are significantly different (P<0.05). [1] Kcal/ Kg.

Snowder and Glimp (1991) reported that fat content of colostrum was 119% higher than that of 28 day milk. Furthermore, they found that the 1st day colostrum of ewes was significantly higher in fat (8.6 *vs.* 6.6) and protein (9.8 *vs.* 7.9) than those of the 4th day colostrum. While lactose was significantly lower in the 1st day colostrum (3.4 *vs.* 4.3) compared to the 4th day colostrum. Moreover, Pattinson *et al.* (1995) reported that at 1 h postpartum the mean concentrations of TS, fat, and protein in the colostrum of mature ewes were 367, 132 and 203 g/L, respectively while the corresponding values at 24 hr postpartum were 242, 122 and 71 g/L, respectively. Also, Hadjipanayiotou (1995) found that lactose content was low in the 1st

colostrum sample (1st day), increased sharply in the 2nd sample (2nd day) and increased steadily thereafter. They also added that TS, CP and fat contents were the highest on the 1st day and decreased thereafter. Furthermore, they found an abrupt fall in CP and TS content occurred in the first three days post-lambing and as overall, from day 3 postpartum TS, lactose, CP and fat content in mammary secretions remained relatively constant. Pattinson *et al.* (1995) reported that over the 24 hrs period following parturition there was a marked decline in the concentrations of TS and TP without significant changes in fat and lactose contents of ewes colostrum. They suggested that whereas the energy value of colostrum was similar over the period of 24 hrs postpartum , the immunoglobulins concentration fell rapidly.

The high concentrations of total solids observed in the 1st day colostrum indicated a high supply of nutrients available for the new born. Hadjipanayiotou (1995) in a comparison between ewe mammary secretion on the 1st day (prior to suckling) and day 11 postpartum, found less nutrients, except lactose in milk than colostrum being 48.7, 55.3, 28.2 and 162% of the TS, CP, fat and lactose content of the colostrum.

From the variations in the concentrations of different studied constituents and also in the calorific value of colostrum it should be stated that after the 4th day post-lambing the transformation of colostrum into milk takes place. Perrin (1958) considered mammary secretions up to 6 days postpartum to be colostrum. While Peart *et al.* (1975) considered mammary 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.

CONCLUSION

It is concluded that partial substitution of concentrate feed mixture crude protein by barley radicle crude protein up to 40% (24.64% of the total dietary CP) starting from 28 days pre-lambing improved colostrum and transitional milk composition of Rahmani ewes. Days after parturition affected significantly the constituents of mammary gland secretions. The first colostrum (before suckling) was the richest in all studied constituents and calorific value, except lactose. Also, days relative to parturition significantly affected all the studied blood constituents of Rahmani ewes.

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التغيرات في تركيب الدم والسرسوب و اللبن الانتقالي للنعاج الرحماني نتيجة لاستخدام مستويات مختلفة من راديسيل الشعير و الأيام حول الولادة.

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استخدم في هذه الدراسة عدد ١٥ نعجة رحماني عشار (٣٨,٩ ± ١,٢١ كجم) تابعة لمزرعة محطة التجارب و البحوث الزراعية – كلية الزراعة – جامعة القاهرة. وقد كان هناك هدفين للدراسة أولهما هو دراسة تأثير استبدال بروتين مخلوط العلف المركز في عليقه المقارنة (غير محتوية علي راديسيل الشعير) ببروتين راديسيل الشعير بمستوي ٢٠ أو ٤٠% علي بعض خصائص الدم و كذلك علي تركيب السرسوب و اللبن الانتقالي أما الهدف الثاني فكان دراسة تأثير الأيام حول الولادة علي نفس الصفات. و قد بدأت التجربة قبل ميعاد الولادة المتوقع بأربعة أسابيع و استمرت حتى اليوم العاشر بعد الولادة.

و قد أشارت النتائج أن التغيرات في مستوي الهيموجلوبين و النسبة المئوية للمكونات الخلوية بدم النعاج وكذلك مستوي الألبيومين و اليوريا بالبلازما كان غير معنويا كنتيجة لاستخدام مستوي ٤٠% من بروتين راديسيل الشعير بينما انخفض تركيز كل من البروتين الكلي و الجلوبيولين مع مستوي ٢٠% من بروتين الراديسيل بينما ارتفع مستوي كل منهما بيلازما الدم مع مستوي ٤٠%.

وقد مال مستوي الكرياتينين و إنزيم ALT للارتفاع بيلازما الدم مع استخدام الراديسيل. بينما أظهر نشاط إنزيم AST بالبلازما ارتفاعا علي مستوي ٢٠% من بروتين الراديسيل و أظهر انخفاضا علي مستوي ٤٠%.

وقد أوضحت النتائج أيضا أن قيم الهيموجلوبين و النسبة المئوية للمكونات الخلوية و الجلوبيولين وإنزيم ALT بدم النعاج كانت أعلاها عند اليوم ٢٨ قبل الولادة و انخفضت إلى اقل مستوي لها عقب الولادة مباشرة ثم أظهرت ثباتا بعد ذلك و علي العكس من ذلك فان قيم الألبيومين و نسبة الألبيومين إلى الجلوبيولين و اليوريا و الكرياتينين و إنزيم AST بالبلازما كانت اقلها عند اليوم ٢٨ قبل الولادة و ارتفعت إلى اعلي قيم لها عقب الولادة مباشرة.

وقد أظهرت النتائج أيضا أن النعاج المغذاة علي مستوي ٤٠% من بروتين راديسيل الشعير قد أنتجت افضل سرسوب و لبن انتقالي من الناحية الغذائية مقارنة بالمجموعتين الأخريين حيث كانتا متشابهتين. وأن سرسوب اليوم الأول كان الأغنى في محتواه من المادة الجافة و البروتين و الدهن و كذلك طاقته الكلية مع اقل محتوي من اللاكتوز. و قد انخفضت جميع مكونات السرسوب المدروسة و كذلك طاقته الكلية معنويا بتقدم الأيام بعد الولادة حتى اليوم العاشر باستثناء اللاكتوز الذي اظهر اتجاها معاكسا.

من هذه الدراسة يمكن استخلاص أن استخدام راديسيل الشعير في علائق النعاج الرحماني كمصدر للبروتين حتى مستوي ٤٠% من بروتين مخلوط العلف المركز لعليقه المقارنة (٢٤,٦٤% من بروتين العليقة الكلي) بدءا من اليوم ٢٨ قبل ميعاد الولادة المتوقع قد حسن تركيب السرسوب و اللبن الانتقالي.

وكذلك فان تركيب السرسوب قد تغير بتتابع الأيام عقب الولادة حيث كان السرسوب عقب الولادة مباشرة هو الأغنى في محتواه من الطاقة وفي كل المكونات الغذائية المدروسة عدا اللاكتوز.