

Free stall design affects stall usage

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The objective of this study was to evaluate effect of free stall design on stall usage in Norwegian dairy herds. In 232 Norwegian free stalled dairy herds, trained observers recorded number of lying, standing, eating and milking cows every tenth minute in total four times starting one hour after morning feeding (milking cows is only for herds with automatic milking systems). Stall Use Index (SUI) was calculated as cows lying divided by total number of cows except of eating and milking cows. Mean overall SUI for all herds was 0.64 (SD 0.16) ranging from 0.08 – 0.94. Mean stall base length against wall was 239.9 cm and as double row 224.0 cm. Width measured inside the dividers was in average 113.7 cm. Neck rail height for all herds was in average 106.8 cm and mean diagonal distance from rear curb to neck rail was 191.7 cm. Rear curb height for all herds was in average 23.6 cm. Softness of stall base was classified into following groups; 1: wood and concrete, 2: compact rubber mats and stud mats, 3: soft mats and mattresses. Four herds were excluded from the dataset because of problems with delayed morning milking, calving or veterinary treatments in the herds. The correlation between SUI and each of the design parameters stall base length (wall and double row), neck rail height, diagonal neck rail distance, height of rear curb, stall base softness and also locomotion was calculated. There were found significant correlations between SUI and thickness of mat/ mattress (corr.: 0.241, $p < 0.001$), stall base length against wall (corr.: 0.191, $p < 0.01$) and the height of rear curb (corr.: 0.133, $p < 0.05$). There were nearly a significant correlation between SUI and locomotion ($p = 0.06$) and a small tendency to correlation between SUI and stall base length placed as double row ($p = 0.11$). There were found no correlations between SUI and position of neck rail (height and diagonal distance to rear curb), width of stall or stall surface type.

In this study we found that length of stall base, the height of rear curb and the thickness of mats/ mattresses is important factors to consider when designing free stalls, and that the position of neck rail does not influence the stall use index one hour after morning feeding when the cows are highly motivated to lie down. It is still an open question how relevant the SU index is as a tool for assessing stall usage or stall comfort under field conditions, and it is necessary to validate the index before it could be widely used.