www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(1): 192-195

www.thepharmajournal.com
Received: 19-11-2019
Accepted: 21-12-2019

Swarnalata Bara
Ph.D. Scholar, Department of Livestock Production and Management, ICAR-Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India

SK Chaurasia
Professor, Department of Livestock Production and Management, College of Veterinary Science and Animal Husbandry, Anjora, CGKV, Durg, Chhattisgarh, India

BPS Kanwar
Veterinary Assistant Surgeon, Department of Animal Husbandry Development, Chhattisgarh, India

AK Chaturvedani
Assistant Professor, Department of Veterinary & Animal Husbandry Extension Education, FVAS, RGSC-BHU, Mirzapur, Uttar Pradesh, India

Corresponding Author:
AK Chaturvedani
Assistant Professor, Department of Veterinary & Animal Husbandry Extension Education, FVAS, RGSC-BHU, Mirzapur, Uttar Pradesh, India

Factors affecting somatic cell counts in jersey crossbred cows

Swarnalata Bara, SK Chaurasia, BPS Kanwar and AK Chaturvedani

Abstract
The present study was carried out in the herd of Jersey crossbred cows at private dairy farm located at Durg, Chhattisgarh. Milk samples were analyzed to evaluate the effect of season, stage of lactation and parity on somatic cell counts (SCC). The mean SCC in low and high milk yielders groups were 1.323 ± 0.043 and 1.274 ± 0.046 x 10^5 cell/ml, respectively while in different season (spring and summer) were noted as 1.125 ± 0.034 and 1.475 ± 0.034 x 10^5 cell/ml, respectively. In early, mid and late stage of lactation the SCC were 1.189 ± 0.051, 1.271 ± 0.051 and 1.439 ± 0.051 x 10^5 cell/ml, while in early, mid and late parities were found to be 1.215 ± 0.053, 1.299 ± 0.053 and 1.385 ± 0.053 x 10^5 cell/ml, respectively. The milk somatic cell counts of Jersey crossbred cows was found highly significant (p<0.01) with season and stage of lactation while non-significant (p>0.01) with parities. Non genetic factors such as season and stage of lactation affect the SCC.

Keywords: Jersey crossbred, somatic cell counts, season, stage of lactation, parity

Introduction
The composition of milk from dairy cows is of major interest to milk producers, processors and consumers because of its health related issues and also market demand. Profitability of dairy industry and end product quality is closely related to the hygienic and chemical properties of incoming raw milk. Raw milk quality encompasses criteria relating to composition and hygiene.

The composition of milk varies with breed, feeding regimes and health status of the dairy animals and SCC is one of the most important factors to evaluate the quality and health of milk (Yarabbi *et al*., 2014) [17]. It directly affects the economy of milk production as well as economic condition of these farmers. The normal composition of milk somatic cell varies with the type of secretion or lactation cycle. Normally, in milk from a healthy mammary gland, the SCC is lower than 1x10^5 cells/ml, while bacterial infection can cause it to increase to above 1x10^5 cells/ml (Bytyqi *et al.*, 2010) [3]. Somatic cell counts are being used as an index of the inflammatory condition of the udder. These are secreted during normal course of lactation in milk (Silva and Silva, 1994) and therefore are a valid indication of abnormal milk secretion, milk composition and mammary disease in dairy animals (Haenlein and Hinckly, 1995) [7]. A decrease in bulk milk somatic cell count can be used as an indicator in mastitis control programme (Suriyasathaporn *et al.*, 2000) [15]. Considerable literature on SCC levels in milk of exotic cattle is available (Sheldrake *et al*., 1983; Kehril and Shuster, 1994) [13, 8]. But information on mean and variations of SCC during different stages of lactation, parity and season in cows under tropical condition is not available. Therefore, the present study was carried out to evaluate the factors affecting SCC of milk of Jersey crossbred cows.

Material & Method
The present study was carried out in the herd of Jersey crossbred cows maintained at a private dairy Farm located at distance of 8 km from College of Veterinary Science and Animal Husbandry Anjora, Durg, Chhattisgarh. The area is light tropical, sub humid and monsoon climatic zone. Total 72 samples of milk from Mid February 2018 to June 2018 were collected and analyzed to study the effects of season, stage of lactation, parity on milk somatic cell counts.

Selection of animals
The present study was conducted on 35 Jersey crossbred lactating cows ranging from 1st to 5th

and above lactation covering a period from mid Feb to June 2018.
The information about the parity of cows and date of calving were obtained from the records available in the farm.

Feeding and management
The standard feeding and managemental practice were followed throughout the experimental period. The Jersey crossbreds were housed in head to head system. The milking of the animals was practiced twice a day. Milk yield was recorded separately by milk weighing machine. The Jersey crossbreds were tied and stall fed with the required quantity of paddy straw at the rate of 4 Kg per day, barseem at the rate of 10 to 15 kg per day and 1.5 kg concentrate mixture, were offered to lactating Jersey crossbreds for maintenance under the shade. The milk recording started after 5th day from calving. They were always fed individually. The fresheners were given 1 kg extra concentrate ration up to 1st month of production. After that the concentrate was given according to their milk production level. The concentrate was fed at the rate of 1 kg for each 2 kg of milk produced. The nutrient requirement of the animals was mostly met through concentrate and green fodder.

Milk sampling
Milk sampling was done at weekly interval. The fresh milk sample was collected separately in morning and evening. On each collection day aliquots of morning and evening milking was sampled from each cow in amount proportional to the amount produced and was mixed thoroughly. In case of freshly calved cows sampling was started from 5th day of calving. Total of 72 milk samples were collected from Jersey crossbred cows with apparently healthy udder producing normal milk in appearance during the period of 4 months. During each season 36 milk samples of early, mid and late lactation were considered for determination of SCC, taking due care of parity. A representative sample of milk (30-40ml) was taken for analysis.

Determination of somatic cell count
SCC in milk samples were done as per method described by Shalm *et al*. (1971) [12]. 10µl (0.01ml) fresh milk sample was taken on pre-drawn one square cm marked area over a grease free clean glass slide which was uniformly smeared with the sterilized platinum loop, and then smear was air dried. Smears were stained by modified Newman's stain. In SCC analysis, direct microscopic counting method was performed for sampling. Number of somatic cells was multiplied by the multiplication factor of the microscope to obtain the number of cells per ml of milk.

Classification of data
Data of animals were classified according to the milk yield (low milk yielder less than 10 kg per day and high yielder more than 10 kg per day), Season (spring and summer), stage of lactation (early stage, mid stage and late stage), parities (early parity-1st and 2nd parity, mid parity- 3rd and 4th parity and late parity- 5th and above parity).

Statistical analysis
Statistical analysis of data was done using analysis of variance to study the effect of season, parity and stage of lactation, Test day milk yield on somatic cell count. The following fixed effect model was used for the analysis:

$Y_{ijklm} = \mu + A_i + B_j + C_k + D_l + e_{ijklm}$
Where,

Y ijklm = mth observation under lth milk yield, kth parity, jth stage of lactation and ithseason
μ = Overall mean
A_i = Effect of ith season group
B_j = Effect of jth stage of lactation group
C_k = Effect of kth parity group
D_l = Effect of lth milk yield group
e ijklm = Random error, NID (0,ó²e)

Result and Discussion
The mean SCC in low and high milk producers was 1.335 ± 0.041 and 1.228 ± 0.047 (x10^5 cells/ml) respectively. The level of production was had significant (p<0.05) effect on SCC level. The mean of somatic cell counts in different level of production was presented in the Table. The mean SCC changes during different seasons were significant (p<0.01), being high during summer season 1.475 ± 0.034 (x10^5 cells/ml) and low in spring season 1.125 ± 0.034 (x10^5 cells/ml). The mean SCC in early, mid and late stage of lactation were 1.189 ± 0.051, 1.271 ± 0.051 and 1.439 ± 0.051 (x10^5 cells/ml). The gradual increase in SCC level with the advancement of stage of lactation had been observed. Analysis of milk yield showed high significance (p<0.01) difference for effect of stage of lactation. The results of the present study showed increasing trend for mill SCC with parity, SCC being lowest in early parity cows and highest in late parity cows. The mean value of SCC for mid and late parity were 1.215 ± 0.053, 1.299 ± 0.053 and 1.385 ± 0.053, respectively. The analysis of variance revealed non-significant (p>0.01) effect of parity on SCC.

Table 1: Analysis of variance for Somatic Cell Counts (x10^5 cell/ml)

Effect	df	Sum of square	Mean square	F
Milk Production	1	0.286	0.286	4.200*
Season	1	2.212	2.212	54.515**
Stage of lactation	2	0.784	0.392	6.337**
Parity	2	0.348	0.174	2.555

** Significant at p<0.01,*Significant at p<0.05

Table 2: Group, season, stage and parity wise Means, standard error and standard deviation for somatic cell counts (x10^5 cell/ml)

Source	Mean	Std. error	Std. Deviation
Group			
Low yielder	1.323	0.043	0.238
High yielder	1.274	0.046	0.296
Season			
Spring	1.125	0.034	0.202
Summer	1.475	0.034	0.266
Stage			
Early	1.189^a	0.051	0.220
Mid	1.271^a	0.051	0.290
Late	1.439^b	0.051	0.228
Parity			
Early	1.215^a	0.053	0.208
Mid	1.299^{ab}	0.053	0.287
Late	1.385^b	0.053	0.279

^{ab}Mean superscripted by different letters differed significantly from each other.

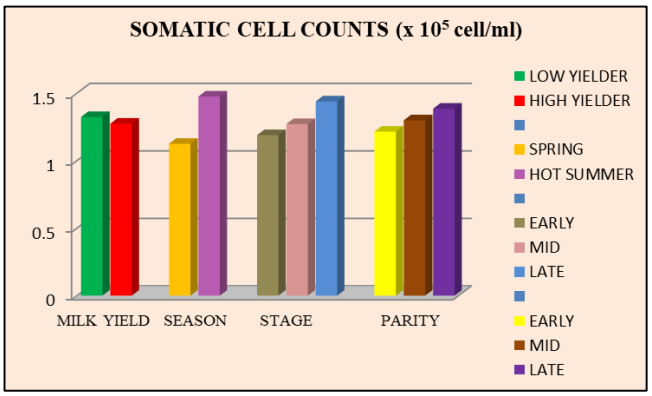

Fig 1: Graph showing average values of milk yield, season, stage of lactation and parities on somatic cell counts (x10^5 cell/ml)

A total 72 milk samples were examined for somatic cell count during the four months of experimental period. The means of the low and high producing animals was significantly (p<0.05) differed from each other. Similar to present findings, significant differences in milk SCC were observed by Samanta *et al*. (2006) [11] between different levels of milk yield. Ouedraogo *et al*., 2008 [9] reported higher SCC values for low yielding animals compared to high yielder animals. The low yielder animal possibly get less attention in terms of feeding and cleaning thereby affecting milk yield and increase in SCC. The SCC was higher in summer season as compare to the spring season. Syridion *et al*. (2012) [16] and Baul *et al*. (2011) [2] also reported significant effect of season on SCC variation. Animals during summer are under stress as well as high temperature and excess moisture in hot humid region make them more susceptible to infections, having a greater number of SCC. Similar to present study, the gradual increase in SCC level with the advancement of stage of lactation have been observed by Fadlemoula *et al*. (2008) and Ruegg and Pantoja (2013) [10]. Increased SCC values towards the end of lactation could be due to higher infection rate as the streak canals are dilated due to continuous milking and dilution effect of increased milk yield during early lactation and declines of milk yield during mid and late lactation. In the present study the effect of parity on SCC was non-significant. SCC was highest in late parity and lowest in early parity. It shows increasing trend for milk somatic cell count with parity. Ahn *et al*. (2006) [1] and De *et al*. (2011) [4] observed non-significant effect of parity on SCC. Contrary, Erdem *et al*. (2010) [5] reported significant effect of parity on SCC. The higher SCC in later parity in comparison to primiparous animals may be due to fact that animal's resistance to mastitis might be lowered with advancement of lactation number or age.

Conclusion

This study indicates that SCC content varied as per season and stage of lactation suggesting these are very much influenced by non genetic factors. Therefore, it is suggested that monthly control of SCC in dairy farms is one of the most effective methods to monitor and evaluate changes in the amount of production of milk and milk quality. Understanding the relationship between somatic cells and the production of high-quality milk is fundamental for the profitability of the dairy business. Optimum outputs can be achieved by reducing somatic cell counts at the herd level. Routine screening tests, improved sanitation, dry period therapy and improvement in management, as well as feeding, are needed to reduce somatic cell counts and prevent the occurrence of udder infections.

References

1. Ahn BS, Suh GH, Kwon EG. Estimation of environmental effects and genetic parameters for somatic cell score, stress and immunological traits in Holstein cattle. Journal of Animal Science and Technology. 2006; 48:9-14.
2. Baul S, Cziszter LT, Acatincai S, Cismas T, Gavojdian D, Tripon I *et al.* Researches regarding the season influence on somatic cell count in milk during lactation in Romanian black and white cows. Lucrari Stintifice. 2011, 56.
3. Bytyqi H, Zaugg U, Sherifi K, Hamidi A, Gjonbalaj M, Muji S *et al*. Influence of management and physiological factors on somatic cell count in raw milk in Kosova. Veterinarski Archiv. 2010; 80(2):173-183.
4. De K, Mukherjee J, Prasad S, Dang AK. Effect of parity and stage of lactation on milk SCC and DLC in native and crossbred cows. Indian Journal of Dairy Science. 2011; 64:326-328.
5. Erdem H, Atasever S, Kul E. A study on somatic cell count of jersey cows. Asian Journal of Animal and Veterinary Advances. 2010; 5:253-259.
6. Fadlelmoula AA, Anacker G, Fahr RD, Swalve HH, Factors affecting test day somatic cell counts and milk yield of dairy cows. International Journal of Dairy Science. 2008; 3(2):105-111.
7. Haenlein GFW, Hinckley LS. Goat milk somatic cell counts in USA. International Journal of Animal Sciences. 1995; 10:305-310.
8. Kehril ME, Shuster DE. Factors Affecting Milk Somatic Cells and Their Role in Health of the Bovine Mammary Gland1. Journal of Dairy Science. 1994; 77(2):619-627.
9. Ouedraogo GA, Millogo V, Anago-Sidibe AG, Kanwe BA. Relationship between somatic cell counts, dairy cattle milk yield and composition in Burkina Faso. African Journal of Biochemistry Research. 2008; 2:56-60.
10. Ruegg PL, Pantoja JCF. Understanding and using somatic cell counts to improve milk quality. Irish Journal of Agricultural and Food Research. 2013; 52:101-117.
11. Samanta A, Prasad S, Ghosh CP. Incidence of sub clinical mastitis in Karan swiss and Karan Eries crossbred cows. Indian Journal of Dairy Science. 2006; 59:13-18.
12. Shalm O, Carroll E, Jain N, Bovine Mastitis. Lea and Febiger. Philadelphia. 1971, 129-130.
13. Sheldrake RF, Hoare RJT, McGregor GD. Lactation stage, parity, and infection affecting somatic cells, electrical conductivity, and serum albumin in milk. Journal of Dairy Science. 1983; 66(3):542-547.
14. Silva LD, Silva KFST. Total and differential cell counts in buffaloes (*Bubalus bubalis*) milk. Buffalo Journal. 1994; 2:133-137.
15. Suriyasathaporn W, Schukken YH, Nielen M, Brand A. Low somatic cell count: a risk factor for subsequent clinical mastitis in a dairy herd. Journal of Dairy Science. 2000; 83:1248-1255.
16. Syridion D, Layek S, Behera K, Mohanty TK, Kumaresan A, Manimaran A *et al.* Effects of parity, season, stage of lactation and milk yield on milk somatic cell count, pH and electrical conductivity in crossbreed cows reared under subtropical climatic conditions.

Milchwissenschaft. 2012; 67:362-365.
17. Yarabbi H, Mortazavi A, Mehraban M, Sepehri N. Effect of somatic cells on the physic-chemical and microbial properties of raw milk in different seasons. International Journal of Plant, Animal and Environmental Sciences. 2014; 4(3):289-298.