

## **Dealing with Slopes Steps are the answer! Neil Chesterton**

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A big problem on many dairy farms is slopes. We often build the milking yards and dairy high enough up to get drainage for the water but end up with steep slopes in the entrances and exits. Sometimes we can't avoid having slopes due to the terrain or if there is an underpass or tunnel under a road.

Cows like the level, but can manage some incline. Cows will tolerate going up at 20% as long as it is not slippery. Often cow tracks in New Zealand may be 20% slope with not too much problem apart from poor cow flow. However, at entrances and exits anything much more than 10% creates problems, and the steeper the incline the more the problems.

### Problems:

- slow cow flow – this often causes the stockperson to put pressure on cows to speed up.
- Feet slipping, especially when the weather is damp and the steep surfaces are covered with cow dung.
- Injury to feet due to slipping and extra forces on the foot in pushing and shoving if there is any pressure put on them by the herdsman.
- Other injuries from falling over, including dislocated hips.

### Solutions:

- Allow cows lots of time to go up and down slopes at their own speed
- Surfaces may be roughened with a "scabber" to remove the top 1 to 2mm concrete to prevent slipping and give better grip for the feet if the slope is up to 10%.
- If the slope in the entrance or exit is steeper than about 10%, the surface may need to be corrugated across the slope. Stamping ruts across the concrete just before it sets works fairly well up to 15% slope.
- I have looked at lots of underpasses and when you get much more than 15% gradient you can have real problems, even with fairly rough corrugations in the concrete, if the cow faeces dry on the surface. If a cow urinates on the dry faeces or if you get light rain, the surface becomes very slippery. In this situation (slopes greater than 15%) I recommend steps.

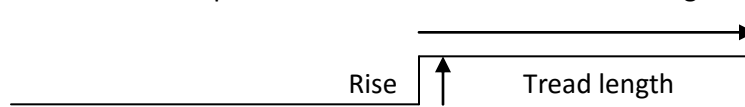
Steps - The best solution for all slopes around the milking parlour.

- Cows prefer steps to slopes
- The feet are on the level and feel much safer, both walking up and walking down.
- Cow flow will speed up – almost as though there is no slope.

If you are building a new facility I would always build steps in preference to a slope. If there was any slope, a step or steps make it much more "cow safe" for the exiting cows. For slopes of more than 10% at entrances to the milking yard, steps are the best. Steps are also the perfect answer for both stepping down or up between two levels where you have limited space. For underpasses I also recommend steps be considered if the slope is close to 15% and always if the slope is approaching 20%.

## Designing and building steps:

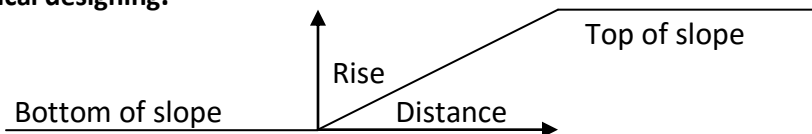
Cows prefer shallow steps and will walk better both up and down steps that have a shorter rise. If there needs to be a compromise choose more steps with lower rise and shorter tread length.



Ideal rise – 100 mm - 150 mm. Steps are best to be less than 150 mm. 100 mm are very cow friendly, so it is better to be 100mm high and shorter horizontal, than long horizontal with high rises. Note, however, that if the cows only have to go UP the steps then 150mm (6 inches) is ok. If the cows ever have to go DOWN the steps then I recommend a rise of 100mm (4 inches) maximum.

Ideal tread length - A step tread length of 1600mm would allow the cow to have all four feet on the step before the next step up or down and so some might advise steps should be 1600mm long. However, you can only do this where there is plenty of space. My observations are that with 800mm steps cows flow very well. Cows prefer two steps of half the length if it means a lower rise. So for example if you had a 10% rise in a short distance I would choose steps of 1000mm long and 100mm rises rather than 1500mm and 150mm rises. I know of one farm where we couldn't make the step length more than 300mm and it still worked so much better than the slope without steps.

## Practical designing.



Measure your total rise. Divide by 100 mm – this will give you the number of steps.

Divide the distance by this and you will find the length for each step. Make the steps of even length. So for example let's design steps for an underpass where the track is 4 metres below the road surface and the cow yard is only 20 metres from the road. First we would decide on 40 steps (4 metres divided by 100mm = 40 steps). Then we would calculate the step tread length to be only 500mm (20 metres divided by 40 = 500mm)

Always make the steps flat / level. Never put a slope on the tread of a step. The cow must step down onto a level step or she will slip or feel unsafe.

