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Effects of swinging cow brush on milk production and mastitis

by Ynte H. Schukken
Quality Milk Production Services, Cornell University, Ithaca, NY
and G. Douglas Young
Sprucehaven Farm and Research Center, Scipio Springs, NY

To optimize health and maximize production, cows need to live and act like cows. Grooming is one behavior they seek to perform. In all different types of housing situations they can be seen rubbing their faces and sides on barn walls, water troughs, or low hanging branches. Grooming is a behavior that appears to promote cow health, calm, comfort, and overall performance.

In the last 20 years numerous companies have developed large mechanical brush systems to promote grooming activity that does not result in inadvertent accidents or abnormal wear and tear of the facilities. One of these is shown in Figure 1. The brush, which resembles something from a car wash, is hung so that when the cow starts to rub against it, it begins to rotate. Figure 2 shows a cow using the brush. A short video of a cow using a mechanical brush system can be seen at http://www.youtube.com/watch?v=VpjCQD8ynZE

DeVries and colleagues in British Columbia studied how mechanical brushes affect the grooming behavior of group-housed dairy cows. (DeVries et al., 2007) Researchers split a 72-cow herd into groups; each spent time during a control period without a brush, and an experimental period with it. Using video surveillance cameras researchers evaluated each animal's behavior.

During the control period cows scratched themselves mostly on walls and water bowls. Each animal groomed herself an average of three times a day for a total of about one and a half minutes.

Within the first day of access to the mechanical brush more than half the cows were using it. After a week most of the cows were getting themselves brushed. Each cow averaged almost seven minutes a day using the device. Total scratching time for cows when they had access to the mechanical brush was more than six times greater than when they were without it, and the number of times they groomed themselves more than tripled.

Figure 2: Swinging cow brush being used by cows.

Introducing a mechanical brush to the pen not only increased the time and frequency of grooming, but also changed the parts of their bodies the cows scratched. Head scratching accounted for 86 percent of the total, with neck and thigh at 11 and three percent, respectively, during the control period. When the mechanical brush was available the proportions changed. Although the head remained the main target

Figure 1: Swinging cow brush installed.

63 percent of the time, cows used the brush to scratch hard-to-reach places like their backs and tails 10 and nine per cent of the time, respectively.

The authors concluded that a grooming device helps to satisfy the animals' need for grooming, while at the same time improving their cleanliness. Both factors (better 'welfare' and cleaner cows) may also have a measurable impact on disease occurrence and milk production.

Although the intuitive concept of the swinging cow brush being associated with better productivity and increased health may be straightforward, no hard data exist to quantify this potential relationship. Therefore, we designed a comparison study of cows that were allowed to use a cow brush. The objective of the pilot study was to compare daily milk production and animal health in pens of cows both with and without access to a swinging cow brush on one New York dairy.

Study design

The study took place on a well-managed 1,800-cow dairy in New York. Four pens of approximately 100 cows per pen were enrolled. Cow brushes (DeLaval Swinging Cow Brush) were installed in two of the four pens. The remaining two pens served as matched controls. Data on daily milk production, somatic cell count, clinical mastitis incidence, and metabolic diseases were collected in all four pens.

Daily milk weights were made available for three months before brushes were installed, and were collected in both brush and control pens for six months afterward. Data for calving, pen movement, and disease were collected in the on-farm computer system (DairyComp 305). Clinical mastitis cases were sampled and results were available through Quality Milk Production Services. Statistical analysis of data was done using conventional statistical techniques for daily milk production and disease incidence. Statistical models (Generalized Linear Mixed Models) were developed to allow for repeated observations.

Results

As soon as the cow brushes were installed, cows in both pens started using the brushes intensively. Statistical analysis of the data was done separately for first lactation, second lactation cows and older cows as the shape of the lactation curve is quite different between these three groups. A total of 88,567 daily milk weights from 1,217 cows were available for analysis.

One important observation: in none of the three lactation groups was an overall difference between the cow brush and control pen observed before the study started. Hence, the pens were comparable in terms of starting production levels.

Switching on the cow brush resulted in a significant daily milk production change in lactation 2 cows, but not in first lactation or older lactation cows (Figure 3). For second lactation cows a difference of approximately 3.5% (1 kg) of milk per day is present between cow brush and control animals. The difference was smaller immediately after go-live of the cow brushes, but became larger and significant after a few months of use of the cow brush. (Figure 3).

Clinical mastitis and culture results

For second and higher lactation cows mastitis rate in the cow brush and control pen was, respectively, 1.77 per 1,000 cow-days at risk and 2.68 per 1,000 cow days at risk. This difference was statistically significant (P<.05). When the data were further subdivided for cows in lactation 2 and lactation 3+ it became clear that the biggest difference in clinical mastitis incidence was observed in lactation 3+.

After the start of the cow brush, 39 clinical mastitis cases were observed in cows in lactation 3+ in the control pen, while in the cow brush pen 24 cases were observed in lactation 3+ cows. In lactation 2 cows the number of mastitis cases were 19 and 12 in the control and cow brush pen, respectively.

The main causes of mastitis in the two pens were Coagulase Negative Staphylococci (CNS) and Streptococcus species (Strep spp.). No difference in relative importance of the organisms was present between the cow brush and control pens.

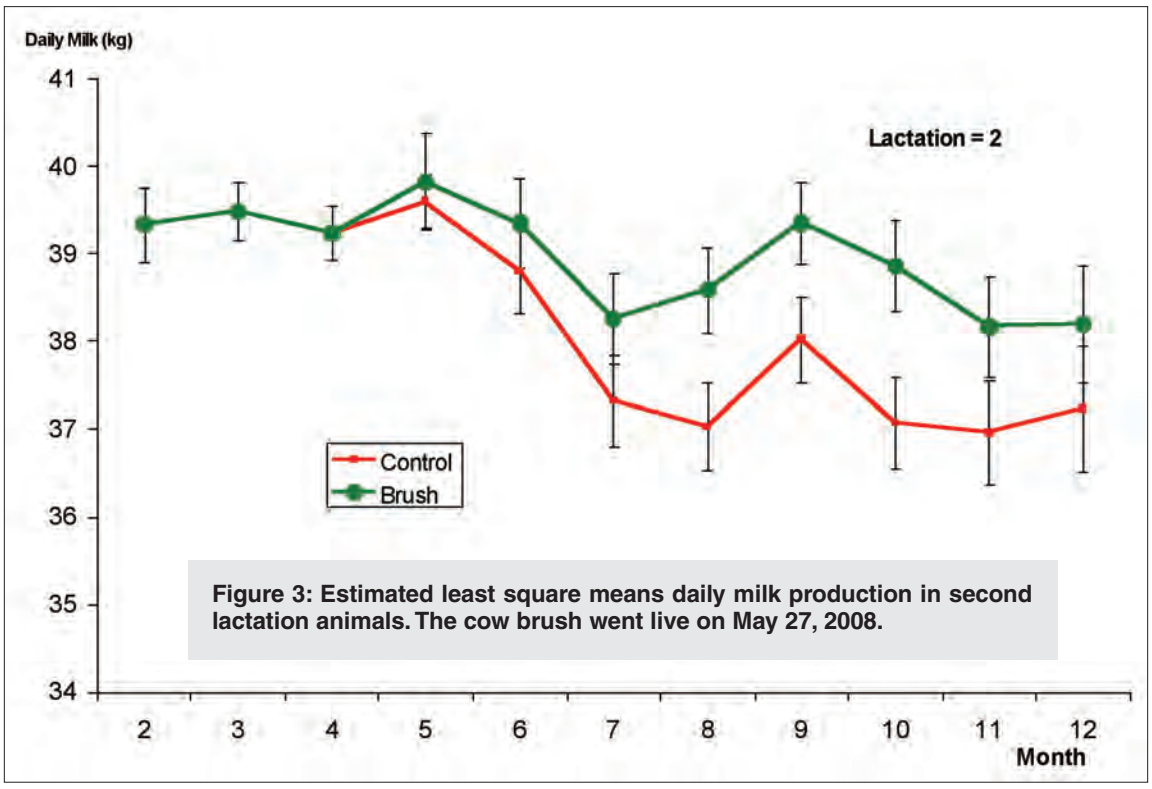

Figure 3: Estimated least square means daily milk production in second lactation animals. The cow brush went live on May 27, 2008.

Discussion

In our field study cows adapted well to the cow brushes and utilized them frequently. Farm workers noticed the eagerness of cows to use the brushes. Daily milk production for second lactation animals showed a significant and increasing difference as time passed after installation of cow brushes. At approximately six months after installation the difference stabilized at approximately 1 kg higher production (3.5%) for cows experiencing the cow brush (Figure 3). This difference was not observed in the other two lactation groups.

It is not clear why one lactation group of cows would show an effect due to the cow brush, while other groups would not. While evaluating the behavior of cows with access to a mechanical brush, DeVries et al. (2007) did not report on differences between parity groups in the use of the mechanical brush.

It may be hypothesized that cows which are more active and walk to use the cow brush are also inclined to visit the feedbunk while active. Cows being more active would also utilize ketones more efficiently and may experience less reduction in feed intake due to high ketone concentration in serum. This would lead to a potential increase in daily milk yield. No obvious reason is present why this would differentially affect cows in different lactation groups.

Clinical mastitis data in second and higher lactation cows showed a clear and significant difference in mastitis incidence as soon as the cow brushes were installed. The difference increased with increasing lactation number. We can only speculate to the reasons for decreased mastitis cases in pens with cow brushes. The initial hypothesis is that cows that are more active and walk more are lying a shorter period of time in stalls, thereby exposing themselves less to bacteria on the stall surface.

Also, grooming behavior of cows may lead to overall cleaner skin in animals with access to the cow brush. Although the mammary gland itself will not be groomed when using the cow brush, the tail and hind areas will be groomed and may result in a lower exposure of the mammary gland due to general reduction of dirt on the cow.

No mastitis difference was observed in the two pens with first lactation animals. The incidence of mastitis in both was very low and the ability of this study to identify differences in clinical mastitis between the two first lactation cow pens was very small. It is important to realize that this study was based on two pens with and two pens without a cow brush. The observed differences were real for these pens, but may be different under different farm situations.

Summary

In summary, installation of the cow brush resulted in an immediate increase in cow grooming behavior. It resulted in either no difference in daily milk production (in lactation 1 and 3+), or in an approximate 1 kg higher daily milk production in lactation 2 cows. Clinical mastitis was lower in pens of cows in second and higher lactation with a cow brush present.

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For further information contact:
Dr. Ragan Adams, Editor
ILM, CSU-VTH
300 W. Drake Road
Fort Collins, CO 80523
970-297-0371
radams@lamar.colostate.edu