Cow comfort is widely recognized as an important factor in determining milk production. Freestall management, and bedding levels in particular, can have a significant effect on the comfort of cows as well as freestall associated lying behavior. Dairy cows housed in barns with freestalls normally spend between 8 and 16 hours per day lying in stalls. Research has demonstrated that blood flow to the mammary gland increases around 25% when cows are lying down as opposed to standing (2). This increase in blood flow to the mammary gland provides precursors for the synthesis of milk components in the gland. More time spent lying down also can lead to greater cud chewing and decreased lameness.

In a series of three experiments, Drissler and coworkers at the University of British Columbia in Canada examined changes in freestall bedding parameters over time as well as associated changes in cow behavior (1). Their findings suggest that keeping bedding level with the freestall curb can increase the amount of time cows spend lying down, with benefits also possible for cow comfort and milk production.

First experiment
In the first experiment, freshly filled and leveled sand bedded freestalls were measured over 10 days for depth and shape of the sand bedding relative to the top of the curb (Table 1). The distance from the top of the curb to the sand bedding increased each day with the greatest daily loss of sand occurring the day after stalls were filled. The surface of the stall beds became concave in shape and was higher towards the edges of the stalls. Stalls with higher occupancy times tended to have greater loss in sand depth. This may have been due to cows dragging or digging sand out of stalls as they used them more frequently.

Second experiment
For the second experiment, stalls were filled and maintained to a depth and shape corresponding to those recorded on days 0, 3, 6, and 9 of Experiment 1 (Table 2). Each treatment was applied for a 2-day period with stall sand bedding depth and shape maintained at treatment specifications by twice daily grooming. Use of stalls by cows was recorded for each treatment and compared below.

Cows spent 1.1 fewer hours per day lying in freestalls when the level of the sand surface was 2.4 inches below the curb versus stalls that were filled with sand to a level that was even with the curb. The number of lying bouts did not differ between treatments but duration of lying bouts decreased as the distance from the top of the curb to the sand surface increased (Table 2). It was further noted that for each 1 inch
decrease in sand level below curb height cows spent 28 fewer minutes lying in freestalls.

**Third experiment**

In the third experiment, sand levels were maintained at a depth of 0.0, 2.4, 3.9 and 5.4 inches below the top of the curb. The distance to the sand surface below the curb height was maintained and the sand bedding was kept level during the experiment. Each treatment was imposed on the freestalls for a period of 2 days during which sand level below the curb was maintained and stalls were leveled by twice daily raking.

Cows spent 2.3 fewer hours per day lying in freestalls when the level of sand was 5.4 inches below the curb height than they did in stalls that were filled with sand even with the top of the curb. The number of lying bouts in Experiment 3 did not differ between treatments. Duration of lying bouts decreased as the distance from the top of the curb to the sand surface increased. Cows spent 25 fewer minutes lying down in freestalls for each 1 inch increase in distance from sand surface to top of curb.

**Conclusion**

This series of experiments identified specifically how sand levels in freestalls decrease over time and by use. In addition, experiments 2 and 3 demonstrated that cows spent less time lying in freestalls as the distance between the top of the curb and the sand surface increased. The authors speculate that decreased lying time may be indicative of cow discomfort associated with freestall bedding levels. A reduction in lying time of 2.3 hours per day out of an expected range of 8 to 16 hours per day may be indicative of suboptimal cow comfort. The observed 2.3 hour reduction in lying time per day resulted from an increase in distance between the top of the curb and the sand surface of only 5.4 inches. It may be beneficial to take a closer look at the levels of bedding in your dairy’s freestalls to ensure routine maintenance of sand freestall beds.

**References**
