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Microbiological control of raw milk obtained from Red and Black Holstein Cows in second week of postpartum period to determine cow health

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Key words: Microbiological control, Raw milk, Subclinical mastitis, Postpartum period.

Abstract

In the study, total 20 cows (10 Red and 10 Black Holstein) were used. The observed means for somatic cell counts (SCC) and total bacteria counts (TBC) of both groups were compared with the cow health standards for subclinical mastitis test (max. 200000 cells/ml for SCC and max. 1000 cells/ml for TBC) using one-sample t test. The SCC means in both Holstein groups were lower than critical thresholds for subclinical mastitis, whereas TBC means in both groups were statistically higher than critical thresholds. According to findings in our study, we can say that diagnosis of subclinical mastitis was not found according to the SCC means even if the TBC means of both groups were higher than the critical threshold. The SCC is more useful indicator for mastitis detection in raw milk than TBC. It is not reliable that TBC is the only criterion for mastitis detection in raw milk.

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Introduction

The composition and physical properties of milk are highly variable due to time postpartum period (Mc. Grath *et al*., 2016). Also, this period is so critical in terms of cow and offspring health. Therefore, it is important to know the factors affecting milk hygiene in this period.

Good hygiene in high-producing dairy herds can only be achieved when management is excellent. Milk from subclinically infected cows contains more than 1000 TBC, cells/ml (Constable *et al*., 2016) and 200.000 SCC, cells/ml (Guidry, 1985). The detect mastitis early can have a significant impact on milk production, milk quality and herd health. Subclinical mastitis affect the dairy sector and producers by reducing milk production, decreasing milk quality, and suppressing individual performance of dam. New and interesting studies on effective factors related to mastitis are important for dairy sector (Batavani *et al*., 2007).

Total bacteria counts (TBC) and somatic cell counts (SCC) are useful methods used as indicators of quality in raw milk (Costello *et al*., 2003). The dairy farms that produce milk with low SCC and TBC have automatic milking system and hygiene control mechanisms. Dairy processors should take in to account SCC and TBC of obtained milk from individual farms to enforce milk quality regulations. Therefore, it is important to know the microbiological quality of milk obtained from individual farms. The goal of this study is to present new knowledge on SCC and TBC that indicator of subclinical mastitis for Holstein cows in postpartum period.

Material and methods

Animal material

In the research, 10 Red Holstein and 10 Black Holstein cows were used.

Milk analysis

To determine somatic cell counts (SCC) and total bacteria counts (TBC), milk samples were collected individually from each cow in second week of postpartum period. Total bacteria count was determined by standard plate count.

The somatic cell counts within taken raw milk samples were detected by the standard analysis (Microscopic count) method.

Statistical analysis

The observed means for SCC and TBC of both groups were compared with the cow health standards for subclinical mastitis test (max. 200000 cells/ml for SCC and max. 1000 cells/ml for TBC) using one-sample t test (Çimen, 2015; Ntoumanis, 2005).

Results and discussion

The statistical controls on somatic cell counts and total bacteria counts are covered in subheadings.

Statistical control for SCC

Table 1 gives means and standard errors for SCC in milk obtained from different cow breeds. Milk SCC in the Red and Black Holstein cows were 68875 cells/ml and 78125 cells/ml, respectively (Table 1).

There were statistically differences between observed SCC means and reference values in both groups ($p<0.001$). The observed SCC means in Black Holstein cows (78125, cells/ml) were slightly higher than that of Red Holstein cows (68875, cells/ml). However the SCC means in both Holstein groups were lower than critical thresholds for subclinical mastitis. These values for both groups have an advantage for cow health. These findings obtained from SCC in raw milk suggest that mastitis is not present in the used animal material. According to findings from SCC in both groups, we can say that, the dairy farm is very successful in terms of announced critical thresholds.

Table 1. Statistical control of milk SCC (cells/ml) for subclinical mastitis test.

	Observed value	Reference value	Significance level (p)
Red Holstein	68875±10943	200000	0.001
Black Holstein	78125±6820	200000	0.001

Statistical control for TBC

Total bacteria counts in raw milk obtained from the Red and Black Holstein cows were 86666 cells/ml and 121667 cells/ml, respectively (Table 2).

As shown the Table 2, there were statistically differences between means of groups and reference value for TBC in both groups ($p<0.01$).

The TBC means in Black Holstein cows (121667, cells/ml) were higher than that of Red Holstein cows (86666, cells/ml). TBC means in both groups were statistically higher than critical thresholds. Therefore, we cannot say that any one group is better than the other for above mentioned parameter. The findings in Table 2 show that the hygienic performance of dairy farm is not enough in terms of announced critical thresholds. It is expressive for mastitis control when the high level of the TBC is evaluated together with the high level of the SCC. TBC alone is insufficient to explain the presence of mastitis.

Table 2. Statistical control of milk TBC (cells/ml) for subclinical mastitis test.

	Observed value	Reference value	Significance level (p)
Red Holstein	86666±16465	1000	0.003
Black Holstein	121667±28450	1000	0.008

According to findings from Wallace (2008) bacterial contamination is occur from three sources; within the udder, outside the udder, and from the surface of equipment used for milking and storage. Dam health, environment conditions, milking operations and equipment sanitation can influence the rate of bacterial contamination in raw milk (Srairi *et al.*, 2009). The somatic cell counts are more useful indicator for mastitis detection in raw milk than total bacteria counts. It is not reliable that TBC is the only criterion for mastitis detection in raw milk.

Conclusion

The Holstein cow has significant advantages in milk production; however, it unfortunately also has some disadvantages, especially regarding its high TBC means from in our findings. Observed SCC means in both Holstein groups were lower than critical thresholds for mastitis detection from raw milk. It can be said that diagnosis of subclinical mastitis was not found according to the SCC means even if the TBC means of both groups were higher than the critical threshold. In our study, Black Holstein cows have more TBC and SCC than Red Holstein cows.

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