

# Expanding the Dairy: Barn Design

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## Four Tough Decisions in A New Dairy Facility

*The first tough decision is whether to use sand bedding or mattresses in free stalls.*

When **sand** is used as a bedding, with a four inch minimum, it can be both a base and bedding. Sand provides great cow comfort, drains well, and helps keep cows very clean. Sand will not support bacterial growth. In addition when a cow steps out of the stall and kicks sand onto the alleys, it improves cow footing. Sand is the **GOLD STANDARD** for cow comfort. The major problem with sand bedding is sand in the manure systems. As much as 35 to 70 pounds per cow per day can be added to the manure. When the sand settles out in the manure system this can be a major problem. The only sound advice for sand laden manure is to plan on sand settling and to then be able to remove it from the manure system.

**Mattresses** can provide a satisfactory stall and adequate cushioning. A mattress can be filled with a variety of materials: sawdust, shavings, straw, hay, or ground rubber. The mattress, when properly filled, only provides cushioning. A dairy farmer still needs to add adequate amounts of dry bedding on top of the mattress to help keep the surface dry and to reduce friction on the hocks. Mattresses are easily the second best thing that can be used for a free stall surface, and they may be the best choice for a manure system that cannot handle sand laden manure. All other free stall surfaces do not come close to providing both the comfort and cleanliness of sand or mattresses.

Remember, the goal is to have every cow lie down as soon as possible after maximally filling her rumen. There are two papers from Europe, both showing an increase in blood flow to the udder of a lying cow versus a standing cow. One showed approximately a 20% increase, the other showed almost a 50% increase. The conclusion is simple; cow comfort equals increased performance.

*The second tough decision is whether or not to insulate the free stall barn roof.*

Insulating the roof probably began because of poorly ventilated barns that dairy farmers tried to keep too warm in the winter. When trying to keep warmer than 5 to 10 degrees above the outside temperatures, condensation occurs with dripping. Rather than providing more ventilation and lowering the temperature inside the barn, farmers put insulation under the roof. Insulation may stop the condensation, but it ignores the problem - poor ventilation. Insulation is sometimes added under the pretense that it will provide cooler summer temperatures. This ignores the fact that insulation will, in summer or winter, hold in the heat produced by the cow herself. The answer to condensation and moisture is not insulation, but more ventilation. When a building starts dripping, it is time to open it up more. Today's new naturally ventilated free stall barns should be simply a sunshade in the summer and a wind break in the winter. The cold, naturally ventilated free stall barn should have: no insulation, an open ridge and sides, and end walls and sidewalls that can be opened completely.

*The third tough decision is which barn to build, a four row or a six row free stall barn.*

A four row free stall barn is the best choice for dairy herd performance. A four row barn has four rows of stalls in any cross sectional area. A four row barn provides approximately two feet of manger space per cow. The width of a four row barn is approximately 90-92 feet with a 12 foot high side wall.

The major advantage of a six row barn is in a lower building cost per stall. Some disadvantages of a six row barn include the following: limited manger space of approximately 1.5 feet per cow, not the recommended 2 feet per cow. Also, by adding an additional row of free stalls to the outside of the building, a 100 cow barn will increase to a 150 cow barn, thus adding 50% more cows

and reducing the effective ventilation by 50%! With the increased width, the extra cows inside the building, and the reduced ventilation, summer heat can increase on the "lee" side of the building by 8 to 15 degrees.

A six row free stall barn has a life expectancy of 20 to 25 years. With the rolling herd average ever increasing, the combination of reduced manger space, increased summer temperatures and reduced ventilation per cow, make the six row barn a poor choice for optimal dairy herd performance.

*The fourth tough decision in a new dairy facility is whether to place the free stalls "nose to nose" or "tail to tail".*

This choice is probably the toughest simply because it has the least effect on profitability and performance. When choosing between orienting the stalls, either nose to nose or tail to tail, the choice is one mostly made on how important it is to be able to have cows locked away from using the stalls. If forcing the animals away from using the stalls is an important management goal, then choosing tail to tail is the right choice.

Another advantage of tail to tail is the alley between the stalls is both farther away from the outside wall and 100% of the cows have to use that alley, making it less likely to freeze quickly.

Tail to tail free stalls make orienting the barn east to west the best way. If the tail to tail barn is north to south, then the outside stalls are subject to too much sun in the early morning and late afternoon. The extra

sunshine will discourage stall usage in warmer weather. Tail to tail also has the advantage in that a few extra stalls will fit in the same size building versus a nose to nose arrangement.

Some of the advantages of nose to nose includes, only 50% of the cows of a group have to walk to the back row, the building can be oriented north and south or east to west, and cows can share lunge space. Most builders find that nose to nose is cheaper to build than tail to tail. Also, sunshine or rain that is blown into the building goes harmlessly on the cow alley, instead of into a stall. The fresh air entering the open sidewalls will evaporate the water in the alley quickly, providing cooling and drying.

Nose to nose may have a disadvantage with cow behavior in that some cows will not use a stall across from a dominant cow. Also, if the stalls are shorter than 7.5 feet, the shared lunge space will increase and stall usage may decline in the summer because of sharing airspace, but if the total length is 15 feet or greater, this is not seen as a problem.

**All in all, the orientation of the stalls is the least performance issue of these four tough decisions. As I see these problems, mattresses versus sand is a comfort issue. A four row barn versus a six row barn is a performance issue. Insulation versus no insulation is a ventilation issue, and head to head versus tail to tail is a management issue.**

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## Abstract

### Virulence and genotype of a bovine herpesvirus 1 isolate from semen of a subclinically infected bull

**J. T. van Oirschot, F. A. M. Rijsewijk, P. J. Straver, R. C. Ruuls, J. Quak, A. Davidse, F. Westenbrink, A. L. J. Gielkens, J. E. van Dijk, A. Moerman**  
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A bovine herpesvirus 1 (BHV-1) isolate from the semen of a subclinically infected bull was administered to cattle by various routes to assess its virulence. Cattle that were artificially inseminated or inoculated intrapreputially did not develop clinical signs, but did transmit the virus to contact cattle. However, the isolate

induced severe signs of rhinotracheitis and vulvovaginitis in cattle that were inoculated by the intravaginal, intranasal or intravenous routes, but did not infect the fetus. The isolate was therefore not of low virulence. Analysis with DNA restriction enzymes could not assign the isolate to either the BHV-1.1 or BHV-1.2 genotype.