

Cubicle construction for healthy, injury free cows

The importance of achieving good lying times:

Cows should lie down for 12-14 hours per day. They do this at grass and straw yards, but rarely in all but the very best cubicles.

There are many factors which determine whether a cow lies for the right length of time in a cubicle: her ability to enter the stall freely, lie down without obstruction, be comfortable when lying, in a normal position with the ability to easily regurgitate and chew her cud, to get up easily without obstruction and with good grip; and lastly to leave the cubicle easily without fear or obstruction.

It is a rare cubicle which provides all of these freedoms, yet with a little understanding of the processes and principles of lying, many present cubicles can be modified to achieve significant improvements.

Research shows that for every extra hour lying time (up to 12-14 hours) cows will produce 1 litre more milk per day, for the same inputs. This is largely due to better blood flow to the udder in a lying cow (the heart is level with the udder, compared with a standing cow). In addition, comfy beds promote better rumination, and reduce lameness (sole bruising, sole ulcers) due to less pressure on the feet. It is very common for lying times to be 9 hours (or less) in cubicles: this equates to 3-5 litres lost milk/cow/day!

The six freedoms of the cubicle/ resting place:

It is like your own bed.....you like it clean, dry and soft with enough space to lie down easily and get up again!

Cows want 14 hours lying with no stress: pasture is the best option, and straw or sand yards are the best housed option. Cows around calving (3 weeks before until 3 weeks after) should be provided the extra freedoms provided by a loose housed straw bed (stress free calving line).

For cubicle housing, take care of the next 6 points in order of importance. The dimensions are based on a typical 700kg Holstein cow.

1: Soft, grippy bed surface

Softness prevents front knee and hock damage, and is more comfortable. Good grip prevents slipping and sliding, backbone and hock damage, and helps cows get up smoothly with confidence.

Sand, deep straw or deep sawdust (15-30cm) is best. A very soft rubber mattress with a minimum of 5-10cm foam under-layer is a reasonable, but second best, alternative. Providing a soft, deep bed will improve lying times in

even the poorest cubicles. Conversely, big, spacey cubicles will fail if there is not a soft, grippy bed surface. Good ventilation and 2-3 times a day cleaning and/or filling with fresh bedding will prevent manure and milk remnants to cause high cell counts and mastitis.

2: Free head swing space (bob space):

Provide free head swing space up to 3.25-3.5m from the back of the kerb, and at least 1 metre high free space from the bedding surface. This is essential to allow easy lying down and (especially) getting up. To prevent cows walking through the front of the stall, use a flexible band at 1-1.15m off the ground. The cow will be able to lie with her head straight forward and up. She will be able to stretch her neck to regurgitate her cuds. When she gets up and down, she can lunge forwards to use her head as a counter-balance for her back end. This will allow a softer landing and easier rising. The cow will lay down straight and so you will see less backbone damage and less manure in the corners of the cubicle. Head space provided to the sides of cubicles is a VERY BAD alternative, causing hock, back and teat damage.

To achieve forwards head space in your current cubicles, you may need to remove walls or any other obstruction at the front of the cubicles. It is surprising how often this can be done, without a new build!

3: Ensure the neck rail is out of the way:

A flexible neck band or chain with a rubber cover is ideal. A hard metal rail is only ever needed for cubicle stability – if your divisions do not need this, change it! Unfortunately, in 95% of western European dairy farms, the position of the neck rail is very bad.

The neck rail should be 125cm (MINIMUM) above lying surface and 180cm (MINIMUM) from the kerb (horizontal measurement).

With a flexible neck band or chain with a spring on the end (available at Zimmermann cattle stalls) cows stand in the cubicle more straight. They don't hurt themselves while standing up or lying down. Less fear will mean the cows muck less in their beds. Start with the maximum size based on the biggest cows: a flexible system should be easy to adjust to create the optimum compromise between cow positioning (bed cleanliness) and cow comfort. If less than 10% of beds are mucked on, you have the neck rail too far back! Heifers need less space than cows.

4: Have a low brisket locator with enough lying surface behind:

A brisket locator 6-10 cm high is OK. The top part should be rounded. The length of bed behind it should be at least 185 cm; 195cm is needed for bigger cows. Cows do like space!

Cows need a brisket locator to direct her where to lie down, and then she can stand up without hitting the neck rail. She will prefer a low, rounded brisket

locator so she can stretch one of her front legs over it (80% of cows will choose to lie with their bottom front leg out-stretched if given the option). It also makes it easy to step over it when she stands up – again, this is the normal motion of a rising cow, and is an essential move to get her front end up. Cows will shit less in the beds because of less stress. Rounded wood or plastic pipes do an excellent job. Iron is too hard and cold. 6" planks which act as strength for cantilever cubicles are very bad. With deep straw or sand beds, 25 cm x 6 cm wooden planks with a rounded top can be used as long as only 10 cm max is raised above the bed surface.

5: Have the right width of the cubicles:

A minimum width of 122 cm (cubicle dividers centre to centre) is OK for deep bedding cubicles. For mattresses, we advise 125 cm width. Dry cows need 135 cm (they are wider cows!). Heifers can manage with 120 cm. In a spacey cubicle, there is less hock, backbone, rib and teat trauma. Cows will have greater rest time, more feed intake and give more milk.

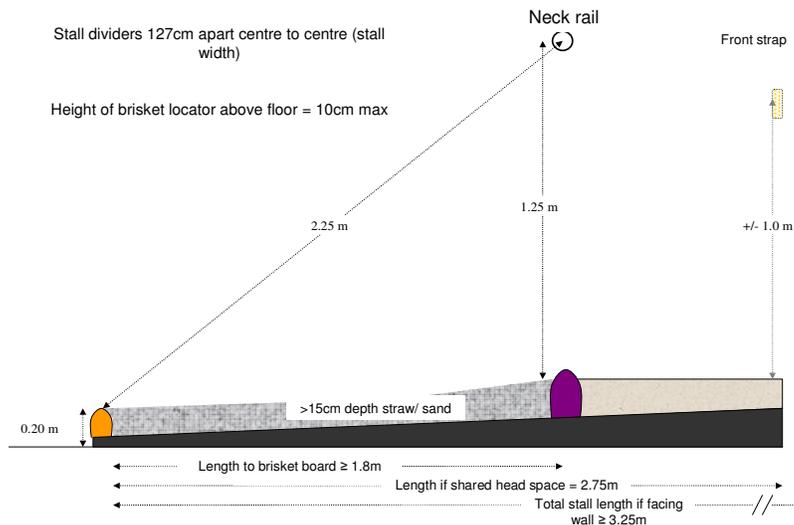
6: Shape of the divider:

If points 1 to 5 are OK, arguably the type of divider does not matter. If the cubicle is too narrow (or too short so cows are lying at an angle), the shape of the divider can greatly influence the amount of backbone, pin bone and rib damage: shiny metal on dividers indicates where the cow is rubbing, and always means damage to the cow.

The divider should be high enough not to bother the legs and low enough not to bother the backbone.

Some systems use a plank of wood (rounded top, 8 cm high) on the back 1 metre of cubicle to keep bedding in place and help cows lie more straight.

Cubicle dimension guide for a 700 kg Holstein cow:



Having the confidence to make the changes:

The best judges of cubicles are the cows! Please adapt 10-20 cubicles in your current shed, using this guide and the drawing shown, and see the difference.

The dimensions on the drawing are based on a 700 kg Holstein Friesian.

Remember, lying surface is the most important thing. Replacing old cubicles with shiny new ones will not improve cow comfort or lying times if the basics aren't right. Often, cubicle comfort is sacrificed for cubicle hygiene. The cleanest cubicle is the one which is never used!

Our principle works on the basis that stressed cows will shit more on their beds: you see this when they get up. If cows get up and down easier, they shit less on the beds. However, we also use the rule of thumb that if less than 10% of beds have muck on the back of them, the cubicles are likely to be too short. Keeping beds clean should be a part of the daily dairy farming routine! 2-3 x/day bed cleaning is recommended.

Finally, remember the other factors which can reduce lying times: too much time in collection yard/ being milked; heat stress; competition for cubicles (over-stocking) and time in holding pens/ lock-ups.

The following websites also give cubicle dimensions, based on different size cows. Measure your biggest cows to find out what you should be building for.

From Ontario Ministry of Agriculture and Forestry (by Neil Anderson):

Free stall behaviour:

http://www.gov.on.ca/OMAFRA/english/livestock/dairy/facts/info_cowbehave.htm

Free stall (cubicle) sizes:

http://www.gov.on.ca/OMAFRA/english/livestock/dairy/facts/info_fsdimen.htm

Tie Stalls:

<http://www.gov.on.ca/OMAFRA/english/engineer/facts/99-003.htm>

From Nigel Cook, Wisconsin:

Dimensions and design tips for freestalls:

http://www.vetmed.wisc.edu/dms/fapm/fapmtools/5house/Dimensions_and_Design_Tips_for_Freestalls.pdf

From Nick Bell, Bristol University:

<http://www.cattle-lameness.org.uk/Housing.php>