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Interrelationship between somatic cell count and biochemical changes in Egyptian camel milk.

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Abstract

Colostrum and milk samples from 10 she dromedary camels *(Camelus Dromedarius)*(reared in Marsa Matrouh province) in their first season of lactation were collected from parturition until 90 days post-partum. Samples were analyzed for somatic cell count (SCC), fat, protein, casein, lactose, IgG1 and ash. Within the whole period, the concentration of casein decreased by 60%, IgG1 by 94%, and lactose increased by 34%. The average contents increased in protein, lactose, fat, ash and total solids in colos-trum at 12 hours PP, and the mean values were 3.55, 4.24, 5.65, 0.87, and 14.31% for regular milk on 90 days. Total Nitrogen, non-protein Nitrogen, casein, and whey protein were found to be 2.23, 0.06, 0.86 and 1.31 g/100 ml for the colostrum at 12 hours PP; and 0.56, 0.04, 0.45 and 0.07 g/100 ml for the regular milk at 90 days PP. Sodium Dodecyl sulphate (SDS-PAGE) and densitometry results demonstrated that camel co-lostrum is rich in immunoglobulin, serum albumin, and 2 unknown fractions, which are reduced in amount (%) within 2 days of lactation.

The mean somatic cell count (SCC) of camel's milk was $68.87X10^3$ cells/ml, in the whole period. The mean somatic cell count (SCC) was $42.21X10^3$ cells/ml, in colostrum's milk. The mean somatic cell count (SCC) of regular milk was $97.53X10^3$ cells/ml, those 5 to 90 days. It is concluded that there was a strong significant positive correlated between SCC in colostrum and whole milk samples were with total nitrogen (TN), whey pro-tein nitrogen (WPN) and casein and negatively correlated with NPN .

Key words: *dromedary camel (Camelus dromedarius), colostrum, milk, chemical composition .*

Introduction

Camel milk is mainly used for feeding young colts. Camel milk is an important nutrition source for inhabitants in arid and semiarid areas. Unlike other milk-pro-ducing animals, camels can thrive under extreme hos-tile conditions of temperature, drought, and lack of pas-ture, and still produce milk **(Mehaia *et al.,* 1995)**. The general composition of camel milk varies in various parts of the world with a range of 3.5 to 4.5% pro-tein, 3.4 to 5.6% lactose, 3.07 to 5.50% fat, 0.7 to 0.95% ash, and 12.1 to 15% Total Solids **(Gnan and Sheriha, 1986 and Alhadrammi, 2003)**. The wide variations in the constituents of camel milk may be attributed to factors such as breed, age, the number of calving, nutrition, managements, and the stages of lactations **(Alshaikh and Salah, 1994).**

The measurement of SCC or other tests, provide information about the status of the quarter **(Middleton *et al*., 2004)**. The changes of SCC associated with evidence of milk hygiene **(Zandik *et al*., 1993)**.

An inverse relationship was noticed between SCC and milk yield **(Blood and Raostits, 1989)**. The increase of SCC associated with the reduction in daily milk yield **(Madsen *et al*.,2004)**. A positive correlation was observed between SCC scores and bacteriological examination of milk **(Zandiket *et al*., 1993).**

With the increasing interest in the production of camel milk, a need has been arisen for a means of monitoring SCC. The physical and chemical changes in milk during early lactation, and how these changes affected the first lactation, with the purpose of discriminating between colostrum and normal milk**.**

The information about camel milk chemistry is very limited in Egypt. The objective of this work was to study 1. The Chemical composition and protein fractions of camel milk from Dromedary camels were assayed. 2. Establish a SCC threshold value, which it can normal SCC of camel' milk.

Material and Methods

1. Animals:

Ten 5-yr-old Dromedary female camels (Camelus dromedarius) camels close to giving birth for the first time was randomly selected from different herds that are fed natural graze. In Marsa Matrouh , she camels were kept under master management before birth and after parturition. All camels were fed the same diet (50% corn stalk + 50% dry clover) supplemented with 1.5 kg of grain concentrate (70% corn + 30% soybean cake after oil extraction) and 30 g of table salt for each animal daily.

2. Samples Collection:

Sampling started following parturition at 12, 24, 36, 48, and 72 h, and 5th, 7th, 15th, 30th, and 90th day postpartum (PP). Samples were measured immediately for SSC and stored at -20°C until further analysis. The samples taken at the same stage of lactation were thawed and portions were taken for analyses. Colos-trum is produced for the first week, after which the secretion is considered regular milk.

3. Analysis of TS, Fat, Ash, and Lactose

Total solids (TS) were determined gravimetrically after drying in a forced-draft oven at 105°C until a steady weight was achieved. Fat percentage was determined according to the method of Rose-Gottlieb **(Görs *et al.*, 2009)**, and ash content was measured gravimetrically **(Aggarawala and Sharma, 1961)**. Lactose content was determined by the difference of TS minus fat and ash.

4. Determination of Protein Fractions

Nitrogen content was determined by the Kjeldahl method **(Grappin and Horwitz, 1988)**. The concentrations of total nitrogen (TN), whey protein nitrogen (WPN), casein N, and NPN were analyzed according to the procedure of **Guo *et al.*, (2001)**. Protein profiles in each sample were examined by SDS-PAGE under reducing conditions according to **Laemmli, (1970)**. The experiment was performed using a Mini-Protein II Cell (BioRad Laboratories, Hercules, CA) with a 4% acryl-amide stacking gel and a 12% separating gel. Bovine milk protein standards including lactoferrin, BSA, a_s-CN, if-CN, K-CN, 3-LG, and a-LA from Sigma Chemical Co. (St. Louis, MO) were used for comparison.

5. Densitometry:

Quantitative analyses of electrophoretic separations of camel milk proteins were performed using the Gel-Pro Analyzer 3.1 software from Media Cybernetics (Sil-ver Spring, MD) **(Ren *et al.*, 2012)**.

6. Somatic Cell Counts;

The milk samples collected for the biochemical analysis were also used for the SCC. The samples were then double processed in a Fossomatic 360 (A/S N. Foss Electric, Hillerod, Denmark). The reagents were prepared following the manufacturer's instructions, which coincide with the method recommended by **International Dairy Federation. (1984)**.

7. Statistical Analyses

Data were analyzed by a GLM procedure of the Fish-er's protected-least-significant-difference test using SAS software (SAS Institute Inc., Cary, NC). This test combines ANOVA with comparison of differences be-tween the means of the treatments at the significance level of $P < 0.05$. Correlation between values for SCC in milk samples was measured with Pearson's correlation coefficients. Differences between samples within different were statistically compared using Student's t test (data were logarithmically transformed) and the Mann-Whitney test for ratios **(Snedecor and Cochran, 1980)**.

Results and Discussion

Gross Composition

Changes in gross composition (total protein, lactose, fat and ash) of dromedary camel colostrum and milk were observed during the 3 month lactation period.

There was a sharp decline in protein content from 14.23 to 9.63% within the first 72 hours (table 1). It continued decreasing gradually to reach 7.17% on 2nd day of lactation, stabilized between 2 to 7 days, and further decreased to 5.32, 4.87 and 3.55% at 15th, 30th, and 90th day, respectively. These results agreed with that observed in Bactrian camel **(Zhang *et al*., 2005)**, where the reported protein content decreased from 14.49% at the first milking day to 3.95% within 2 days until 6 days of lactation in Indian camel colostrum. In contrast, Kazakhstan camel colostrum exhibited higher protein content (19.4%) at parturition, and then decreased quickly to 3.6% within 2 days. Moreover, the mean protein contents in pooled colostrum (1 to 7 days PP) and regular milk (10 to 240 days PP) of dromedary camels in Saudi Arabia were 5.82 and 3.27%, respectively, which lower than our results.

The lactose content remained relatively stable during the study period from parturition up to 3 months PP. The values of the lactose content of dromedary camel milk ranged from 3.24 to 4.44%, which didn't agreed with **Mehaia *et al*., (1995)**. The same was reported for camel's milk **(Zhang *et al*., 2005)**, but it was not confirmed with present study or the work of **Merin *et al*.. (2001).**

The ash content (table 1) decreased significantly to 0.99% in the first 24 h, and then fluctuated slightly thereafter with percentages ranging from 0.82 to 0.98%. on the other hands, a steady decrease in ash content of colostrum was reported for the Najdi camel **(Mehaia *et al*., 1995)**. Ash content ranged from 0.6 to 1.0% for dromedary camels sug-gesting that camel milk may provide a satisfactory level of minerals for consumers.

The TS content of colostrum (table 1) showed a rapid decrease from 20.16 to 14.93% during the first 72 h, likely attributed to the sharp decrease in the protein content over the same period. The TS content remained relatively stable (17.39 to 18.22%) from 12 h to 30th days PP, and then decreased to 14.31% on 90th day of lactation. According to **Mehaia *et al*.,(1995)**, TS content in colostrum during the first days of lactation for Kazakhstan and Najdi camels, ranged from 10.0 to 14.4% in dromedary camel milk.

The contents of protein, lactose, fat, ash, and TS of Dromedary camels' milk at 90th day PP were 3.55, 4.24, 5.65, 0.98, and 14.31, respectively. The largest variations during lactation were in TS and fat contents. According to **Alhadrammi *et al*.,(2003)**, the composition of camel milk is similar to bovine milk, and the average values of protein, lactose, fat, ash, and TS contents of camel milk were 3.4, 3.7, 4.1, 0.7, and 13.1%, respectively.

Nitrogen Distribution

Changes in nitrogen distribution of Dromedary camel's milk during the first 90 days of lactation are shown in table (2). Total N decreased quickly within the first day. This decrease was attributed mainly to the decrease in WPN. No further major decrease in TN was observed between 1st day and 7th day. The TN content began to decrease again, reaching 0.56 g/100 mL on 90th day. This decrease was likely attributed to the decrease in both casein N and WPN contents over the same period. Relatively higher content of TN was observed in Dromedary camel's milk com-pared with the published data (0.42 to 0.53 g/100 mL) as reported by **Mehaia *et al*., (1995)**. Non-protein N contents were found to vary considerably (from 0.03 to 0.08 g/100 mL) throughout the period of this study. However, the concentrations of NPN as percentage of TN showed a trend of increase over the 90th day and the values were 7.89 and 7.14% on 30th day and 90th day, respectively (Table 2). These results fall within the range of the published data (4.6 to 15.9%) for dromedary camel **(Mehaia *et al*., 1995)**. Results of this study were in agreement with **Zhang *et al*., (2005)**.

The content of casein N remained relatively stable (ranging from 0.80 to 0.90 g/100 mL) during the first week of lactation (Table 2). After that, casein N began to decrease and reached 0.45 g/100 mL on 90th day. The casein level of Dromedary camel's milk was found to increase steadily from 38.57% at parturition up to 79.52% at 15th day PP; and stabilizing around 80% thereafter. The casein number of camels milk was higher than that of camel's milk in Saudi Arabia **(Mehaia *et al.*, 1995)**,

Highest concentration (1.31 g/100 mL) of WPN was observed in Dromedary camel's colostrum at parturition (Table 2). The WPN content decreased by about 50% within the first 36 h and continued to decline steadily thereafter reaching 0.07 g/100 mL on d 90, whereas the levels of WPN as percentage of TN in camel milk decreased gradually from 58.74% at parturition to 12.5% at 90th day. Because Dromedary camel's colostrum contains more WPN, it is of higher biological value than regular milk, suggesting the importance of colos-trum in providing the newborn with immunity. On the other hand, the WPN content and the ratio of WPN to casein-N of Bactrian camel milk were lower compared with dromedary camel milk **(Mehaia *et al.*, 1995and Zhang *et al.*, 2005)**.

SDS-PAGE and Densitometry

Gel electrophoretic patterns of raw camel's milk samples obtained during the 3-month lactation period are shown in table (3). It is shown that Dromedary camels colostrum contained considerably high level of serum proteins in the first days of lactation (table 4), which decreased quickly thereaf-ter. The SDS-PAGE results agreed well with those for WPN and casein N based on nitrogen distribution analysis reported in this study. It is possible to observe protein bands with apparent molecular weights of 11.9, 26.0, 31.2, 70.3, and 80.0 kDa, respec-tively, which were comparable to bovine a-LA (11.2 kDa), 3-CN (26.0 kDa), a_s-CN (31.0 kDa), BSA (65.4 kDa), and lactoferrin (76.9 kDa). In addition, bands of 42 and 55 kDa (designated as MW42 and MW55, respectively), and a band at about 210 kDa (more intense in colostrum) were also observed. **Merin *et al.* (2001)** observed a similar band of 42 kDa in dromedary camel milk. With respect to the band of 210 kDa, it is presumed to be immunoglobulins (mainly IgG). A molecular weight of about 160 kDa from chromatography for IgG in dromedary camel milk has been reported **(Merin *et al.*, 2001)**. On the other hand, Dromedary camel's colostrum and milk showed the ab-sence of proteins having electrophoretic mobility com-parable with bovine f3-LG (16.1 kDa) (table 3). This result is in agreement with pub-lished data **(Merin *et al.*, 2001)**.

The major whey protein bands in Dromedary camel's colos-trum belong to camel serum albumin, Ig, a-LA, and (Table 3). On the other hand, the electrophoretic patterns of Dromedary camels colostrum and milk samples showed 2 main protein bands (designated as camel ns_I-CN and /3-CN) in the area of caseins with estimated molecular weights of 31 and 26 kDa, respectively, simi-lar to the published data for dromedary camel milk (table 4). The 2 unknown fractions (MW42 and MW55) also showed high intensities in Alxa bactrian camel **(Zhang *et al.*, 2005)** camel colostrum. However, the nature of the 2 protein fractions has not yet been determined.

Somatic Cell Count (SCC):

The somatic cell count (SCC) ranged from 28.20X10^3 to 120.60X10^{3}cells/ml; with the mean was 68.87X10^{3}cells/ml in the whole period. The threshold level of somatic cell count (SCC) ranged from 28.20X10^3 to 65.78X10^3 cells/ml with the mean was 42.21X10^3 cells/ml in colostrum milk.

The colostrum milk samples (24 hours) had significantly ($p < 0.01$) lower than mean values for total SCC. There was a weak negative correlation coefficient between the SCC and total nitrogen (TN), and a high significant negative correlation with whey pro-tein nitrogen (WPN) and low positive correlations with NPN and medium positive correlation coefficient between the SCC and casein.

The threshold level of somatic cell count (SCC) of regular ranged from 66.11X10^3 to 120.60X10^3 cells/ml with the mean was 97.53X10^3 cells/ml in regular milk from 5 to 30th days. The regular milk samples (90 days) had significantly ($p < 0.01$) higher than mean values for total SCC. There was a strong significant positive correlation coefficient between the SCC and total nitrogen (TN), with whey pro -tein nitrogen (WPN) and medium significant negative correlations with NPN and low positive correlation coefficient between the SCC and casein.

The value for SCC was significantly influenced by the stage of lactation **(Caccamo *et***

***al*., 2008).** Somatic cell count of camel' milk has not been studied extensively; consequently accept normal value. In our investigation, the SCC in the udder halves of camel was comparable to those in quarters of got **(Chen *et al*., 2010)**. The cutoff points for SCC had to be relatively higher than observed with others **(Pyorala and Pyorala, 1997).** Using of SCC to determine udder status are usually sufficient, and examinations can subsequently be made on quarters **(Bouwstra *et al*., 2008).** Moreover, the importance of SSC as a limiting factor in milk yield is not at all well documented in dairy camel. Neither significant correlation between the SSC content of milk and lactalbumin nor significant variation in SSC contents during different stages of lactation was detected **(Younan *et al*., 2001)**. Increased values of camels SSC in regular milk may be due to release from damaged epithelial cells as well as other somatic cells in milk and increased vascular permeability **(Castro-Alonso *et al*., 2009)**. Our result is conceded with cell counts were to depend on the lactation period following parturition. This number decreased towards the 24th week of lactation. At the end of lactation this value increased again.

Conclusions

The present data revealed the following: 1.There was higher protein, lower casein N, and markedly higher WPN contents in Dromedary camel's colostrum than those in milk. 2. Both colostrum and regular milk had considerable level of lactose and The colostrum is rich in immunoglobulin and albumin, whereas levels of casein and a-LA were relatively low and increased gradually until the average values reached the levels of regular milk. 3. There were gross differences between SSC in colostrum and the regular milk. 4. The somatic cell count (SCC) ranged from $28.20X10^3$ to $120.60X10^3$ cells/ml with the mean $68.87X10^3$ cells/ml in the whole period. The threshold level of somatic cell count (SCC) ranged from $28.20X10^3$ to $65.78X10^3$ cells/ml with mean was $42.21X10^3$ cells/ml in colostrum milk. The level of somatic cell count (SCC) of regular milk ranged from $66.11X10^3$ to $120.60X10^3$ cells/ml, with the mean was $97.53X10^3$ cells/ml in regular milk from. 5. The SSC of colostrum milk were correlated positively with total nitrogen (TN), NPN and casein levels and negatively with whey pro-tein nitrogen (WPN). This SSC profile was in regular milk correlated positively with total nitrogen (TN), whey pro-tein nitrogen (WPN) and casein level and negatively correlations with NPN level. The overall conclusion based on the results in this study is, that the measurement of the SCC in camels' milk can be an effective tool for monitoring udder status.

Table (1). Total solid, Protein, lactose, fat and ash content % in colostrum and milk of Dromedary camels (*Camelus dromedarius*) during the lactation period.

Time	Total solid	Protein	Lactose	Fat	Ash
12 h	$20.16±0.43^a$	$14.23±0.21^a$	$3.24± 0.11^a$	$4.65± 0.08^b$	$1.22±0.09^a$
24 h	$17.73±0.22^b$	$13.06±0.16^b$	$3.84± 0.09^a$	$5.01± 0.09^a$	$0.99±0.01^a$
36 h	$17.39±0.17^b$	$13.74±0.11^c$	$2.44± 0.05^b$	$5.15± 0.10^a$	$0.82±0.05^b$
48 h	$16.98±0.33^b$	$13.04±0.18^b$	$3.94± 0.15^c$	$4.15± 0.01^b$	$0.72±0.02^b$
72 h	$14.39±0.23^c$	$9.63±0.03^d$	$4.01± 0.19^a$	$5.95± 0.12^a$	$0.89±0.03^b$
5 d	$13.89±0.41^c$	$4.02±0.07^c$	$4.84± 0.71^b$	$4.98± 0.19^b$	$0.85±0.01^b$
7 d	$14.46±0.31^c$	$5.12±0.08^c$	$4.44± 0.52^a$	$4.15± 0.21^b$	$0.98±0.01^b$
15 d	$10.00± 0.41^d$	$5.32±0.09^c$	$3.77±0.81^a$	$5.05± 0.08^a$	$0.83± 0.01^b$
30 d	$18.22± 0.42^b$	$4.87±0.08^c$	$4.08± 0.41^a$	$5.35± 0.01^d$	$0.87± 0.02^b$
90 d	$14.31± 0.38^c$	$3.55±0.01^c$	$4.24± 0.01^a$	$5.65± 0.01^d$	$0.98± 0.01^a$

a, b, c, d, e; Significantly different ($P < 0.05$) based on Fisher's protected least significant difference test for multiple comparisons. Data are means of triplicate determinations.

Table (2). Nitrogen distribution (g/100 mL) in colostrum and milk of Dromedary camels during the lactation period.

Time	Total N	NPN	Casein N	Whey protein (WPN)	WPN: Casein N
12 h	1.51 ±0.0^{a}	0.04± 0.01^{a}	0.80 ± 0.01^{a}	0.67 ± 0.01^{a}	46:54
24 h	1.26 ±0.01^{b}	0.03 ± 0.06^{a}	0.82± 0.01^{b}	0.41± 0.01 ^{b}	33:67
36 h	1.29 ±0.00^{b}	0.08± 0.01^{b}	0.82± 0.00^{b}	0.39± 0.01^{b}	32:68
48 h	1.12 ±0.02^{c}	0.07± 0.0 1^{b}	0.81± 0.015^{b}	0.24± 0.01^{c}	23:77
72 h	1.14±0.03^{c}	0.06± 0.03^{b}	0.82 ± 0.01^{b}	0.27 ± 0.00 ^{c}	25:75
5 d	1.15±0.01^{c}	0.07 ± 0.01^{b}	0.86± 0.01^{c}	0.21 ± 0.01^{c}	20:80
7 d	1.16±0.01^{c}	0.08 ± 0.02^{b}	0.90± 0.02^{c}	0.18 ± 0.01^{d}	17:83
15 d	0.83± 0.01^{d}	0.05± 0.01^{a}	0.66±0.01 ^{d}	0.12± 0.01^{3}	15:85
30 d	0.76 ± 0.02^{d}	0.06 ± 0.02^{b}	0.61± 0.01^{d}	0.09 ± 0.01^{e}	13:87
90 d	0.56 ± 0.01^{d}	0.04± 0.01^{a}	0.45 ± 0.01^{d}	0.07 ± 0.0l^{e}	14:86

Table (3). Changes of protein components (% of total protein) in colostrum and milk samples obtained during the lactation period.

Time	ImmunoG	LactoF	CSA	MW55	MW42	Casein	a-LA
12 h	2.05±0.16^{a}	3.69±0.81^{a}	9.83±2.93^{a}	11.5±1.56^{a}	14.50±1.8^{a}	32.8±4.12^{a}	8.94±1.1^{a}
24 h	1.88±0.13^{a}	4.01±0.83^{b}	9.55± 1.7^{a}	9.40± 1.2 ^{b}	13.49±3.6^{b}	38.01±2.4^{b}	8.89±2.0 ^{a}
36 h	2.28±0.37^{a}	4.82±0.81^{b}	9.37± 2.1^{a}	8.32±0.9^{c}	12.99±2.9^{b}	34.94±2.6 ^{a}	10.60±0.7^{b}
48 h	0.92±0.06^{b}	4.71±0.86^{b}	9.96±2.33^{a}	4.98±0.40^{d}	8.16±2.07^{c}	37.34±1.8^{b}	15.82±1.1^{c}
72 h	0.63±0.05^{d}	3.79±0.74^{a}	9.84±0.80^{a}	4.25±0.08^{d}	5.21±0.46^{d}	46.77±3.8^{c}	14.03±2.3^{c}
5 d	1.02±0.51^{a}	4.10±0.06^{b}	8.53±1.9^{b}	4.79±0.05^{d}	3.10±0.09^{e}	55.75±7.2^{d}	12.43±0.7^{d}
7 d	0.90±0.3^{b}	3.27±0.08^{a}	9.16±0.06^{d}	3.07±0.35^{e}	2.30±0.58^{e}	57.97±6.8^{e}	13.56±1.6^{d}
15 d	0.65±0.07^{c}	2.35±0.46^{c}	9.42±1.24^{d}	2.70±0.19^{e}	2.03±0.33^{d}	58.93±3.1^{e}	15.71±2.2^{c}
30 d	0.93±0.47^{b}	2.91±0.82^{c}	9.89±1.99^{a}	2.74±0.33^{e}	1.89±0.14^{e}	55.97±5.4^{d}	16.53±2.5^{e}
90 d	1.60±0.42^{a}	7.28±2.04^{e}	6.71± 1.2^{e}	5.21±0.56^{d}	2.46±0.49^{e}	52.24±0.1^{d}	15.00±0.4^{c}

Table (4). Somatic cell count (SSC) and Correlations (Pearson Correlation) and its Sig. (2-tailed is in colostrum and milk of Dromedary camels (*Camelus dromedarius*) during the lactation period.

Time	SCC (cellsX10^{3}/100ml)	Pearson correlation and its significant			
		Total N	NPN	Casein	Whey protein N
12 h	36.07±4.8b^{a}	-0.444(0.199)	0.034(0.925)	0.839(0.002)**	-0.835(0.003)**
24 h	28.20±4.2c^{b}	-0.378(0.128)	0.023(0.928)	0.600(0.016)**	-0.822(0.001)**
36 h	30.0±2.7^{c}	-0.444(0.199)	-0.132(0.715)	-0.724(0.018)**	0.656(0.039)*
48 h	51.0±9.4^{d}	-0.378(0.128)	-0.070(0.785)	-0.511(0.040)*	0.467(0.050)*
72 h	65.78±0.03^{ef}	0.034(0.925)	-0.132(0.715)	0.183(0.613)	-0.246(0.493)
5 d	66.11±0.01^{ef}	0.023(0.928)	-0.070(0.785)	0.070(0.785)	-0.023(0.928)
7 d	87.81±0.01^{f}	0.839(0.002)**	-0.724(0.018)*	0.183(0.613)	-0.822(0.003)**
15 d	90.65± 0.01^{g}	0.600(0.016)**	-0.511(0.040)*	0.070(0.785)	-0.600(0.016)**
30 d	120.60± 0.02^{h}	0.822(0.001)**	-0.467(0.060)	0.023(0.928)	0.600(0.016)**
90 d	112.5± 0.01^{b}	0.83(0.003)**	-0.656(0.039)*	0.246(0.493)	0.822(0.003)**

A, b, c, d, e; Significantly different ($P < 0.05$) based on Fisher's protected least significant difference test for multiple comparisons. Data are means of triplicate determinations.
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

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ارتباط عدد الخلايا الجسدية والتغيرات الحيو ية في البان الجمال المصريه

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الملخص العربى

تم جمع 10 عينات من حليب النوق الإبل (منطقة مرسى مطروح) في الموسم الأول بعد و بصورة دورية من الولادة وحتى اليوم 90 بعد الولادة. وقد تم تحليل العينات وعدد الخلايا الجسدية، و الدهون، والبروتين، والكازين واللاكتوز .

طوال فترة الدراسة حدث انخفاض تركيز الكازين بنسبة 60٪ ، و IGG1بنسبة 94٪ ، والدهون والمواد الصلبة الكلية وانخفاض فى اللاكتوز بنسبة 34% في السرسوب وبين كل قيم وزن متوسط محتويات التكوين الإجمالي إما بروتين ، 3.55 ، 4.24 ، 5.65 ، 0.87 ، و 14.31٪ للحليب العادي فى اليوم 90 للعناصر (مجموع N، غير بروتينN، الكازين ، وبروتين مصل اللبن) بمستويات 2.23 ، 0.06 ، 0.86 ، و 1.31 جم لكل 100مللى على التوالى و0.56 ، 0.04 ، 0.45 ، 0.07جم لكل 100مللى للحليب الكامل في اليوم 90 .وقد لوحظ زيادة النسب المئوية للكازيين باطراد ، في حين انخفضت بروتينات مصل اللبن تدريجيا حتى 3شهر من الرضاعة.

نتائج التحليل الكهربائى للالبان وتشير ان السرسوب غنية بالبروتينات المناعية و ألبومين المصل و و 2 بروتين غير معروف ، والتي بدات فى الانخفاض فى الكمية بداء من اليوم الثالث من الرضاعة.

تراوح متوسط عدد الخلايا الجسديه (SCC) التى وجدت فى حليب النوق من 68.87 $X10^3$ خلية /مللي في الفترة بأكملها .وتراوح متوسط عدد الخلايا الجسدية فى لبن السرسوب 42.21 $X10^3$خلية / مللى في الحليب وتراوح متوسط عدد الخلية الجسدية فى .97 $53X10^3$ خلية /مللي في الحليب العادي من 5-90 أيام.

خلص البحث إلى أن وجود ارتباط إيجابي قوي بين مستوى الخلايا الجسديه في لبن السرسوب وعينات الحليب كامل الدسم والنتروجين الكلي (TN) ، ومصل البروتين و النيتروجين (WPN) والكازين ونحوهما سلبيا مع..NPN