

Influences of Switch Trimming on Cleanliness and Udder Health in Dairy Cattle

Research Article

A. Bahari^{1*}, P. Zamani², H. Mohammadi³ and M. Yavari¹¹ Department of Clinical Science, Faculty of Veterinary Science, Bu Ali Sina University, Hamedan, Iran² Department of Animal Science, Faculty of Agriculture, Bu Ali Sina University, Hamedan, Iran³ Milk and Livestock Company, Kermanshah, Kangavar, Iran

Received on: 5 Jul 2014

Revised on: 11 Sep 2014

Accepted on: 15 Oct 2014

Online Published on: Sep 2015

*Correspondence E-mail: aliasghar.bahari@basu.ac.ir

© 2010 Copyright by Islamic Azad University, Rasht Branch, Rasht, Iran

Online version is available on: www.ijas.ir

ABSTRACT

The periodic trimming of the long hairs growing at the distal end of the tail -switch trimming- is humane alternative of tail docking. The purpose of this study was to determine the influence of switch trimming on somatic cell count (SCC), California mastitis test (CMT) and udder cleanliness of lactating cows in a free-stall dairy farm. In the present study, 219 healthy, pregnant Holstein cows were enrolled. All cows were randomly allocated to either trimmed (T) (n=107) or control (C) groups (n=112) prior to entering the calving pen. The long hair in the tail switch of the cows enrolled in group T was removed completely by a hair clipper machine, while the tail hair of the animals enrolled in group C remained intact. After two months, all studied cows were evaluated for udder cleanliness and health. Udder cleanliness scores (UCS) were significantly associated with switch trimming of the tail ($P=0.0129$). Both trimmed and control cows showed significant difference in UCS of 2 and 3 ($P\leq 0.05$), though the difference in other UCS was not significant. No significant difference ($P=0.41$) in SCC between groups was identified. Comparing the CMT scores of front, rear, or all udder quarters showed that the frequency of a CMT score of 0 in group T was significantly higher than in group C ($P\leq 0.05$). Reversely, the frequencies of Trace and 2 scores of CMT for rear and all udder quarters in the control group were significantly higher than the group T ($P<0.05$). The results of this study show that switch trimming may be suggested to improve cleanliness and udder health of dairy cows in free-stall housing systems.

KEY WORDS cleanliness, cow, switch trimming, udder health.

INTRODUCTION

Mastitis is the most frequent and costly dairy cattle disease, and may be related to production losses due to subclinical mastitis on dairy farms. Mastitis based on the reservoir and most common route of transmission of pathogens is generally categorized as either contagious or environmental. The major reservoir for contagious pathogens is the udder of infected cows, and the reservoirs for environmental pathogens are water, manure, and dirt present in the environment (Hamann, 1991). Udder cleanliness is speculated to influ-

ence the quantity and type of bacteria present on teat surfaces (Eicher and Dailey, 2002). Cows are often contaminated with environmental mastitis pathogens in their housing areas or walkways. In wet and dirty conditions, large numbers of environmental mastitis pathogens have the opportunity to infect the udder. The exposure of the udder quarters to these pathogens may occur at any time (Zadoks *et al.* 2001). In typical indoor housing systems, the tail often becomes contaminated with feces and urine and it can then spread pathogens across the cow's body, including her udder and teat ends, as well as to her herd mates and even

to workers (Tucker *et al.* 2001). On the other hand, it could be hypothesized that udder health and milk quality may improve through reduced contact with the contaminated tail.

In many countries, dairy farmers have begun tail-docking their animals in an attempt to increase the workers' comfort and to reduce the risk of mastitis on their farms. However, several experiments have failed to show such benefits and most importantly found no effect on udder health and mastitis (Eicher *et al.* 2001; Tucker *et al.* 2001; Schreiner and Ruegg, 2002). Moreover, the normal functions of the tail have advantages for cows and their caretakers and the natural benefits of having a tail may be lost with its removal. For these reasons, tail docking is prohibited in many countries.

A common alternative to tail docking in dairy cows is switch trimming (the periodic trimming of the long hairs growing at the distal end of the tail) (Weary *et al.* 2011; The Humane Society of the United States, 2012). Matthews *et al.* (1995) reported no significant differences between somatic cell counts (SCC), frequency of mastitis, or milk yield among dairy heifers with switch trimmed, docked, or intact tails that were kept in pasture. There is no information available on the effects of switch trimming in indoor systems. Therefore, the aim of this study was to determine the influences of switch trimming on SCC, California mastitis test (CMT) and udder cleanliness scores (UCS) of lactating dairy cows in a free-stall farm.

MATERIALS AND METHODS

The present study was conducted on a large dairy farm (n=2500) in the west of Iran. In total, 219 healthy, pregnant multiparous (n=169) and primiparous (n=50) Holstein cows with no clinical mastitis in previous lactation period were enrolled. They were housed as a single group in a free-stall barn and were milked in a parallel herringbone parlor. A flush system was used to clean the barn, and bedding was replaced once a week. All cows were randomly allocated to either trimmed (T; n=107, mean of parity=2.45) or control (C; n=112, mean of parity=2.30) groups prior to entering the calving pen.

The long hair at the end of the tail on cows enrolled in group T were removed completely by a hair clipper machine (Delta 3, Heiniger, Austria), while the tails of animals enrolled in group C were left intact. Furthermore, the udder, tail and hindquarters of all enrolled cows were washed, cleaned and thoroughly dried.

At the end of the second month of study, all enrolled cows were evaluated for udder cleanliness and health. Udder health was assessed by the number of cows that developed subclinical mastitis as diagnosed by CMT and SCC tests (Tucker *et al.* 2001). CMT test was performed on each

udder quarter of the enrolled cows before milking (ProfilacReagent N, WestfaliaSurge, Germany GmbH). The CMT results were interpreted as negative 0+ (homogenous mixture of milk and reagent) or Trace (slight thickening of the mixture), 1+ (distinct thickening but no gel formation), 2+ (immediate thickening of the mixture with a slight gel formation) and 3+ (gel is formed and the surface of the mixture becomes elevated). Milk samples were collected aseptically from the quarters and submitted to the laboratory on ice for somatic cell counting. SCC data for each sample was determined automatically by fluoro-optoelectronic method (Fossomatic; Foss Electric, 3400 Hillerød, Denmark).

Udder cleanliness was scored by an observer in the parlor during the collection of the milk samples using a method previously described by Schreiner and Ruegg (2002). According to this method, a subjective score numbered 1, 2, 3 or 4 was given to each udder based upon the following criteria: 1) completely free of dirt or has very little dirt; 2) slightly dirty; 3) mostly covered in dirt or 4) completely covered and caked with dirt, respectively.

Statistical analysis

Essential assumptions for parametric analysis, including normality of residuals and homogeneity of variances, were tested using Shapiro-Wilk and Levene tests, respectively. The data and their transformations, e.g. square roots, logarithms and inverses, did not meet the essential assumptions for analysis of variance including normality and homogeneity of variances. Therefore, all traits were analyzed by a chi-square test. PROC UNIVARIATE and PROC FREQ of SAS 9.1 (SAS, 2004) were used for Shapiro-Wilk and Levene tests and chi-square test, respectively.

RESULTS AND DISCUSSION

The average of milk yield (\pm SD) for switch trimmed and control animals were 32.5 (6.9) kg and 36.5 (7.7) kg/day, respectively, which their mean and standard deviations are near to the range reported by Farhangfar and Naemipour (2007) and Khaleghi *et al.* (2013). The mean (\pm SD) of UCS for groups T and C was 1.94 (0.83) and 2.18 (0.09), respectively. The distribution of hygiene scores was 29.9 and 27.7% (score 1); 53.3 and 37.5% (score 2); 9.3 and 24.1% (score 3); and 7.5 and 10.7% (score 4) for groups T and C, respectively. The UCS was significantly associated with the switch trimming of the tail ($P=0.0129$). The cows in groups T and C showed a significant difference in the UCS of 2 and 3 ($P\leq 0.05$), though the difference in other UCS was not significant (Figure 1).

As observed in Figure 2, no significant differences ($P=0.4155$) in somatic cell counts between groups were identified. The frequency of CMT score of 0 in group T

was significantly higher in comparison with the front, rear or all udder quarters than in group C ($P \leq 0.05$). Conversely, group C had a higher frequency of CMT score Trace and 2 in the rear and all udder quarters than group T ($P < 0.05$) (Table 1).

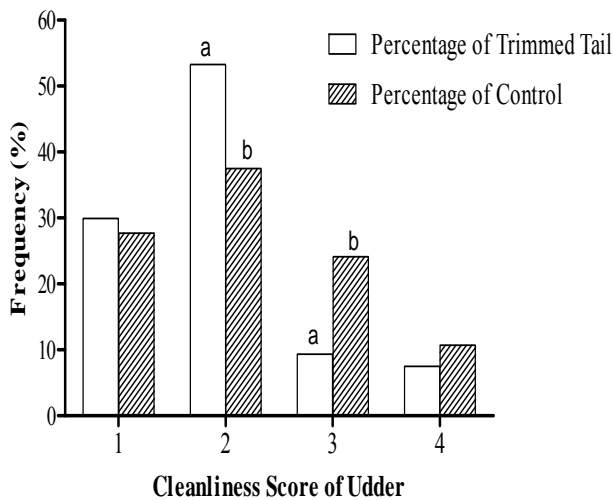


Figure 1 The effect of switch trimming on cleanliness score of udders in lactating dairy cows ($P=0.0129$)

* Bars with different letters in columns of each score are significantly different ($P < 0.05$)

Subjective score numbered 1, 2, 3 or 4 of each udder: 1) completely free of dirt or has very little dirt; 2) slightly dirty; 3) mostly covered in dirt or 4) completely covered and caked with dirt, respectively

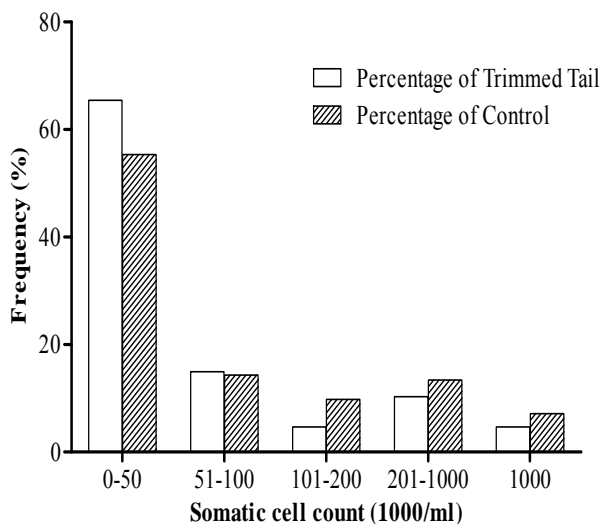


Figure 2 The effect of switch trimming on somatic cell counts in lactating dairy cows ($P=0.4155$)

In the present experiment, switch trimming provided cleanliness and udder health benefits to the observed dairy cattle (Figure 1). The significant difference of UCS between trimmed and control groups in this study ($P=0.0129$)

indicates that the tail with hair may be an influencing factor in contamination of the udder and teat skin in lactating dairy cows. However, many studies which have been done following the elimination of the tail conclude that cow cleanliness is not strongly affected by tail docking (Eicher *et al.* 2001; Tucker *et al.* 2001; Schreiner and Ruegg, 2002).

According to the SCC results, udder health was not significantly different between switch trimmed and untrimmed animals ($P=0.1952$). Moreover, a considerable correlation has not been found between the SCC and UCS in groups T and C ($r=0.26$ vs. $r=0.28$, respectively). The above results agree with a report by Matthews *et al.* (1995) which did not find any difference between the cleanliness and somatic cell counts of cows with intact, trimmed, or docked tails in pasture conditions. The results of this study show that the percentage of the CMT scores of cows in group T is lower than that of group C (Table 1). The total CMT score showed a more positive correlation with the UCS scores of group T when compared with group C ($r=0.34$ vs. $r=0.21$, respectively). The result is in agreement to Sergant *et al.* (2001) which reported that CMT could have a useful role in dairy herd monitoring programs as a screening test to detect fresh cows with intramammary infection (IMI) caused by major pathogens. However, there is no report for a relationship of IMI and cow cleanliness scores, though Reneau *et al.* (2003) noted that the SCC of cows with cleaner udders and hindlimbs was lower than the SCC of cows with dirtier udders and hindlimbs. Tail hair that becomes contaminated with manure may cross-contaminate the body and udder of the cow (Johnson, 1992).

The rear quarters have been shown to have higher rates of IMI and the presence of intact tails has been considered to be a potential causative factor (McCorry, 1976). The practice of tail docking in dairy cattle, or amputating half or more of the cow's tail, first became a routine practice among dairy farmers in New Zealand to minimize the spread of leptospirosis to milking staff via an infected cow soaking her tail's switch in her urine and spraying the workers (Barnett *et al.* 1999). It has been shown that tail docking in cows with the exception of cases of traumatic injury to the tail, has negative impact on animal welfare because partially amputating the tail reduces the animals' ability to switch away biting insects (The Humane Society of the United States, 2012). Moreover, the removal of the cow's tail was claimed to promote greater udder cleanliness, therefore improving milk quality and hygiene, and at the same time providing increased comfort for the farm workers (Stull *et al.* 2002). However, several experiments have failed to show such benefits, and most importantly found no effect on udder health and mastitis (Eicher *et al.* 2001; Tucker *et al.* 2001; Schreiner and Ruegg, 2002).

Table 1 Frequency of California mastitis test (CMT) score of switch trimmed and control lactating dairy cows

Teats	CMT score (%)									
	0		Trace		1		2		3	
	T	C	T	C	T	C	T	C	T	C
Fronts	87.38 ^a	75.78 ^b	7.48	11.21	3.74	7.18	0.93 ^a	5.38 ^b	0.47	0.45
Rears	89.25 ^a	79.09 ^b	5.14 ^a	10.91 ^b	3.74	5.45	1.87	4.55	0.00	0.00
All	88.32 ^a	77.43 ^b	6.31 ^a	11.06 ^b	3.74	6.32	1.40 ^a	4.97 ^b	0.23	0.23

T: trimmed group and C: control group.

The means within the same row with at least one common letter, do not have significant difference ($P>0.05$).

In addition, the tail may play a primary physiologic or behavioral role or may be integrated with mechanisms to contribute to a systemic function (Stull *et al.* 2002). The tail functions as a visual form of communication between herd mates and it is also recognized as a communication tool by caretakers (Albright and Arave, 1997). Cutaneous irritation by biting insects can evoke lateral movements of the tail in a swishing or flicking motion (Matthews *et al.* 1995, Phipps *et al.* 1995).

Cows can use their tails to control flies and previous studies have found more flies on the hind ends of docked animals and more fly removal behaviors, such as tail flicking and leg stamping (Wilson, 1972; Matthews *et al.* 1995; Phipps *et al.* 1995). The normal functions of the tail have advantages for cows and their caretakers, and the natural benefits of having a tail may be lost with its removal. Therefore, tail docking may also involve disadvantages to the cow, including pain associated with the procedure and permanent lack of use of the tail to perform its normal functions.

Switch trimming is an effective and humane alternative to tail docking in dairy cows (University of California Cooperative Extension, 1998). In Australia, 60% of the surveyed producers trimmed tail switches a mean of 1.6 times per year (range, 1 to 6 times per year) (Barnett *et al.* 1999).

In New Zealand, producers that did not dock believed they could adequately maintain cleanliness by switch trimming 2 to 3 times per year (Loveridge *et al.* 1996; Stull *et al.* 2002).

Results of our study showed that UCS and CMT were significantly associated with the switch trimming of the tail, though SCC was not significantly different between the groups.

However, Matthews *et al.* (1995) did not find any difference between the cleanliness and somatic cell counts of cows with intact, trimmed, or docked tails in pasture conditions. The study also showed that the proportion of flies on the rear quarters of trimmed cows was intermediate between that of cows with complete and docked tails. These authors noted, however, that the small sample size resulted in low statistical power and limited their ability to detect differences that may have existed among study groups.

CONCLUSION

According to the results of this experiment, it may be suggested to adopt switch trimming for cleanliness and udder health of dairy cows in free-stall housing systems, but further investigations using the assessment of milk quality parameters may strengthen and improve the approach. However, because of the high fly densities in most dairy farms, especially during the warmer months, it seems that for the cows' comfort, a compromise might be achieved by trimming the switch when the tail is more likely to be dirty and allowing it to grow back over the summer, when fly numbers are the highest.

ACKNOWLEDGEMENT

The authors thank the herd managers of Kangavar Milk and Livestock Company involved in this study for their cooperation.

REFERENCES

- Albright J.L. and Arave C.W. (1997). The Behaviour of Cattle. CAB International, New York.
- Barnett J.L., Coleman G.J. and Hemsworth P.H., Newman E.A., Fewings Hall S. and Ziini C. (1999). Tail docking and beliefs about the practice in the Victorian dairy industry. *Australian Vet. J.* **77**(11), 742-747.
- Eicher S.D. and Dailey J.W. (2002). Indicators of acute pain and fly avoidance behaviors in Holstein calves following tail-docking. *J. Dairy Sci.* **85**(11), 2850-2858.
- Eicher S.D., Morrow-Tesch J.L., Albright J.L. and Williams R.E. (2001). Tail-docking alters fly numbers, flyavoidance behaviors and cleanliness, but not physiological measures. *J. Dairy Sci.* **84**(8), 1822-1828.
- Farhangfar H. and Naeemipour H. (2007). Phenotypic study of lactation curve in Iranian Holsteins. *J. Agric. Sci. Technol.* **9**, 279-286.
- Hamann J. (1991). Milking hygiene, milking and mastitis. *Dairy Food Environ. San.* **11**, 260-264.
- Johnson A.P. (1992). Mastitis control without a slap in the face. Pp. 146 in Proc. 24th Ann. Conv. Am. Assoc. Bov. Prac., Orlando, FL.
- Khaleghi M.H., Zerehdaran S., Hassani S., Farhangfar H. and Eghbal A.R. (2013). Genetic analysis of milk production trait

- using test day model with fixed and random regressions in Holstein dairy cows of Yazd province. *J. Rumin Res.* **1(1)**, 13-30.
- Matthews L.R., Phipps R.A. and Verkerk D. (1995). The effects of taildocking and trimming on milker comfort and dairy cattle health, welfare and production. *Anim. Beh. Welf. Res. Cent.* 1-25.
- McCrary J. (1976). Do cows' tails help to cause mastitis? *J. Agric.* **74**, 341.
- Phipps A.M., Mathews L.R. and Verkerk G.A. (1995). Tail docked dairy cattle: fly induced behaviour and adrenal responsiveness to ACTH. *Proc. NZ. Soc. Anim. Prod.* **55**, 61-63.
- Reneau J.K., Saylor A.J., Heinz B.J., Bye R.F. and Farnsworth R.J. (2003). Relationship of cow hygiene scores and SCC. *Proc. Natl. Mastitis Count.* **42**, 362-363.
- SAS Institute. (2004). SAS[®]/STAT Software, Release 9.1. SAS Institute, Inc., Cary, NC, USA.
- Schreiner D.A. and Ruegg P.L. (2002). Effects of tail docking on milk quality and cow cleanliness. *J. Dairy Sci.* **85(10)**, 2503-2511.
- Sargeant J.M., Leslie K.E., Shirley J.E., Pulkrabek B.J. and Lim G.H. (2001). Sensitivity and specificity of somatic cell count and California mastitis test for identifying intramammary infection in early lactation. *J. Dairy Sci.* **84(9)**, 2018-2024.
- Stull C.L., Payne M.A., Berry S.L. and Hullinger P.J. (2002). Evaluation of the scientific justification for tail docking in dairy cattle. *J. Am. Vet. Med. Assoc.* **220(9)**, 1298-1303.
- The Humane Society of the United States. (2012). "An HSUS Report: Welfare Issues with Tail Docking of Cows in the Dairy Industry". HSUS Reports: Farm Industry Impacts on Animals. Paper 19, Available at: http://animalstudiesrepository.org/hsus_reps_impacts_on_animals/19.
- Tucker C.B., Fraser D. and Weary D.M. (2001). Tail docking dairy cattle: effects on cow cleanliness and udder health. *J. Dairy Sci.* **84(1)**, 84-87.
- University of California Cooperative Extension. (1998). Dairy care practices. Available in: <http://www.dairyweb.ca/Resources/USWebDocs/Welfare2.pdf>.
- Weary D.M., Schuppli C.A. and von Keyse M.A.G. (2011). Tail docking dairy cattle: responses from an online engagement. *J. Anim. Sci.* **89(11)**, 3831-3837.
- Wilson G.D.A. (1972). Docking cows' tails. Pp. 158-165 in Proc. Ruakura Farm. Conf., Ruakura, New Zealand.
- Zadoks R.N., Allore H.G., Barkema H.W., Sampimon O.C., Wellenberg G.J., Grohn Y.T. and Schukken Y.H. (2001). Cow and quarter level risk factors for *Streptococcus uberis* and *Staphylococcus aureus* mastitis. *J. Dairy Sci.* **84**, 2649-2663.