Somatic Cell Counts in Milk of Buffaloes Administered Oxytocin During Early Lactation

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ABSTRACT : To find out the effect of oxytocin on somatic cell count and milk production, 12 primiparous and multiparous Murrah buffaloes were selected, immediately after the parturition, from the Institute's buffalo herd. These were divided into two groups of 6 each. Buffaloes of group I did not receive oxytocin injection (control); whereas, buffaloes of group II were administered oxytocin during early lactation (av. 42.50 days). The oxytocin injection was given in doses of 2.5 IU i.m. before the start of milking, to let down the milk, for a period of 5 days. Samples of milk from individual buffaloes were collected for 5 days before (Period I), during (Period II) and after (Period III) from both the group of buffaloes. Milk samples of A. M. and P. M. milking were composited in proposition to milk yields for analysis of milk constituents. Normal values of somatic cell counts in group I of buffaloes varied from 0.54 to 0.75×10^5 cells/ml. Mean cytoplasmic particles and epithelial cells varied from 3.68 to 7.19×10^5 cells/ml and 0.13 to 0.54×10^5 cells/ml. On percentage basis the epithelial and the total leucocyte count were 60 and 40. Total leucocyte count, in the study varied from 0.17 to 0.69×10^5 cells/ml. The differential cell count of milk indicated presence of lymphocytes (16.50 to 61.16×1000), neutrophil (0.00 to 2.00×1000) and monocyte (0.00 to 18.16×1000). Somatic cell count ($p<0.01$) and epithelial cells ($p<0.05$) varied between buffaloes and between periods of study. Total leucocyte counts of milk were also significantly varied between periods ($p<0.05$). The change in fat, lactose, chloride, EC and NEFA concentrations during different periods of study, were highly significant, indicated diurnal variations in different buffaloes during different days of experiment. Administration of oxytocin resulted in increase in somatic cell counts of milk ($p<0.01$) due to the increases in total leucocyte count ($p<0.01$) during the treatment period. The differential cell count indicated that oxytocin administration increased lymphocyte number significantly ($p<0.01$). However, secretion of neutrophil, monocyte and cytoplasmic particles were not affected by oxytocin. Eosinophil and basophil cell, though present in few samples, remain unaffected by oxytocin administration. There was no effect of oxytocin on milk production, composition, pH, EC and NEFA concentration. (*Asian-Aust. J. Anim. Sci. 2001. Vol. 14, No. 5 : 684-692*)

Key Words : Somatic Cell Count, Oxytocin, Milk Production, Milk Composition, Differential Cell Counts, Buffaloes, Early Lactation

INTRODUCTION

Oxytocin plays an important role in eliciting milk ejection in dairy cows and buffaloes (Linzell et al., 1972; Sagi and Goreweit, 1980; Ludri and Singh, 1987; Allen et al., 1988). It is released from the posterior pituitary gland into the blood circulation by various stimuli associated with suckling or milking. Elevated concentration of oxytocin in blood causes contraction of myoepithelial cells surrounding the alveoli and smaller ducts of mammary gland leading to forceful ejection of milk from the acini and the cisternal cavities. Various reports indicate that milk yield of the cows administered oxytocin during a lactation period either increase milk yield or has no effect (Knight, 1994). In India, oxytocin is being used by dairymen for let down of milk as well as for more milk production, but its likely effect on health of the udder have not been investigated. The intrinsic level of oxytocin released as a result of suckling or milking stimulus is very low and 0.1 IU oxytocin intravenously can be used for let down of milk. However, intramuscular administration route requires higher doses of oxytocin. Therefore, it becomes very important to determine the effect of oxytocin as it causes the forceful contraction of myoepithelial cells and may affect the secretion of cells as well as the quality of milk. Few reports, in cattle, indicate either no effect or a little effect on somatic cell count (SCC) in the doses of 10 IU oxytocin (Allen et al., 1988; Ballou et al., 1992). In buffaloes such effects of oxytocin on somatic cell count has not been studied so far. The present study was undertaken to find out (a) the effect of exogenous oxytocin on somatic cell count, yield and composition of milk and (b) to determine the basal concentration of somatic cell counts and differential counts in milk of buffaloes.

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MATERIALS AND METHODS

Selection and management of buffaloes

Twelve lactating Murrah buffaloes in early lactation were selected from the herd of the institute. The experiment was started in the month of February for a period of 15 days. All buffaloes were in their 1st to 8th lactation period. The buffaloes were managed as

per the feeding and management practices followed in the institute's herd. The animal were fed *ad lib* green fodder, which consisted of berseem *(Trifolium alexandrinum)* and concentrate mixture based on milk production (1 kg upto 5 kg and 1 kg for additional 2.5 kg of milk) was offered only before the start of milking. The tap water was available at all the time of the day. The buffaloes were hand milked at 5.30 A. M. and 6.00 P. M. daily and the milk yields were recorded. During the experimental period, records of maximum and minimum ambient temperature, dry and wet bulb temperature, relative humidity and vapour pressure were also recorded. Temperature humidity index (THI) was calculated by the method of McDowell (1972).

Experimental treatment and sampling of milk

Buffaloes were divided into two groups of six each. Buffaloes of group II received oxytocin injection (Chiron Pharmaceuticals Pvt. Ltd., Phagwara, Punjab), @ 2.5 IU per ml intramuscularly for a period of 5 days, while buffaloes of Group I did not receive any injection and served as a control. Oxytocin was injected before milking to let down the milk. Milk samples were collected from both the group of buffaloes during the 15 days experiment, divided into three periods of five days each. Milk samples from buffaloes were collected 5 days before (-5, -4, -3, -2, -1 days), during (1, 2, 3, 4, 5 days) and after (+1, +2, +3, +4, +5 days) oxytocin administration. Aliquots of milk samples from each buffalo were composited in proportion of milk yield and were used for analysis of milk constituents. The udders were tested for mastitis using Modified California Mastitis Test.

Analysis of milk samples and measurement of somatic cell count

In fresh milk samples, fat was determined volumetrically by Gerber's method (I. S. I., 1958). Lactose was estimated by picric acid method (Perry and Doon, 1950) and the protein by formaldehyde method (Singhal and Deshraj, 1989). Non-esterified fatty acids (NEFA) were estimated by extraction method (Chloroform : Heptane : Methanol, 49 : 49 : 2) of Shipe et al. (1980). Chloride content of milk was estimated by using $AgNO_3$ method (I. S. I., 1981). Electrical conductivity (EC) and pH of fresh milk was determined using the electrical conductivity digital meter (Century CC 601, Cell Constant) and digital pH meter (Electronics Corporation of India Ltd.), respectively. Somatic Cell Count of milk was measured microscopically by the method of Singh and Ludri (2000). Differential cell counts like lymphocytes, neutrophils, basophils, eosinophils and monocytes were also measured microscopically. Briefly, 10 ul fresh milk was spread over a glass slide having a marked area of 10 mm × 10 mm using a micropipette and the fine milk smear so prepared was dried in an oven at 30℃. The slides were then dipped in xylene for 1 to 2 minutes to remove the fat globules, dried subsequently and were then stained using methylene blue dye for a period of 15 minutes. The cells were counted in 50 fields and was multiplied with microscopic factor.

Statistical analysis

The statistical analysis of data was done using Least Square analysis (2-way ANOVA) with interaction as described by Snedecor and Cochran (1980). Mean and Standard error for all the parameters calculated and were compared using Duncan's Multiple Range Test (DMRT) for significance. Correlation among the various parameters of milk composition, somatic cells and differential cells were also calculated to find out the effect of oxytocin, if any.

RESULTS

Somatic cell count in control group of buffaloes

As shown in the table 1, the mean values of cytoplasmic particles varied from 3.68-5.95 × 10^5 cells per ml. There was a greater variation in occurrence of cytoplasmic particles in milk of different buffaloes, but the changes were non-significant. SCC during different days of experiment fluctuated between 0.33 to 1.04 × 10^5 cells per ml. Epithelial cell and the total leucocyte count on percentage basis were 60 and 40. Epithelial cell concentration varied in different buffaloes but in some milk samples epithelial cells were not found. The average epithelial cells were from 0.06 to 0.54 × 10^5 cells per ml during different days of the experiment. The average values of epithelial cell number varied significantly ($p<0.05$) in different buffaloes (table 2). The interaction of animal × period for CP and SCC was not significant. Normal values of total leucocyte count varied from 0.17 to 0.69 × 10^5 cells per ml of milk in different buffaloes, during three periods of the study. There was no significant variation in total leucocyte count in different buffaloes, but the changes in total leucocyte count between periods were significant ($p<0.05$). Mean values of lymphocyte non significantly varied from 16.50-61.16 × 1000 during different days of the experiment. On percentage basis, the differential cell counts were 86.48%, 12.44%, 0.87%, 0.10% and 0.11% for lymphocytes, monocytes, neutrophils, eosinophils and basophils. Neutrophil, monocyte, eosinophil and basophil cells were found only in few milk samples in some of the buffaloes, and therefore, their statistical analysis was also non-significant.

Table 1. Mean of cytoplasmic particles, total somatic cell count, epithelial cell, total leucocyte count and differential counts of cells in control and oxytocin administered buffaloes

	Experimental period (days)																	
	Period I						Period II						Period III					
	-5	-4	-3	-2	-1	Overall Average	1	2	3	4	5	Overall Average	+1	+2	+3	+4	+5	Overall Average
	Cytoplasmic particles ($\times 10^5$ cells/ml)																	
Group I	5.61	5.70	5.78	3.68	5.90	5.33 ±0.68	5.51	5.46	4.62	3.72	5.93	5.05 ±0.50	5.15	5.41	7.19	5.95	5.63	5.86 ±0.65
Group II	3.46	4.67	4.88	4.59	5.07	4.53 ±1.05	5.27	5.50	5.04	4.49	3.20	4.70 ±0.96	4.66	5.68	4.19	5.22	4.99	4.95 ±0.88
	Total somatic cell count ($\times 10^5$ cells/ml)																	
Group I	0.55	1.04	0.48	0.61	0.74	0.68 ±0.17	1.04	0.86	0.93	0.51	0.42	0.75 ±0.17	0.33	0.71	0.41	0.55	0.72	0.54 ±0.10
Group II	0.72	1.02	0.65	0.87	0.86	0.82 ±0.19	2.21	1.26	1.07	1.40	0.89	1.36 ±0.33	1.23	0.86	0.57	1.02	0.76	0.88 ±0.18
	Epithelial cell ($\times 10^5$ cells/ml)																	
Group I	0.22	0.54	0.06	0.22	0.31	0.27 ±0.08	0.34	0.20	0.27	0.13	0.24	0.24 ±0.09	0.08	0.38	0.17	0.32	0.33	0.26 ±0.07
Group II	0.37	0.64	0.35	0.48	0.43	0.45 ±0.14	1.21	0.14	0.58	0.71	0.28	0.58 ±0.21	0.72	0.47	0.30	0.43	0.42	0.47 ±0.12
	Total leucocyte count ($\times 10^5$ cells/ml)																	
Group I	0.33	0.49	0.20	0.39	0.43	0.37 ±0.08	0.69	0.66	0.65	0.25	0.17	0.48 ±0.15	0.25	0.36	0.23	0.22	0.38	0.28 ±0.08
Group II	0.34	0.37	0.30	0.39	0.42	0.37 ±0.09[a]	1.01	1.12	0.48	0.68	0.60	0.77 ±0.20[b]	0.52	0.38	0.26	0.58	0.34	0.42 ±0.09[ab]
	Lymphocyte ($\times 1000$ cells/ml)																	
Group I	32.33	44.00	18.66	37.83	41.50	34.86 ±8.34	61.16	59.00	36.00	17.80	16.50	38.09 ±16.45	23.66	19.16	21.16	22.66	36.50	24.62 ±9.87
Group II	23.50	32.66	26.66	38.00	41.16	32.39 ±8.43[a]	97.33	107.83	19.16	55.33	55.33	66.99 ±16.18[b]	33.00	29.16	18.33	47.00	29.66	31.43 ±11.10[c]
	Neutrophil ($\times 1000$ cells/ml)																	
Group I	0.00	0.66	0.00	1.00	0.00	0.33 ±0.33	0.33	0.00	0.00	0.00	0.33	0.13 ±0.13	0.00	2.00	0.66	0.00	0.00	0.53 ±0.53
Group II	1.66	1.00	0.33	0.00	1.33	0.86 ±0.79	0.00	0.00	9.16	1.66	5.00	3.16 ±2.89	6.16	1.66	0.00	1.16	0.33	1.86 ±1.71
	Monocyte ($\times 1000$ cells/ml)																	
Group I	1.00	4.83	1.66	0.33	1.83	1.93 ±0.85	7.83	6.83	18.16	7.66	1.00	8.29 ±5.52	1.33	14.50	1.33	0.00	2.00	3.83 ±1.51
Group II	9.00	3.16	3.00	1.00	0.33	3.29 ±1.78	3.50	4.16	20.16	11.33	1.16	8.06 ±5.19	12.50	7.16	8.00	10.66	3.83	8.43 ±4.53
	Eosinophil ($\times 1000$ cells/ml)																	
Group I	0.00	0.00	0.00	0.00	0.00	0.00 ±0.00	0.66	0.33	2.33	0.00	0.00	0.66 ±0.49	0.00	0.00	0.00	0.00	0.00	0.00 ±0.00
Group II	0.33	0.00	0.00	0.00	0.00	0.06 ±0.06	0.00	0.33	0.00	0.00	0.00	0.06 ±0.06	0.00	0.66	0.00	0.00	0.33	0.19 ±0.19
	Basophil ($\times 1000$ cells/ml)																	
Group I	0.00	0.00	0.00	0.00	0.00	0.00 ±0.00	0.00	0.00	0.00	0.00	0.00	0.00 ±0.00	0.00	0.33	0.00	0.00	0.00	0.06 ±0.66
Group II	0.00	0.00	0.00	0.00	0.00	0.00 ±0.00	0.00	0.66	0.00	0.00	0.00	0.13 ±0.13	0.00	0.00	0.00	0.00	0.00	0.00 ±0.00

Values with different superscripts[a,b,c] in a line differ ($p<0.05$).

Effect of oxytocin on somatic cell counts

Average values of cytoplasmic particles (CP) varied from 3.46 to 5.07×10^5 cell per ml before the administration of oxytocin. During the treatment

Table 2. Summary of ANOVA of complete data on CP, SCC and differential cell counts for comparison between control and oxytocin administered buffaloes

Source of variation		Mean sum of squares					
	d.f.	CP	SCC	Epithelial cell	TLC	Lymphocyte	Monocyte
Between animals	5	8.118	1.354**	0.526**	6.228	0.191	0.004
Between period	2	5.102	2.106**	0.040	1.495**	1.148**	0.055**
Between group	1	21.403**	6.090**	2.365**	0.882**	0.404	0.028
Animal × period	10	5.309	0.149	0.071	0.802	0.110	0.019
Animal × group	5	0.004	0.001	0.000	0.000	0.000	0.000
Period × treatment	2	0.267	0.166	0.027	0.061	0.046	0.007
Error	154	4.041	0.277	0.155	0.111	0.111	0.216

* $p<0.05$; ** $p<0.01$.

period, mean values were high on day 1 and day 2 of treatment, the respective values being 5.27 and 5.50×10^5 cells/ml. The values of CP continuously declined to low values of 3.20×10^5 cell per ml on day 5 of treatment. The cytoplasmic particles secretion in milk was more even after the stoppage of oxytocin injection, but the magnitude of response of oxytocin treatment in all the buffaloes was not similar (figure 1 and 2). The effect of oxytocin on cytoplasmic particles secretion was more in Mu 4250 as compared to other buffaloes. During the treatment with oxytocin, mean somatic cell count increased on day 1 (2.21×10^5 cells per ml) and thereafter, decreased gradually to low values of 0.89×10^5 cells per ml on day 5 of treatment. Initially two buffaloes, Mu 3606 and Mu 3998, exhibited greater response to oxytocin treatment, which subsequently became similar to the other buffaloes. Overall mean values of SCC indicated that somatic cell count increased from 0.82 to 1.36×10^5 cells per ml during the treatment and decline to the low values of 0.88×10^5 cell per ml after the oxytocin treatment. Average values of epithelial cell varied from 0.04 to 3.42, 0.14 to 1.21 and 0.30 to 0.72×10^5 cells per ml before, during and after administration of oxytocin. Total leucocyte count before, during and after administration of oxytocin varied from 0.30 to 0.42, 0.48 to 1.12 and 0.26 to 0.58×10^5 cells per ml, respectively. During the treatment with oxytocin, total leucocyte cell count were more on day 1 and 2 of injection (1.01 and 1.12×10^5 cells per ml) and thereafter, fluctuated between 0.48 to 0.68×10^5 cells per ml. The total leucocyte count for Mu 3606 and Mu 4250 were high (2.08 and 1.28×10^5 cells per ml) even on day 1 of oxytocin administration. Contrary to this, in Mu 4320, total leucocyte count was not high on day 1 but were high on day 4 and 5 of oxytocin treatment as shown in the figures. Average lymphocyte values, before, during and after oxytocin treatment were 23.50 to 41.16, and 19.16 to 107.83 (×1000) cells per ml and 18.33 to 47.00 (×1000) cells per ml. The effect of oxytocin on lymphocyte cell was not uniform in all the buffaloes. In Mu 3606 and Mu 4250, the lymphocyte number was more on day 1 of treatment in comparison to other buffaloes. Neutrophils before, during and after administration of oxytocin, varied from 0.00 to 1.66, 0.00 to 9.16 and 0.00 to 6.16 (×1000) cells per ml, respectively. In most of the buffaloes milk samples, neutrophils were not found during all the three periods of study. The average value of monocyte was 0.33 to 9.00, 1.16 to 20.16 and 3.83 to 12.50 (×1000) cells per ml, respectively, before, during and after oxytocin administration. In some of the buffaloes, the monocytes were absent in milk samples. There was no definite trend in the increase of monocyte due to oxytocin. Baring one or two observations eosinophils and basophil cell in milk of different buffaloes were not found. The variation in SCC ($p<0.01$) and TLC ($p<0.05$) between buffaloes were significant. The somatic cell, TLC and lymphocyte also varied significantly ($p<0.01$) during different periods of study. However, except CP ($p<0.05$) interactions for all the parameters were not significant.

Milk yield and composition in control group of Buffaloes

Milk yield of individual buffaloes during different days of the study varied from 0.5 to 20.0 kg per day. The mean milk yield varied from 10.41 to 13.00 kg. Fat percentage in different buffaloes varied non-significantly and were 6.21 to 6.88% during different days of the experiment. Mean protein percent of milk in different buffaloes were in the range of 4.08 to 4.93 and was significant ($p<0.05$) between buffaloes and between periods of study. Lactose percent was low (3.81 to 4.81) in buffalo, which were producing low milk (Mu 3691), but in buffaloes, producing more milk, lactose percent was normal. Mean values of lactose percent varied from 4.09 to 5.08% during different days of study. Chloride content of milk was highly variable in different buffaloes ($p<0.05$) and the mean values of chloride were 65.00 to 106.89 mg%. Milk pH in different buffaloes varied significantly ($p<0.01$) being, in the range of 6.73 to 6.89. EC of

milk was high in Mu 3691 as compared to other buffaloes. In this buffalo, the EC value varied from 2.01 to 5.20 mhos, while mean values of EC was from 2.28 to 3.24 mhos, in different buffaloes. Milk NEFA concentration was highly variable in different buffaloes ($p<0.01$) and varied from 0.109 to 0.195 mM/l during different days of studies. Between periods variations were significant for fat, lactose, chloride, EC, NEFA ($p<0.01$) and protein and pH ($p<0.05$), but milk yield changes were not different. The animal × period interaction were significant for protein, chloride, pH, EC and NEFA concentration. Changes in milk yield, protein, lactose, pH, EC and NEFA were highly significant ($p<0.01$) in different buffaloes whereas, chloride was significant at 5%. However, variation in fat was non-significant.

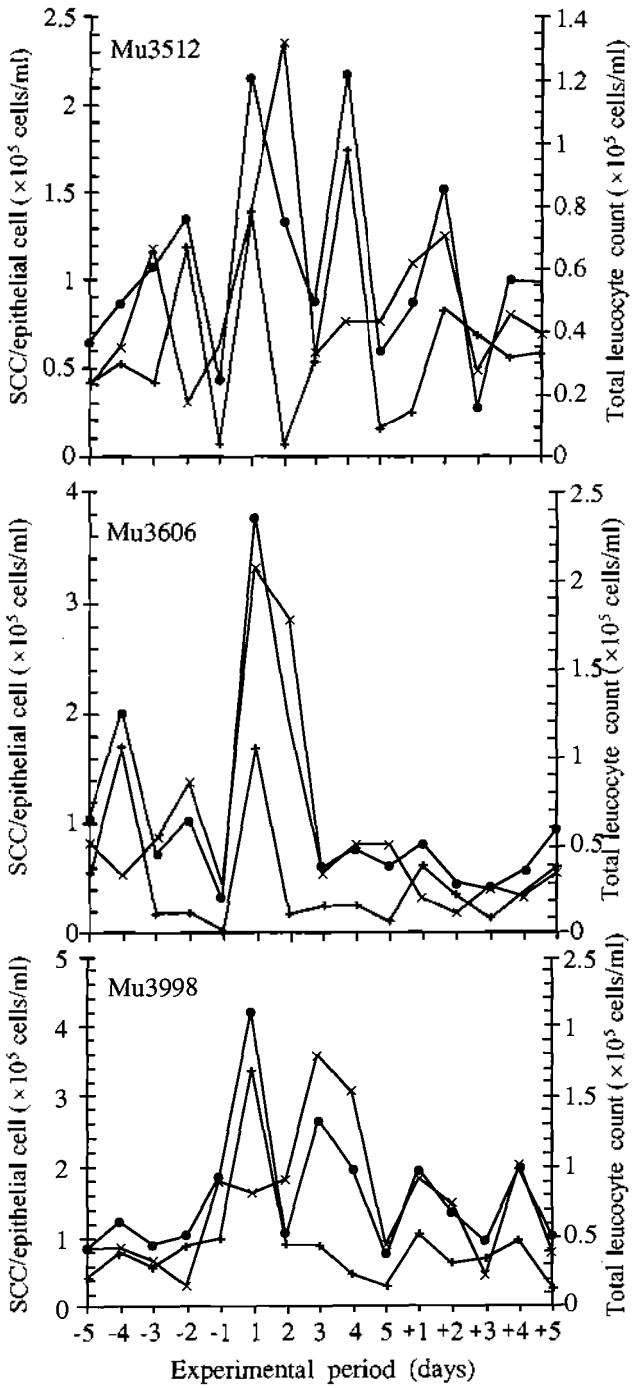

Figure 1. Somatic cell count (●), epithelial cell (+) and total leucocyte count (×) in oxytocin administered burraloes

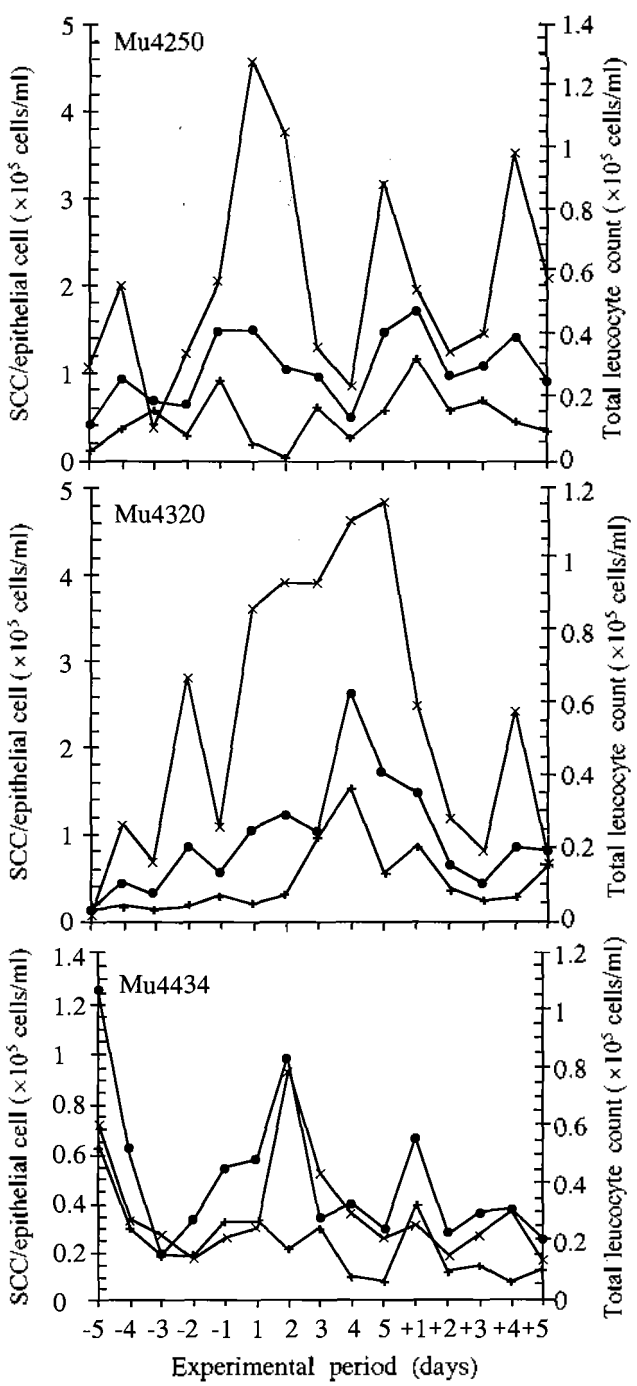

Figure 2. Somatic cell count (●), epithelial cell (+) and total leucocyte count (×) in oxytocin administered burraloes

Table 3. Yield and composition of milk EC, pH and NEFA in control and oxytocin administered buffaloes

	Experimental period (days)																	
	Period I						Period II						Period III					
	-5	-4	-3	-2	-1	Overall Average	1	2	3	4	5	Overall Average	+1	+2	+3	+4	+5	Overall Average
							Milk yield (kg)											
Group I	11.50	10.91	10.83	10.41	10.66	10.86 ±2.24	12.00	10.58	12.25	11.25	13.00	11.82 ±2.37	11.16	12.25	11.08	11.42	10.42	11.69 ±2.55
Group II	5.75	5.41	5.16	5.00	5.58	5.38 ±1.02	6.33	6.00	7.16	7.00	6.25	6.55 ±0.84	6.41	5.33	6.66	6.50	6.16	6.21 ±0.94
							Fat (%)											
Group I	6.66	6.61	6.70	6.81	6.76	6.71 ±0.07	6.88	6.76	6.68	6.78	6.48	6.72 ±0.08	6.51	6.25	6.61	6.51	6.21	6.42 ±0.12
Group II	6.70	6.83	6.78	6.70	6.26	6.65 ±0.14	6.75	6.50	6.46	6.43	6.63	6.55 ±0.16	6.73	6.71	6.66	6.75	6.76	6.72 ±0.09
							Protein (%)											
Group I	4.58	4.74	4.69	4.68	4.88	4.71 ±0.22	4.59	4.28	4.71	4.93	4.79	4.66 ±0.20	4.53	4.14	4.74	4.08	4.70	4.44 ±0.23
Group II	4.65	4.82	4.79	4.74	4.64	4.62 ±0.09	4.85	4.72	4.85	4.87	4.58	4.77 ±0.02	4.55	4.26	4.56	4.77	4.89	4.60 ±0.16
							Lactose (%)											
Group I	5.08	4.68	4.61	4.43	4.18	4.59 ±0.15[a]	4.14	4.25	4.09	4.15	4.35	4.19 ±0.07[b]	4.26	4.45	4.33	4.50	4.36	4.36 ±0.14[ab]
Group II	4.82	4.71	4.15	4.12	4.15	4.39 ±0.16[a]	4.08	4.11	4.22	4.24	4.43	4.22 ±0.08[b]	4.27	3.98	4.35	4.27	4.40	4.25 ±0.14[bc]
							Chloride content (mg%)											
Group I	66.77	67.52	65.00	69.14	97.81	73.25 ±7.70[a]	106.89	105.87	100.45	105.07	103.42	104.34 ±3.72[b]	106.89	102.56	101.47	104.21	105.44	104.11 ±2.91[bc]
Group II	77.71	66.08	77.04	72.15	99.16	78.43 ±5.86[a]	105.30	104.54	109.35	108.74	110.83	107.75 ±2.41[b]	110.94	111.87	102.87	104.32	109.65	107.92 ±4.23[bc]
							pH											
Group I	6.86	6.89	6.86	6.87	6.86	6.87 ±0.04[a]	6.89	6.79	6.87	6.81	6.86	6.84 ±0.02[a]	6.82	6.87	6.73	6.80	6.83	6.01 ±0.04[b]
Group II	6.80	6.81	6.78	6.80	6.76	6.79 ±0.04	6.77	6.81	6.86	6.75	6.81	6.80 ±0.04	6.84	6.77	6.72	6.75	6.74	6.76 ±0.06
							Electrical conductivity (mhos)											
Group I	2.28	2.37	2.57	2.58	2.88	2.54 ±0.16[a]	2.46	2.84	2.70	2.43	2.83	2.65 ±0.19[ac]	3.11	2.70	2.86	2.97	3.24	2.97 ±0.31[bc]
Group II	2.25	2.54	2.69	2.58	2.85	2.42 ±0.12[a]	2.71	2.67	2.48	2.45	2.55	2.57 ±0.57[a]	2.97	2.78	2.77	2.69	2.84	2.81 ±0.14[ba]
							Non-esterified fatty acids (m mole/l)											
Group I	0.186	0.137	0.149	0.159	0.167	0.159 ±0.034	0.135	0.155	0.122	0.133	0.109	0.131 ±0.013	0.158	0.184	0.163	0.173	0.195	0.175 ±0.02
Group II	0.151	0.134	0.146	0.132	0.136	0.139 ±0.020	0.114	0.113	0.121	0.148	0.145	0.128 ±0.019	0.150	0.225	0.161	0.163	0.169	0.166 ±0.200

Values with different superscripts[a,b,c] in a line differ ($p<0.05$).

Effect of oxytocin on yield and composition of milk

Mean milk yield before the start of the treatment varied from 5.00 to 5.75 kg, while during experiment period, the values were from 6.00 to 7.16 kg. After the termination of oxytocin injection, milk yield varied from 5.33 to 6.66 kg during different days of the experiment. Fat content of milk in different buffaloes were from 6.26 to 6.83% on different days before the administration of oxytocin. During and after the treatment fat percent varied from 6.43 to 6.75% and 6.66 to 6.76%, respectively. Protein content of milk varied significantly from 4.64 to 4.82, 4.58 to 4.87 and 4.26 to 4.89%, respectively, before, during and after administration of oxytocin. The values of lactose

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