



RESEARCH REPORTS



Free-stall Dimensions Right For Your Cows

Cassandra Tucker and Dan Weary

Producers are faced with a wide range of recommendations when installing new housing facilities or renovating an existing barn. In previous Research Reports, we have discussed the effects of providing a comfortable environment for dairy cattle to lie down and have reported information concerning the choice of bedding. In addition to the lying surface, the configuration of the free stall can affect cow comfort and stall cleanliness.

Unfortunately, there has been very little scientific research on free-stall design and dimensions, and the existing recommendations to producers are highly variable. For example, one recent producer-oriented article suggested that stalls for adult Holsteins should be between 47" – 51" wide and 8'4" – 8'10" long, but another recent article recommended a width of only 44" and a length of 7'3".

In this report we describe some of our latest research at the UBC Dairy Centre that will provide a scientific basis to such recommendations, by testing how various free stall dimensions affect both cow comfort and stall cleanliness. In one experiment we looked at both free-stall length and width, and compared some of the recommendations described above. Cow behaviour was video recorded 24 hours per day using 'time-lapse' recorders developed for the security industry. Cows were tested with four types of stalls:

- 1) 44" wide, 7'6" long (NS; Narrow Short),
- 2) 44" wide, 9' long (NL: Narrow Long),
- 3) 52" wide, 7'6" long (WS: Wide Short), and
- 4) 52" wide 9' long (WL: Wide Long).

Cows spent an additional 1.5 hours per day lying down in the two wide stalls compared to the narrow ones. In addition, both length and width affected the amount of time spent standing with only the front hooves in the stall (standing half-in-half-out – see photo). We found animals with access to the largest stall (52" wide, 9' long) spent 2 hours per day standing half-in-half-out, while animals with access to the smallest stall (44" wide, 7'6" long) spent nearly 3 hours standing in this position (see Figure 1).



Standing half-in-half-out of the stall, like the cow in this photo, can be an indication of problems with the stall design

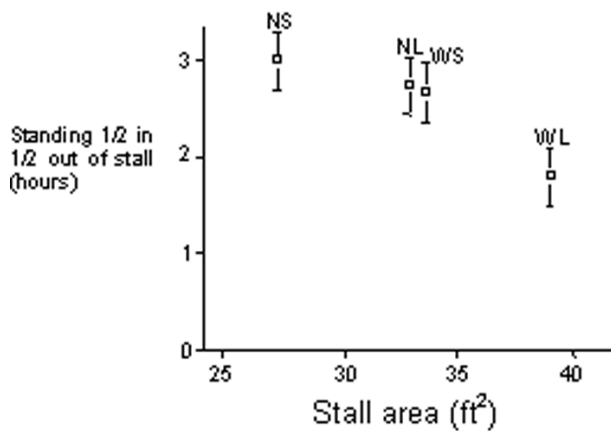


Figure 1.
Cows spend more time standing half-in-half-out of stalls as the total area available decreases.

In a second experiment, we compared three free-stall widths: 41.5", 45.5", 49.5". As in the first experiment, we found that cows spent more time lying down in the wider stalls (Figure 2), and less time standing half-in-half-out.

Thus providing wider stalls increases lying time and reduces the time cows spend standing half-in-half-out. Prolonged standing in this way may be a sign of discomfort, and has negative health consequences for the animals. While standing with the back hooves in the alley, the hooves are exposed to moisture and fecal material that can increase the risk of hoof health problems like digital dermatitis and sole lesions. Lying down is also important for cow health. Reducing lying time results in physiological changes, such as reduced secretion of growth hormone and an increase in the stress hormone cortisol. In addition, cows that spend less time lying down spend more time standing outside of the stall, and increased standing time on concrete floors increases lameness.

In the second experiment we also measured stall cleanliness by collecting and weighing the fecal material in the stalls. We found that the wider stalls contained more fecal material, but this was simply because cows spent more time in these stalls. Thus some poorly designed stalls will stay relatively clean because cows are less likely to use them. In other experiments we have tested the effect of neck rail placement, a feature of stall design that can help improve stall cleanliness without reducing lying time. We will describe our findings from these experiments in a future Research Reports.

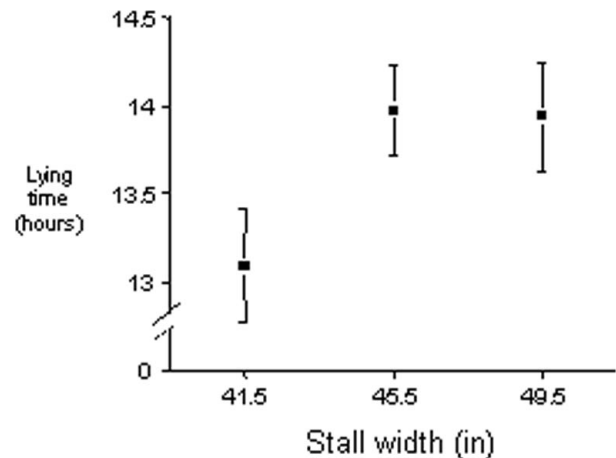


Figure 2.
Cows spend more time lying down in wider stalls.

This article is based on thesis research of Ph.D. student Cassandra Tucker. Dan Weary is an Associate Professor in the Animal Welfare Program and can be reached at danweary@interchange.ubc.ca

Thanks to DFC, BCDF, Westgen and many others in the dairy industry for their support of this research. Supporters are listed at www.agsci.ubc.ca/animalwelfare.