The differences in teat-end hyperkeratosis in Holstein and Jersey dairy cows

Bobić, Tina; Mijić, Pero; Gregić, Maja; Kučević, Denis; Gantner, Vesna

Source / Izvornik: **Journal of Central European Agriculture, 2018, 19, 772 - 776**

Journal article, Published version
Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

https://doi.org/10.5513/JCEA01/19.4.2339

Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:151:719677

Short communication DOI: /10.5513/JCEA01/19.4.2339
Journal of Central European Agriculture, 2018, 19(4), p.772-776

The differences in teat-end hyperkeratosis in Holstein and Jersey dairy cows

Tina BOBIĆ[1]*, Pero MIJIĆ[1], Maja GREGIĆ[1], Denis KUČEVIĆ[2] and Vesna GANTNER[1]

[1] Josip Juraj Strossmayer University of Osijek, Faculty of Agrobiotechnical Sciences Osijek, Vladimira Preloga 1, 31000 Osijek, Croatia, *correspondence: tbobic@pfos.hr

[2] University of Novi Sad, Faculty of Agriculture, Department of Animal Science, Trg Dobriše Obradović 8, 21000 Novi Sad, Serbia

Abstract

The objective of this study was to evaluate the effect of breed (Holstein; HB/Jersey; JB) on the teat-end hyperkeratosis score (TEH) of cows housed in the same farm conditions and under the same milking management. Jersey cows had better score for the front teats, but worse for the rear teats comparing to Holstein cows. The TEH of the front teats in JB cows in third lactation were significantly ($P<0.05$) lower comparing to the same lactation group of HB cows. Regarding the rear teats of the observed cows, significantly ($P<0.05$) higher hyperkeratosis score was found in Jersey cows in first lactation comparing to Holstein cows in same lactation. The somatic cell count was found to be higher in JB comparing to the HB cows, but not significantly. The obtained results indicate that breed influence the level of the teat tissue condition.

Keywords: dairy cows, Holstein, Jersey, teat-end hyperkeratosis

Introduction

Healthy teat skin enable easier cleaning, minimises milking preparation, and finally minimises the risk of new mastitis infections. The mechanical forces during machine milking result in changes in teat-end tissue (Neijenhuis, 2004), particularly in the skin of the teat-end (hyperkeratosis) which increases the risk of new mastitis infections (Hamann et al., 1994). Somatic cell count (SCC) as the indicator of subclinical mastitis, also could be used as indicator of cows' health and milk quality (Tsenkova et al., 2001). In order to assess the effects of milking machines, milking management or environment on teat tissue as well as on the risk of new intra-mammary infections classification of bovine teat condition could be used (Reinemann et al., 2001). Furthermore, quick detection and removal of the cause of the poor teat condition will enable the reduction of the SCC and decrease of the frequency of clinical mastitis, simultaneously saving time and treatment costs (Taylor, 2006). The hyperkeratosis is related to the type of mechanical milking conditions applied to the teat and to the

length of time per day that teat cups are attached to teats (Mein et al., 2003). The objective of this study was to evaluate the effect of breed (Holstein / Jersey) on the teat-end hyperkeratosis score (TEH) of cows housed in the same farm conditions and under the same milking management.

Materials and methods

The research was conducted on the 100 dairy cows Holstein (HB, n = 60) and Jersey (JB, n = 40) breed, which were housed in the same farm conditions and milking management. Cows were milked in Westfalia herringbone parlor, with pulsation ratio 60:40, vacuum level 45-47 kPa, and automatic clusters removing when milk flow <200 g/min. The cows, depending of the parity, were divided into three groups: first, second and third and higher lactation. The evaluation of the teat-end hyperkeratosis score (TEH), was performed few days before regular milk recording. The hyperkeratosis evaluation was performed for each cow's teat, for front, left or right (HFL, HFR), as well as for rear, left or right (HRL, HRR) in the first 10 seconds after removal of the cluster. In accordance to Mein et al. (2003) and Bobić et al. (2018) cows without callous (keratin ring) had score 1, while those with formed and clearly visible callous had score 2. Furthermore, the cows that had rough callous with hyperkeratosis had score 3, while cows with very rough hyperkeratosis and radial cracking had score 4. Also, the somatic cell count on log scale (SCClog) determined in regular milk recording were analysed. The effect of breed (Holstein / Jersey) on the teat-end hyperkeratosis score (TEH) in regard to the parity group was tested by least square analyses of variance using the PROC GLM procedure in SAS (SAS Institute Inc., 2000). The significance of the differences between the breeds was tested by Fisher test.

Results

Very good score (score 1 and 2) of the TEH in interval between 70 to 86% were determined in both breeds. Furthermore, JB cows had better score for the front teats (86%; 81%, Figure 1a and 1b), but worse for the rear teats (70%; 81%, Figure 1b and 2a) comparing to HB cows.

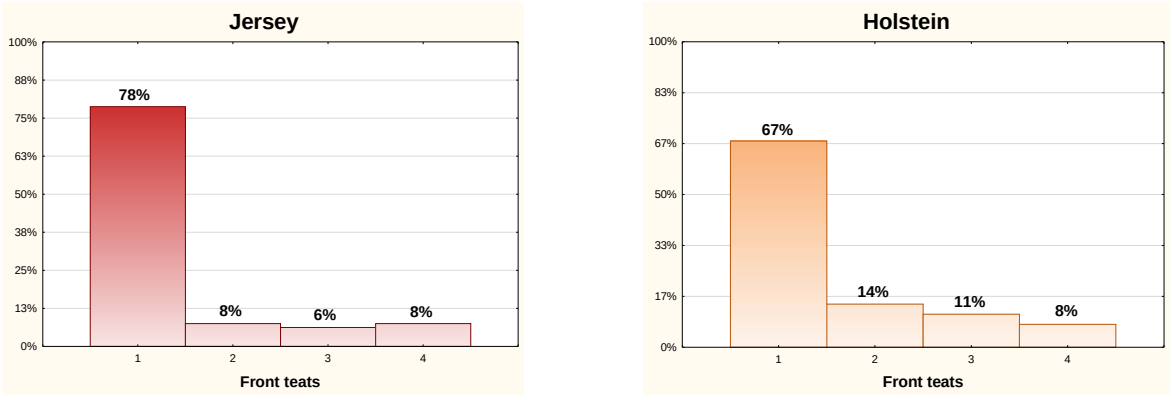

Figure 1a, 1b. Distribution of the teat-end hyperkeratosis score for the front teats of Jersey and Holstein cows

However, if watching at the overall percentage of both front and rear teats together, Holstein cows had a better teat condition (Figure 1a, 1b, 2a and 2b). HB cows had 63% with good and 37% with poor condition, while JB cows had 58% and 42%, respectively.

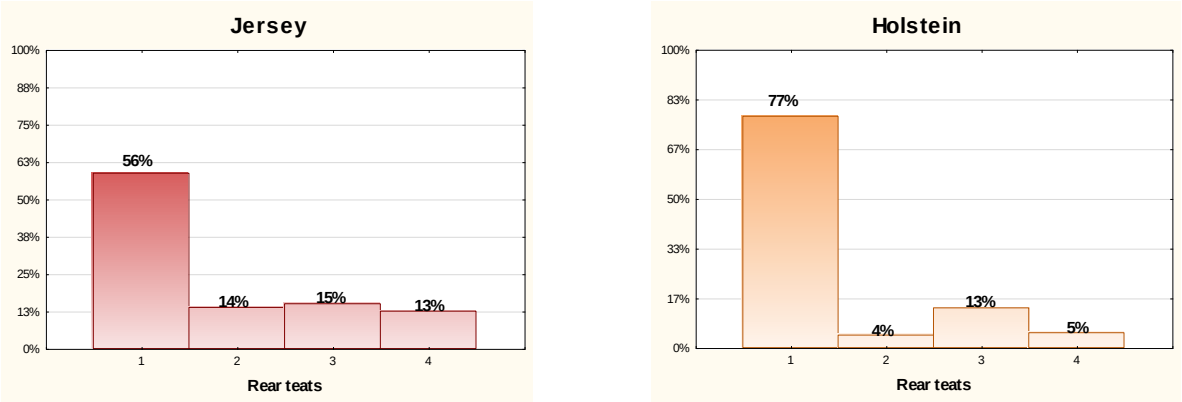

Figure 2a, 2b. Distribution of the teat-end hyperkeratosis scores for the rear teats of Jersey and Holstein cows

Regarding the lactation group, a significant (P<0.05) difference was found between the breeds (Table 1). The TEH of the front left and right teats in JB cows in third lactation were significantly (P<0.05) lower comparing to the same lactation group of HB cows. Regarding the rear left teats of the observed cows, significantly (P<0.05) higher hyperkeratosis score was found in Jersey cows in first lactation comparing to Holstein cows in same lactation.

Table 1. Least square means (LSM) of teat-end hyperkeratosis score and somatic cell count regarding the parity group

Trait	Jersey (JB)			Holstein (HB)		
	1	2	≥3	1	2	≥3
HFL	1.6	1.6	1.19^{*a}	1.2	1.6	2^{*b}
HRL	2.2^{*a}	1.5	1.71	1.2^{*b}	1.55	1.89
HFR	1.2	1.8	1.29^{*a}	1.48	1.75	2.22^{*b}
HRR	1.8	2^{*a}	1.67^{*ac}	1.08^{*b}	1.5	2.22
SCClog	3.35	2.42	3.01	2.2	2.99	2.39

1 – first lactation; 2 – second lactation; ≥3 – third and later lactations; HFL – teat-end hyperkeratosis score for front left teat; HRL – teat-end hyperkeratosis score for rear left teat; HFR – teat-end hyperkeratosis score for front right teat; HRR – teat-end hyperkeratosis score for rear right teat; SCClog – somatic cell count on log scale; *P<0.05; ^{abc} values marked with different letter are significant.

The JB cows in second and third parity had significantly (P<0.05) higher TEH on the HRR, comparing to TEH of the HRR in first parity in HB cows. The somatic cell count in first and third and later lactations was found to be higher in JB compering to the HB cows, but not significantly. Contrariwise, a lower amount of SCClog was determined in second parity for the Jersey cows comparing to the Holsteins.

Discussion

For quality milking, cows need to be milked: fast, cleanly, gently and completely. Milking machine (liner and the vacuum), milking management (machine-on time) and the dairy cows factors such as teat-end shape effect the level of hyperkeratosis. Furthermore, it is necessary to adapt the cows to the milking machines but also the milking machines to the cows. Compering results of TEH from Simmental and Holstein breed (1.33, 1.79., 1.89) in Bobić et al. (2018) the cows in this research had worst conditions for all teats together in all parity's, especially for JB cows in first parity (JB = 2.03, 1.86, 1.77; HB = 1.43, 1.88, 2.14) which indicate that there is a possibility of unadjusted milking machines to the size and shape of a teats of the Jersey cows. Gleeson et al. (2004) and Haghkhah et al. (2011) concluded that there is a significant correlation between the teat condition and somatic cell counts. Furthermore, de Pinho et al. (2012) concluded that increasing teat-end callosity thickness or teat-end callosity roughness increases the incidence risk of clinical mastitis. The Jersey cows had a more teats with score 3 and 4 (with bad teat condition) and a higher value of SCClog. Results of this study support previous, above-mentioned research, and indicate that there is a possibility of unadjusted milking machines to the size and shape of teats of the Jersey cows. Which is consistent with the research of Guarín et al. (2017), who determined an interactions of teat apex diameter and quarter position (front or rear) with quarter SCC, and tendency for narrower teat barrels to be associated with increased quarter SCC.

Conclusions

Despite the same conditions and the milking management on the farm, the significant differences between breeds in teat tissue conditions were found. Cows of Jersey breed had worst teat-end hyperkeratosis score compering to cows of Holstein breed. These results could be due to possibly unadjusted milking machines to Jersey cows. Therefore, further research should be directed to measuring the morphological characteristics of cows' udders of both breeds, which would probably provide a greater breadth of information.

References

Bobić, T., Mijić, P., Gregić, M., Gantner, V. (2018) The differences in milkability, milk, and health traits in dairy cattle due to parity. Mljekarstvo, 68 (1), 57-63. DOI: https://dx.doi.org/10.15567/mljekarstvo.2018.0107

de Pinho, M. M., Nóbrega, D. B., Faccioli, P. Y., Troncarelli, M. Z., Menozzi, B. D., Langoni, H. (2012) Relationship between teat-end condition, udder cleanliness and bovine subclinical mastitis. Research in Veterinary Science, 93, 430-434. DOI: https://dx.doi.org/10.1016/j.rvsc.2011.05.010

Gleeson, D. E., Meaney, W. J., O'Callaghan, E. J., Rath, M. V. (2004) Effect of teat hyperkeratosis on somatic cell counts of dairy cows. The International Journal of Applied Research in Veterinary Medicine, 2 (2), 115-122.

Guarín, J. F., Paixão, M. G., Ruegg, P. L. (2017) Association of anatomical characteristics of teats with quarter-level somatic cell count. Journal of Dairy Science, 100 (1), 643-652. DOI: https://dx.doi.org/10.3168/jds.2016-11459

Haghkhah, M., Ahmadi, M. R., Gheisari, H. R., Kadivar, A. (2011) Preliminary bacterial study on subclinical mastitis and teat condition in dairy herd around Shiraz. Turkish Journal of Veterinary and Animal Sciences, 35 (1), 1-8.

Hamann, J., Burvenich, C., Mayntz, M., Osteras, O., Halder, W. (1994) Machine-induced changes in the status of the bovine teat tissue with respect to new infection risk. IDF Bulletin, 297.

Mein, G. A., Williams, D. M. D., Reinemann, D. J. (2003) Effects of milking on teat-end hyperkeratosis: 1. Mechanical forces applied by the teatcup liner and responses of the teat. In: 42nd annual meeting of the National Mastitis Council, Fort Worth Texas, USA, January 26-29, 125-134.

Neijenhuis, F. (2004) Teat condition in dairy cows. Dissertation. Wageningen: Utrecht University, Faculty of Veterinary Medicine.

Reinemann, D. J., Rasmussen, M. D., Le Mire, S., Neijenhuis, F., Mein, G. A., Hillerton, J. E., Morgan, W. F., Timms, L., Cook, N., Farnsworth, R., Baines, J. R., Hemling, T. (2001) Evaluation of bovine teat condition in commercial dairy herds: 3. Getting the numbers right. In: Proceedings of the 2nd International Symposium on Mastitis and Milk Quality, NMC/AABP, Vancouver. Verona: NMC, 357-361.

SAS Institute Inc. (2000) SAS User's guide. Version 8.2. Cary, NC: SAS Institute Inc.

Taylor, V. (2006) Dairy cow teat condition scoring. Milk quality assurance program Lead/OMAFRA. Ministry of agriculture food and rural affairs Factsheet, 6-19.

Tsenkova, R., Atanassova, S., Kawano, S., Toyoda, K. (2001) Somatic cell count determination in cow's milk by near-infrared spectroscopy: a new diagnostic tool. Journal of Animal Science, 79 (10), 2550-2557.