The Why And How Of Robotic Slat Cleaners

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Why Use Robotic Slat Cleaners

It is important to keep cow alleys clean and dry to improve foot health and also to keep cow stalls clean as cows will drag manure from dirty alleys onto their free stall bed which can result in poor udder health. This is true whether the floors are solid or slatted.

Automatic alley scrapers are effective in pushing manure through slats, but they still involve cables, or shuttle arms that need to be maintained and corner wheels or other drive mechanisms that need to be installed outside of the cow area so not to be a hazard to cow traffic, adding to the size of the barn. There is still the problem with automatic alley scrapers that they can not remove manure from cross-overs and holding areas, so in a slatted floor barn these areas have to be manually scraped to keep clean.

Robotic slat cleaners address these issues. They do not require cables or drive wheels and they can deal with cross-overs and the large open areas that have become common adjacent to robotic milking units. They can be programmed to scrape the areas in the barn where manure builds up quicker, such as next to the free stall curb, more frequently than other areas of the barn. This keeps the slats and consequently the cows cleaner.

Robotic slat cleaners are not intrusive. They do their job quietly and have little effect on cow behaviour. If they encounter a cow lying in the alley or other obstacle, they will either try to go around it or try several times to push it out of the way. If the cow or obstacle still will not move the robotic cleaner will shut down and wait for the producer to take action.

There are two types of robotic slat cleaners used at present in Ontario the JOZ-tech and the Lely Discovery. A third is presently available in Europe manufactured by Royal De Boer.

Introduction of Trial

A trial was conducted in a robotic milking barn which used the Lely Discovery robotic slat cleaners. The robotic slat cleaner was shut off for 24 hours and the goal was to measure the build up of manure in the alleys when the scraper was shut off, and more importantly what effect the build-up of manure in the alleys had on the manure that was transferred to the stall beds from the cows hooves.

Materials and Methods

A method of determining the amount of manure on the stall bed was used were a 1m x 1m (39 in x 39 in) square divided into a 10 x 10 grid was placed on top of the stall bed, centered under a stall partition and the squares containing any signs of manure were totalled. A second 1m x 1m (39 in x 39 in) grid was placed on the slatted floor next to the free stall curb, also centered on a partition. The manure within the square was collected and weighed. Data from four locations in one of the four interior rows was collected and averaged at each collection time.

Time lapse video photography was used to monitor cow behaviour before the Discovery was shut off; during the period when it was shut off; and following the period when it was shut off.
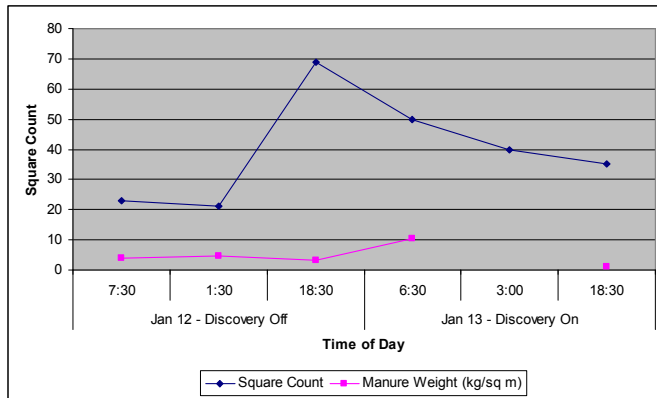

Figure 1. Number of Squares Containing Manure on Stall Platform and Weight of Manure on Slatted Floor (kg/m^2).

Results

The data collection started at 7:30 on January 12th and ended at 18:30 on the following day. Results from the data collection are shown in Figure 1.

Observations and Discussion

Although trends could be observed in the barn during the data collection, there were insufficient samples to establish these trends statistically. The one exception was the evening sampling with the robotic slat cleaner off and then the next day after the robotic slat cleaner was operating again. The squares containing manure with the cleaner off were double what they were with the cleaner on (69 cw. 35), seeming to indicate that the cows were indeed dragging more manure into their stall bed.

Stalls were maintained twice a day, early in the morning at about 7:00, and late in the evening at about 21:00. This explains why the accumulation in manure on the stall surface did not continue to increase after the 18:30 sampling, and as the cows were quieter over night the stall surface was still cleaner in the morning at 6:30 even though the amount of manure in the alley had increased significantly.

The manure build-up in the alleys was quite noticeable after 24 hours, and this build-up would only continue to increase. However with only four samples this didn't always show on the data.

The time lapse video photography showed that the cows paid little attention to the robotic slat cleaner, unless it stopped for some reason. It then seemed to become a matter of great concern. When the robotic slat cleaner was turned on it did an excellent job of keeping the slats clean.

Conclusions

Manure builds up on alleys especially next to the free stall curb when it is not pushed through by a scraper. Eventually a build-up of manure on the slatted floor will lead to increased contamination of the stall beds from cows dragging manure into the stalls with their feet and with their tails.

Summary

Robotic slat cleaners are an effective way of keeping slatted floors clean by pushing the manure down through the slats. They cause little disturbance to the cows normal behaviour. They can be programmed to clean the areas of high manure production, such as at the stall curb frequently. They can also be programmed to clean cross-overs and holding areas. They result in fewer obstructions on the slats compared to automatic alley scrapers.