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EFFECT OF DIFFERENT PHYSIOLOGICAL STAGES AND MANAGEMENTAL PRACTICES ON MILK SOMATIC CELL COUNTS OF MURRAH BUFFALOES

Kalyan De, Joydip Mukherjee, Shiv Prasad and A.K. Dang*

ABSTRACT

To see the effect of different physiological stages and mangemental practices on the amount of milk somatic cells secreted from the udders of Murrah buffaloes, milk was collected from 64 Murrah buffaloes, which were divided into various groups according to their stage of lactation, parity, colostrums collected, body weight, body condition score (BCS), season, milking practices and fractionated. There were non-significant changes in milk somatic cell counts (SCC) in early, mid and late lactation. Milk SCC increased non-significantly from the 1st to 4th parity. Milk SCC were significantly higher (P<0.01) in day-1 colostrum samples and then decreased when colostrums transformed into milk. No relationship was found between milk SCC and body weight and body condition score. Milk SCC was significantly higher (P<0.01) in the summer season *vis-a vis* winter season. SCC was higher in machine milking than hand milking. Our results indicate that milk SCC is greates in buffaloes of higher parity and during the months of summer. Therefore, proper care of these animals should be undertaken to maintain their milk quality.

Keywords: buffaloes, milk, SCC, physiological stages, managemental practices

INTRODUCTION

The buffalo population in India accounts for 57 percent of the world buffalo population. Improvement in milk production has been due to proper breeding, feeding and management of dairy animals. However, in spite of large volume of milk produced, the quality aspects of milk production have not received adequate attention, and this has been the major obstacle in realizing the large export potential of milk and milk products. Also, the vital aspect of clean milk production and herd health including udder health still remains a major concern. All the developed countries are using milk somatic cell counts (SCC) as a marker to determine the mammary health and quality of milk (Dang *et al*., 2007). Seeing the importance of milk SCC internationally, the present study was under taken to estimate milk SCC in Murrah buffaloes in different physiological stages and reared under different management practices.

MATERIALS AND METHODS

Milk was collected from 64 Murrah buffaloes which were divided into various groups according to their stage of lactation (early, mid and late), parity (1, 2, 3 and 4), colostrums collected

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from days 1 to 5, body weight, body condition score, season (summer, autumn and winter), and milking practices (hand and machine), milk collected from different fractions of the udder (stripping, fore milk and normal) as indicated in Table 1. The Number of animals in each group has also been represented in Table 1. Individual milk samples pooled for all four quarters from the entire animal were collected separately. About 100 ml of milk was collected aseptically in clean milk bottles. The samples were brought to the laboratory immediately after collection and placed in a refrigerator till use. For SCC, slides were prepared within one hour of collection of milk samples. Milk SCC was estimated microscopically (Dang *et al*., 2008). The SCC were measured under the microscope with a magnification of 100 X 10 in 200 fields, and the average number of cells per field was multiplied by the microscopic factor (8.81134633). The microscopic factor was determined by using ocular and stage micrometer. Somatic cell counts/ml of milk (100,000) = Average cells count in one field x 8.81134633. The data obtained were subjected to statistical analysis using least square analysis of variance.

RESULTS AND DISCUSSION

Mean ± SE values of SCC (10^5 cells /ml) in milk during different physiological stages and under different managemental practices have been presented in Table 1. The values of milk SCC were within a range (Dang *et al*., 2007) as reported in Murrah buffaloes. There were non-significant changes in milk SCC in early, mid and late lactation. Little change in milk SCC has also been reported with stage of lactation in cows (Eberhart *et al*., 1982). On comparing the effect of parity on milk SCC, it was observed by milk SCC increased

Table 1. The effects of different physiological stages and management practices on milk SCC.

Physiological effects			Managemental effects		
Stages of lactation	Early (n = 17)	0.99 ± 0.70	**Body weight**	<500 kg (n = 13)	0.88 ± 0.09
	Mid (n =17)	0.93 ± 0.70		500kg-600 kg (n = 24)	1.03 ± 0.06
	Late (n = 17)	1.03 ± 0.14		>600 kg (n = 14)	0.90 ± 0.08
Parity	1 (n =14)	0.89 ± 0.07	**Body condition score**	<3.5 (n = 14)	1.08 ± 0.08
	2 (n =16)	0.99 ± 0.08		3.5-4.5 (n = 17)	0.93 ± 0.17
	3 (n =10)	1.06 ± 0.14		>4.5 (n = 20)	0.95 ± 0.05
	4 (n = 11)	1.14 ± 0.17	**Season**	Summer (n = 51)	1.19^{a} ± 0.08
Days of colostrum	1 (n = 13)	7.29^{a} ± 0.25		Autumn (n = 51)	1.17^{a} ± 0.06
	2 (n = 13)	5.29^{b} ± 0.16		Winter (n = 51)	0.83^{b} ± 0.05
	3 (n = 13)	4.04^{c} ± 0.14	**Milking techniques**	Machine (n =22)	1.12 ± 0.11
	4 (n = 13)	2.87^{d} ± 0.12		Hand (n =29)	0.94 ± 0.05
	5 (n = 13)	1.93^{e} ± 0.07	**Milking fractions**	Fore milk (n = 12)	1.92 ± 0.22
				Normal milk (n = 12)	1.39 ± 0.19
				Stripping (n = 12)	1.82 ± 0.20

Figures with different superscripts within a column differ significantly from each other (P<0.01)

non-significantly from 1st to 4th parity. The reason may be that SCC is positively correlated with milk production and milk production increases with an increase in parity. Milk SCC were significantly higher (P<0.01) in day-1 colostrum samples and then decreased to 193,000 in day-5 samples when colostrums transformed into milk. The engorgement of the udder tissue during advanced pregnancy often results in very high level stress on the udder tissue which may be responsible for elevated SCC and neutrophil counts in day 1 colostrum. This returns gradually to normal values as the stress on the udder tissue is reduced by frequent emptying of the udder (Dang *et al*., 2007).

On seeing the effect of different managemental practices on milk SCC, there was no definite relationship between milk SCC and body weight in Murrah buffaloes, whereas, body weight was found to be positively correlated with the level of SCC in cows (Berry *et al*., 2007). Also there was no significant difference in different BCS classes with respect to milk SCC. Milk SCC was significantly higher (P<0.01) in the summer and autumn seasons as compared to the winter seasons as reported in milk of exotic cattle (Kelly *et al*., 2000).

In the present study, milk SCC was higher in machine milking than hand milking. One of the reasons behind relatively higher SCC (non significantly) in machine milking of Murrah buffaloes may be that they have not been selected for the udder traits and therefore have teats of variable shapes and sizes of teats. These are often not perfectly compatible with the milking machine which has one particular dimension and which are mostly suited to cows having uniform udder and teat characteristics (Dang *et al*., 2007).

There was a decrease in milk SCC in normal milk from that of fore milk, which again increased in stripping. A higher concentration of SCC in the stripping may be due to the sloughing off of more cells into milk, and an increase in fore milk SCC may be due to the presence of pathogens towards the teat end, which may promote movement of somatic cells towards it.

Our results indicate that as in cows, milk SCC also varies in the milk of Murrah buffaloes under different physiological stages and managemental practices. Buffaloes possess a powerful defence mechanism against mastitis due to their tight teat sphincter (Hogberg *et al*., 2007) and long narrow teat canal, which can be expected to effectively prevent micro-organisms from invading the udder (Uppal *et al*., 1994). However, with change in management systems (increased feeding and introduction of machine milkings), there is an increase in milk SCC which may increase the chance of mammary infection. Therefore, buffaloes of high parity, producing more milk and those exposed to summer stress require proper care and management to maintain their milk production.

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